



PROJECT ID: PV467-CRG

**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 1 OF 3

BID BOOKLET

FOR FURNISHING ALL LABOR AND MATERIALS
NECESSARY AND REQUIRED FOR:

**Manhattan Class Company Theater
Fit Out**

**LOCATION:
BOROUGH:
CITY OF NEW YORK**

**515 West 52nd Street
Manhattan 10019**

**CONTRACT NO. 1
CONTRACT NO. 2
CONTRACT NO. 3
CONTRACT NO. 4**

**GENERAL CONSTRUCTION WORK
PLUMBING WORK
HVAC + FIRE PROTECTION WORK
ELECTRICAL WORK**

Department of Cultural Affairs

Andrew Berman Architects



Date: December 30, 2014

5-108

February 19, 2016

CERTIFIED MAIL - RETURN RECEIPT REQUEST

SAJIUN ELECTRIC INC.
105 West 27th Street
New York, NY 10001

RE: FMS ID: PV467-CRG
E-PIN: 85015B0012001
DDC PIN: 8502015PV0004C
Manhattan Class Company Theater Fit Out
- Electrical Work - Borough of Manhattan
NOTICE OF AWARD

Dear Contractor:

You are hereby awarded the above referenced contract based upon your bid in the amount of \$3,584,000.00 submitted at the bid opening on April 09, 2015. 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

#1

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: PV467-CRG

Manhattan Class Company Theater Fit Out
515 West 52nd Street
Manhattan 10019

Name of Bidder: SAJIUN ELECTRIC INC.

Date of Bid Opening: 4/9/15

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

Place of Business of Bidder: 109 WEST 26 ST, NY, NY, 10001

Bidder's Telephone Number: 212 675 2800 Bidder's Fax Number: 212 645 1647

Bidder's Email Address: OFFICE @ SAJIUN ELECTRIC .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 N.Y.

Name and Home Address of President: RICHARD SAJIUN
109 W 26 ST, NY, NY 10001

Name and Home Address of Secretary: SAME

Name and Home Address of Treasurer: SAME

14

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BID FORM

PROJECT ID: PV467-CRG
Contract #4 - Electrical Work

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

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

Total Price For Labor

Total Price for Material Sold and Delivered

\$ 2,525,234 +

\$ 1,009,730

Total Price for Item A = \$ 3,534,964

B. ALLOWANCE for Incidental Asbestos Abatement (Section 260013 of the Specifications)

\$5,000.00

C. AMOUNT for Proprietary Items (from page 2a)

\$44,036.00

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

\$ 3,584,000.00
BB 9/9/15

BIDDER'S SIGNATURE AND AFFIDAVIT

Bidder: SASIAN ELECTRIC INC.

By: [Signature]
(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:

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:

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

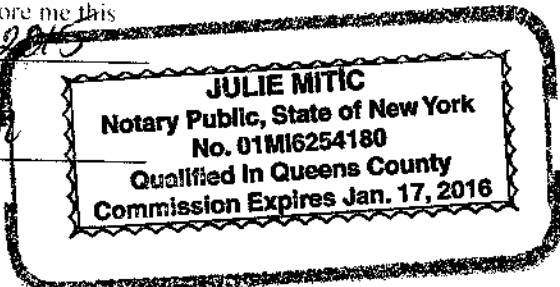
STATE OF NEW YORK, COUNTY OF N.Y. ss:

I am the PRESIDENT of the above named corporation whose name is subscribed to and which executed the foregoing bid. I reside at 101 W 26 ST NY, NY 10001
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 3rd APRIL 2015

Julie Mitic
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 _____

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

Full Name of Bidder: SATIUN ELECTRIC INC.
Address: 109 WEST 26 ST.
City: NY State: NY Zip Code: 10001

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

13 254 6221

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.



NEW YORK CITY DEPARTMENT OF CONSTRUCTION

DESIGN 8

Project: Manhattan Class Company Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder: Sallun Electric Inc

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 4 - ELECTRICAL WORK

DDC ID: PVA67-CRG
Sponsor Agency: Department of Cultural Affairs

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 4 - ELECTRICAL WORK								
26 0000	ELECTRICAL							
26 0000	GENERAL PROVISIONS FOR ELECTRICAL							
	Mobilization	1	LS		0.00	110,000.00	110,000.00	110,000.00
	Short Circuit/Coordination Study	1	LS	3,000.00	3,000.00	1,500.00	1,500.00	4,500.00
	Temp Power and Lighting	38,000	SF	0.50	19,000.00	0.70	26,600.00	45,600.00
	Subtotal				22,000.00		138,100.00	160,100.00
26 0050	DEMOLITION AND REMOVALS FOR ELECTRICAL							
	Misc Demo	38,000	SF		0.00	1.00	38,000.00	38,000.00
	Subtotal				0.00		38,000.00	38,000.00
26 0500	BASIC MATERIALS FOR ELECTRICAL							
	Conductors and Cables							
	MC cable	2,000	LF	0.80	1,600.00	4.50	9,000.00	10,600.00
	#12 CU	38,000	LF	0.20	7,600.00	0.80	30,400.00	38,000.00
	#10 CU	70,000	LF	0.25	17,500.00	1.00	70,000.00	87,500.00
	#6 CU	8,000	LF	0.45	3,600.00	1.50	12,000.00	15,600.00
	#4 CU	300	LF	0.70	210.00	1.70	510.00	720.00
	#3/0 CU	3,000	LF	2.50	7,500.00	3.20	9,600.00	17,100.00
	#4/0 CU	0	LF		0.00		0.00	0.00
	350 Mcm CU	2,600	LF	6.50	16,900.00	4.00	10,400.00	27,300.00
	500 Mcm	2,900	LF	8.50	24,650.00	5.30	15,370.00	40,020.00
	400 Amp Term @ Ex Switch	4	EA	60.00	240.00	150.00	600.00	840.00
	Generator:							
	#12 Controls	1,000	LF	0.20	200.00	0.80	800.00	1,000.00
	#10 CU	2,000	LF	0.25	500.00	1.00	2,000.00	2,500.00
	#2 CU	8,000	LF	1.10	8,800.00	2.00	16,000.00	24,800.00
	#3/0 CU	500	LF	2.50	1,250.00	3.20	1,600.00	2,850.00
	600 Mcm	3,300	LF	10.50	34,650.00	5.70	18,810.00	53,460.00
	Hangers and Supports:							



NEW YORK CITY DEPARTMENT OF CONSTRUCTION

DESIGN 1

CONTRACTORS BID BREAKDOWN FORM

CONTRACT 4 - ELECTRICAL WORK

Project: Manhattan Class Company Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder: Salfun Electric Inc

DDC ID: PV487 - CRG
Sponsor Agency: Department of Cultural Affairs

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
	Hanger and Supports	1	LS	5,000.00	5,000.00	25,000.00	25,000.00	30,000.00
	Hanger and Supports - Generators	1	LS	1,000.00	1,000.00	5,000.00	5,000.00	6,000.00
	Raceways, Boxes and Fittings:							
	3/4" EMT CDT	31,000	LF	1.00	31,000.00	10.00	310,000.00	341,000.00
	1" EMT CDT	15,000	LF	1.50	22,500.00	12.00	180,000.00	202,500.00
	1 1/4" EMT CDT	1,100	LF	2.00	2,200.00	15.00	16,500.00	18,700.00
	2" EMT CDT	800	LF	2.50	2,000.00	20.00	16,000.00	18,000.00
	2 1/2" EMT CDT	40	LF	3.00	120.00	22.00	880.00	1,000.00
	3" EMT CDT	440	LF	4.00	1,760.00	28.00	12,320.00	14,080.00
	3 1/2" EMT CDT	700	LF	5.50	3,850.00	32.00	22,400.00	26,250.00
	Service Grounding Box	1	EA	1,000.00	1,000.00	900.00	900.00	1,900.00
	Bond to Bldg Steel	2	EA	50.00	100.00	200.00	400.00	500.00
	Generator:							
	3/4" EMT CDT	250	LF	1.00	250.00	10.00	2,500.00	2,750.00
	1" EMT CDT	500	LF	1.50	750.00	12.00	6,000.00	6,750.00
	1 1/4" EMT CDT	500	LF	2.00	1,000.00	15.00	7,500.00	8,500.00
	2" EMT CDT	250	LF	2.50	625.00	20.00	5,000.00	5,625.00
	4" EMT CDT	740	LF	6.00	4,440.00	40.00	29,600.00	34,040.00
	400 Amp Wireway	1	LS	300.00	300.00	900.00	900.00	1,200.00
	Wiring Devices:							
	Duplex Receptacles	170	EA	15.00	2,550.00	40.00	6,800.00	9,350.00
	Junction Boxes/Misc	500	EA	10.00	5,000.00	45.00	22,500.00	27,500.00
	Receptacles GFI	20	EA	25.00	500.00	45.00	900.00	1,400.00
	Receptacles GFI Quad	7	EA	50.00	350.00	90.00	630.00	980.00
	Receptacles Quad	80	EA	30.00	2,400.00	90.00	7,200.00	9,600.00
	W/P Sign Conn	1	EA	35.00	35.00	150.00	150.00	185.00
	6-Pilot Switch Bank	4	EA	100.00	400.00	450.00	1,800.00	2,200.00
	LV Transformer	12	EA	250.00	3,000.00	200.00	2,400.00	5,400.00
	Floor Power Outlet	7	EA	500.00	3,500.00	450.00	3,150.00	6,650.00
	TVSS:							
	Surge Protection Device	1	EA	1,500.00	1,500.00	600.00	600.00	2,100.00
	Subtotal				222,330.00		884,120.00	1,106,450.00



NEW YORK CITY DEPARTMENT OF
CONSTRUCTION DESIGN &

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 4 - ELECTRICAL WORK

Project: Manhattan Class Company Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder: Sailun Electric Inc

DDC ID: PV467-CRG
Sponsor Agency: Department of Cultural Affairs

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 0648	ELECTRICAL VIBRATION AND NOISE CONTROL							
	Vibration, Noise Control	1	LS	1,500.00	1,500.00	1,500.00	1,500.00	3,000.00
	Subtotal				1,500.00		1,500.00	3,000.00
26 0800	COMMISSIONING OF ELECTRICAL (INCLUDED W/ OTHER Division 26 sections)							
26 0943	ARCHITECTURAL DIMMING SYSTEMS							
	Switches	34	EA	15.00	510.00	40.00	1,360.00	1,870.00
	Dimmer Switches	27	EA	150.00	4,050.00	90.00	2,430.00	6,480.00
	Occupancy Sensor	36	EA	100.00	3,600.00	90.00	3,240.00	6,840.00
	OS Power Pack	30	EA	50.00	1,500.00	60.00	1,800.00	3,300.00
	Vacancy Sensor	1	EA	100.00	100.00	90.00	90.00	190.00
	24- Ckt Dimming Pnl	1	EA	5,000.00	5,000.00	1,500.00	1,500.00	6,500.00
	24- Zone Control Unit	1	EA	2,000.00	2,000.00	900.00	900.00	2,900.00
	4-Button Scene Selector	1	EA	400.00	400.00	600.00	600.00	1,000.00
	Time Clock	1	EA	750.00	750.00	600.00	600.00	1,350.00
	Subtotal				17,910.00		12,520.00	30,430.00
26 0962	BRANCH CIRCUIT TRANSFER SYSTEMS							
	Nema 1 Starter FBO	6	EA	0.00	0.00	600.00	3,600.00	3,600.00
	Nema 2 Starter FBO	4	EA	0.00	0.00	750.00	3,000.00	3,000.00
	Nema 3 Starter FBO	2	EA	0.00	0.00	900.00	1,800.00	1,800.00
	Subtotal				0.00		8,400.00	8,400.00
26 2212	COMPUTER-GRADE ISOLATION TRANSFORMERS							
	75 Kva Transformer	1	EA	10,000.00	10,000.00	3,000.00	3,000.00	13,000.00
	300 Kva Transformer, zig zag	1	EA	20,000.00	20,000.00	7,500.00	7,500.00	27,500.00
	Subtotal				30,000.00		10,500.00	40,500.00
26 2416	PANELBOARDS							
	100 Amp Panel Board	9	EA	2,000.00	18,000.00	1,800.00	16,200.00	34,200.00



NEW YORK CITY DEPARTMENT OF CONSTRUCTION

DESIGN &

Project: Manhattan Class Company Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder: Salfun Electric Inc

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 4 - ELECTRICAL WORK

DDC ID: PV457 - CRG
Sponsor Agency: Department of Cultural Affairs

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
	225 Amp Panel Board	3	EA	2,500.00	7,500.00	1,800.00	5,400.00	12,900.00
	400 Amp Panel Board	2	EA	3,500.00	7,000.00	3,150.00	6,300.00	13,300.00
	600 Amp Panel Board	1	EA	5,000.00	5,000.00	4,200.00	4,200.00	9,200.00
	800 Amp Distr Board	3	EA	8,000.00	24,000.00	6,000.00	18,000.00	42,000.00
	600 Amp Switch/CB in Ex Swbd	0	EA	0.00	0.00	0.00	0.00	0.00
	Generator:							
	100 Amp Switch/CD in Ex Swbd	1	EA	750.00	750.00	300.00	300.00	1,050.00
	400 Amp Switch/CD in Ex Swbd	1	EA	1,200.00	1,200.00	600.00	600.00	1,800.00
	Manual Snap Switch Starter, VAV	12	EA	150.00	1,800.00	200.00	2,400.00	4,200.00
	Overhead Door Controller FBO	14	EA	50.00	700.00	600.00	8,400.00	9,100.00
	20/2 Amp Disconnect	2	EA	75.00	150.00	300.00	600.00	750.00
	30 Amp Disconnect	2	EA	150.00	300.00	450.00	900.00	1,200.00
	60 Amp Disconnect	3	EA	250.00	750.00	600.00	1,800.00	2,550.00
	60 HP VFD FBO	2	EA	200.00	400.00	3,600.00	7,200.00	7,600.00
	400 Amp Encl Ckt Brkr @ Xfmr	0	EA		0.00		0.00	0.00
	800 Amp Disconnect @ Xfmr	1	EA	4,500.00	4,500.00	3,600.00	3,600.00	8,100.00
	400 Amp Fuse	3	EA	150.00	450.00	60.00	180.00	630.00
	60 Amp Company Switch	5	EA	30.00	150.00	450.00	2,250.00	2,400.00
	100 Amp Company Switch	1	EA	30.00	30.00	750.00	750.00	780.00
	200 Amp Company Switch	1	EA	30.00	30.00	1,050.00	1,050.00	1,080.00
	Subtotal:				72,710.00		80,130.00	152,840.00
26 3200	EMERGENCY POWER SYSTEM							
	Generator:							
	30 Amp Disconnect (block heater)	1	EA	150.00	150.00	300.00	300.00	450.00
	200 Amp Disconnect	2	EA	1,200.00	2,400.00	1,050.00	2,100.00	4,500.00
	400 Amp Encl Ckt Brkr	0	EA		0.00		0.00	0.00
	100 KW EM Generator WP/Sound Encl	1	LS	0.00	0.00	4,200.00	4,200.00	4,200.00
	EG Annunciator Panel	1	LS	3,500.00	3,500.00	1,200.00	1,200.00	4,700.00
	Rigging	1	LS	20,000.00	20,000.00	2,000.00	2,000.00	22,000.00
	Subtotal:				26,050.00		9,800.00	35,850.00



NEW YORK CITY DEPARTMENT OF
CONSTRUCTION DESIGN &

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 4 - ELECTRICAL WORK

Project: Manhattan Class Company Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder: Sajjun Electric Inc

DDC ID: PV467 - CRG

Sponsor Agency: Department of Cultural Affairs

CSI Number	Description	Quantity	Unit	Unit Cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost: Material and Labor
26 3623	AUTOMATIC TRANSFER SWITCH							
	Autotransfer Sw 100A	1	EA	3,500.00	3,500.00	900.00	900.00	4,400.00
	Autotransfer Sw 400A	1	EA	6,500.00	6,500.00	2,100.00	2,100.00	8,600.00
	Autotransfer Sw 600A	0	EA		0.00		0.00	0.00
	Subtotal				10,000.00		3,000.00	13,000.00
26 5000	SERVICE LIGHTING							
	Type B1, no spec	43	EA	70.00	3,010.00	150.00	6,450.00	9,460.00
	Type B1A, no spec	26	EA	270.00	7,020.00	150.00	3,900.00	10,920.00
	Type B4, no spec	10	EA	310.00	3,100.00	150.00	1,500.00	4,600.00
	Type B5, no spec	21	EA	410.00	8,610.00	300.00	6,300.00	14,910.00
	Type B6, no spec	15	EA	165.00	2,475.00	150.00	2,250.00	4,725.00
	Type B2, no spec	12	LF	20.00	240.00	40.00	480.00	720.00
	Type B2A Track, no spec	28	LF	20.00	560.00	40.00	1,120.00	1,680.00
	Type B3 Track Lt, no spec	15	EA	80.00	1,200.00	50.00	750.00	1,950.00
	Subtotal				26,215.00		22,750.00	48,965.00
26 5100	ARCHITECTURAL LIGHTING							
	Type L2	9	EA	380.00	3,420.00	150.00	1,350.00	4,770.00
	Type L2A 8'	6	EA	590.00	3,540.00	300.00	1,800.00	5,340.00
	Type L2B 8'	4	EA	790.00	3,160.00	300.00	1,200.00	4,360.00
	Type L2C 4'	5	EA	390.00	1,950.00	150.00	750.00	2,700.00
	Type L7	7	EA	320.00	2,240.00	150.00	1,050.00	3,290.00
	Type L8	25	EA	330.00	8,250.00	150.00	3,750.00	12,000.00
	Type L8A	11	EA	330.00	3,630.00	150.00	1,650.00	5,280.00
	Type L10	21	EA	320.00	6,720.00	200.00	4,200.00	10,920.00
	Type L11	6	EA	270.00	1,620.00	150.00	900.00	2,520.00
	Type L12	15	EA	430.00	6,450.00	150.00	2,250.00	8,700.00
	Type L12A	2	EA	330.00	660.00	150.00	300.00	960.00
	Type L12B	1	EA	330.00	330.00	150.00	150.00	480.00
	Type L12D	1	EA	530.00	530.00	150.00	150.00	680.00



NEW YORK CITY DEPARTMENT OF
CONSTRUCTION DESIGN &

Project: Manhattan Class Company Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder: Sajun Electric Inc

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 4 - ELECTRICAL WORK

DDC ID: PV467 - CRG
Sponsor Agency: Department of Cultural Affairs

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 L14		47	EA	430.00	20,210.00	150.00	7,050.00	27,260.00
Type L15		3	EA	1,150.00	3,450.00	150.00	450.00	3,900.00
Type L16		6	EA	530.00	3,180.00	180.00	1,080.00	4,260.00
Type L17		40	EA	120.00	4,800.00	150.00	6,000.00	10,800.00
Type L18		1	EA	380.00	380.00	150.00	150.00	530.00
Type L19		11	EA	580.00	6,380.00	150.00	1,650.00	8,030.00
Type L19A		1	EA	660.00	660.00	150.00	150.00	810.00
Type L20		3	EA	660.00	1,980.00	150.00	450.00	2,430.00
Type L20A		9	EA	660.00	5,940.00	150.00	1,350.00	7,290.00
Type L21		0	EA		0.00		0.00	0.00
Type L22		4	EA	730.00	2,920.00	150.00	600.00	3,520.00
Type L23		30	EA	290.00	8,700.00	150.00	4,500.00	13,200.00
Type L23A		18	EA	400.00	7,200.00	150.00	2,700.00	9,900.00
Type L24		15	EA	840.00	12,600.00	150.00	2,250.00	14,850.00
Type L25		2	EA	350.00	700.00	150.00	300.00	1,000.00
Type L26		15	EA	4,600.00	69,000.00	450.00	6,750.00	75,750.00
Type L27		18	EA	700.00	12,600.00	150.00	2,700.00	15,300.00
Type L28		12	EA	460.00	5,520.00	150.00	1,800.00	7,320.00
Type L36		12	EA	270.00	3,240.00	150.00	1,800.00	5,040.00
Type L39		8	EA	730.00	5,840.00	150.00	1,200.00	7,040.00
Type L40		18	EA	660.00	11,880.00	150.00	2,700.00	14,580.00
Type L42		4	EA	300.00	1,200.00	150.00	600.00	1,800.00
Type L43		9	EA	480.00	4,320.00	150.00	1,350.00	5,670.00
Type L50		0	EA		0.00		0.00	0.00
LV Xfmr		6	EA	260.00	1,560.00	200.00	1,200.00	2,760.00
LED Driver		3	EA	240.00	720.00	180.00	540.00	1,260.00
Fir Junc Box, Aidle Seat Power Feed		16	EA	15.00	240.00	55.00	880.00	1,120.00
Type Exit		26	EA	160.00	4,160.00	150.00	3,900.00	8,060.00
Type L1A		48	LF	190.00	9,120.00	55.00	2,640.00	11,760.00
Type L1B		72	LF	240.00	17,280.00	55.00	3,960.00	21,240.00
Type L6		45	LF	85.00	3,825.00	55.00	2,475.00	6,300.00

DDC

NEW YORK CITY DEPARTMENT OF DESIGN & CONSTRUCTION

Project: Manhattan Class Company Theater Fit Out
 Location: 515 West 52nd Street, New York, NY 10019
 Bidder: Saijun Electric Inc

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 4 - ELECTRICAL WORK

DDC ID: PV467-CRG
 Sponsor Agency: Department of Cultural Affairs

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 L9 LED	137	LF	60.00	8,220.00	55.00	7,535.00	15,755.00
	Type L13,13A	50	LF	95.00	4,750.00	55.00	2,750.00	7,500.00
	Type L13C	19	LF	95.00	1,805.00	55.00	1,045.00	2,850.00
	Type L13D	14	LF	120.00	1,680.00	55.00	770.00	2,450.00
	Type L13H	24	LF	120.00	2,880.00	55.00	1,320.00	4,200.00
	Type L14A	36	LF	95.00	3,420.00	55.00	1,980.00	5,400.00
	Type L14B	32	LF	95.00	3,040.00	55.00	1,760.00	4,800.00
	Type L29	5	LF	75.00	375.00	55.00	275.00	650.00
	Type L33	72	LF	840.00	60,480.00	55.00	3,960.00	64,440.00
	Type L39B	12	LF	55.00	660.00	55.00	660.00	1,320.00
	Type L44	10	LF	85.00	850.00	55.00	550.00	1,400.00
	Type L37 Track	48	LF	40.00	1,920.00	55.00	2,640.00	4,560.00
	Type L38 LED Track Lt	16	EA	900.00	14,400.00	55.00	880.00	15,280.00
	Subtotal				376,585.00		108,800.00	485,385.00
26 5561	THEATRICAL SYSTEMS ELECTRICAL REQUIREMENTS							
	Large Theatr 1 Lig Controls - Install	1	LS	1,400.00	1,400.00	14,000.00	14,000.00	15,400.00
	Small Theatr 2 Lig Controls - Install	1	LS	1,000.00	1,000.00	10,000.00	10,000.00	11,000.00
	Rehearsal Lig Controls - Install	2	LS	500.00	1,000.00	4,000.00	8,000.00	9,000.00
	TD Junc Box 2ckt HR	13	EA	50.00	650.00	150.00	1,950.00	2,600.00
	TD Junc Box 3ckt HR	12	EA	50.00	600.00	180.00	2,160.00	2,760.00
	TD Junc Box 6ckt HR	10	EA	50.00	500.00	300.00	3,000.00	3,500.00
	TD Junc Box 6ckt HR, Pipe Mt	23	EA	50.00	1,150.00	600.00	13,800.00	14,950.00
	Receptacle, Pipe Mt	4	EA	15.00	60.00	45.00	180.00	240.00
	Single Trust Panel Term Box 40CKt	5	EA	200.00	1,000.00	2,400.00	12,000.00	13,000.00
	Theater Rigging Motor Controller FBO	5	EA	50.00	250.00	225.00	1,125.00	1,375.00
	Mounting Pipe	0	LF		0.00			0.00
	Plug Strip	200	LF	5.00	1,000.00	55.00	11,000.00	12,000.00
	30 Amp Receptacle	4	EA	150.00	600.00	180.00	720.00	1,320.00
	Circuitry:							
	3/4 Emt, #10	1,000	LF	2.00	2,000.00	14.00	14,000.00	16,000.00



NEW YORK CITY DEPARTMENT OF CONSTRUCTION

DESIGN &

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 4 - ELECTRICAL WORK

Project: Manhattan Class Company Theater Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder: Sajjun Electric, Inc

DDC ID: PV467-CRG
Sponsor Agency: Department of Cultural Affairs

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
	1" Emt, 10#10	17,500	LF	4.00	70,000.00	27.00	472,500.00	542,500.00
	Subtotal:				81,210.00		554,435.00	645,645.00
27 0000	COMMUNICATIONS							
27 0528	TELECOMMUNICATION AND DATA WIRING SYSTEM							
	Communications Eqpt Room:							
	POE	1	LS	500.00	500.00	900.00	900.00	1,400.00
	MDF Term Boards	1	LS	500.00	500.00	600.00	600.00	1,100.00
	Main Tel Ground Bar	1	EA	500.00	500.00	450.00	450.00	950.00
	Tel Ground Bar	1	EA	250.00	250.00	300.00	300.00	550.00
	3-Cell Innerduct	650	LF	3.00	1,950.00	7.00	4,550.00	6,500.00
	4" EMT Cdt	400	LF	6.00	2,400.00	40.00	16,000.00	18,400.00
	1" EMT Cdt	2,000	LF	1.50	3,000.00	12.00	24,000.00	27,000.00
	Communications Horizontal Cabling:							
	Cat 6 Cable	46,000	LF	0.60	27,600.00	0.67	30,820.00	58,420.00
	25 Pair Cat 5E Cable	500	LF	1.20	600.00	2.50	1,250.00	1,850.00
	24 Strand Fiber Optic	500	LF	5.00	2,500.00	2.50	1,250.00	3,750.00
	Communications Devices:							
	WAP Outlet	18	EA	15.00	270.00	45.00	810.00	1,080.00
	Tel Outlet w/ Stdup 1c	1	EA	25.00	25.00	50.00	50.00	75.00
	Tel/Data Outlet w/Stdup 2c	61	EA	35.00	2,135.00	50.00	3,050.00	5,185.00
	Tel/Data Outlet w/Stdup 3c	8	EA	40.00	320.00	60.00	480.00	800.00
	Floor T/D Outlet 4c	6	EA	100.00	600.00	150.00	900.00	1,500.00
	AV System, empty conduit	38,000	SF	0.80	30,400.00	12.00	456,000.00	486,400.00
	Subtotal:				73,550.00		541,410.00	614,960.00
28 0000	ELECTRONIC SAFETY AND SECURITY							
28 0500	COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY							
	Security System Empty conduit	38,000	SF	0.05	1,900.00	0.40	15,200.00	17,100.00
	Subtotal:				1,900.00		15,200.00	17,100.00



NEW YORK CITY DEPARTMENT OF CONSTRUCTION

DESIGN &

Project: Manhattan Class Company Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder: Saitun Electric Inc

CONTRACTOR'S BID BREAKDOWN FORM
CONTRACT 4 - ELECTRICAL WORK

DDC ID: PV467-CRG
Sponsor Agency: Department of Cultural Affairs

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
28 1100	SECURITY SYSTEM							
	Door Contact	11	EA	150.00	1,650.00	119.00	1,309.00	2,959.00
	Glass Break	2	EA	300.00	600.00	180.00	360.00	960.00
	Cardreader	2	EA	300.00	600.00	300.00	600.00	1,200.00
	Camera	8	EA	450.00	3,600.00	375.00	3,000.00	6,600.00
	DVR	1	EA	1,500.00	1,500.00	600.00	600.00	2,100.00
	Subtotal				7,950.00		5,869.00	13,819.00
28 3100	ADDRESSABLE FIRE ALARM SYSTEM							
	1 1/4" Rigid, Riser Cables	250	LF	2.50	625.00	15.00	3,750.00	4,375.00
	Teflon Cable	18,000	LF	0.50	9,000.00	1.23	22,140.00	31,140.00
	Pull Station	16	EA	150.00	2,400.00	180.00	2,880.00	5,280.00
	Audible/Visual	60	EA	150.00	9,000.00	180.00	10,800.00	19,800.00
	Smoke Detector	30	EA	100.00	3,000.00	180.00	5,400.00	8,400.00
	Strobe	10	EA	100.00	1,000.00	180.00	1,800.00	2,800.00
	Duct Detector	12	EA	250.00	3,000.00	375.00	4,500.00	7,500.00
	Central Equipment (new FAOP, tie in ex)	1	LS	2,000.00	2,000.00	1,500.00	1,500.00	3,500.00
	Install Smoke Purge Panel FBO	1	EA	25.00	25.00	1,200.00	1,200.00	1,225.00
	Fu Cutoff	1	EA	600.00	600.00	450.00	450.00	1,050.00
	Door Operator Interface FAI	14	EA	100.00	1,400.00	180.00	2,520.00	3,920.00
	Misc Connections, Modules	68	EA	100.00	6,800.00	180.00	12,240.00	19,040.00
	FSD Connections, 120V	63	EA	15.00	945.00	180.00	11,340.00	12,285.00
	Pull Station, reloc exist	0	EA		0.00		0.00	0.00
	Audible/Visual, reloc exist	1	EA	25.00	25.00	180.00	180.00	205.00
	Subtotal				39,820.00		80,700.00	120,520.00
	TOTAL CONTRACT 4 - ELECTRICAL WORK				1,009,730.00		2,525,234.00	3,534,964.00

SAJIUN ELECTRIC INC.
LICENSED ELECTRICAL CONTRACTORS
109 WEST 26TH ST, STE 2B, NEW YORK, NY 10001

FIN: 13-2546221

COMPLETED CONTRACTS

	Agency/ Owner, Contact Person & Telephone No.	Contract No.	Prime /Sub	Agency	Award Date	Amount	Date completed
1.	DDC Patel Jagdish 347-203-5907	851 Grand Concourse	Prime	DCAS	1/23/2014	11,665,000	8/2014
2.	Dormitory Authority State of New York Christopher Wuest 212-491-6930	121274 CUNY School of Architecture	Prime	DASNY	7/21/2006	10,198,500	7/2009
3.	NYC Department Of Correction Hardee Saini 718-546-0787	Electrical construction work at various NYCDOC Facilities CT07220070035306	Prime	NYC DOC	3/2007	8,361,415	12/2011
4.	MPPC Corp (Prime) Dennis Webster 914-636-0000	SUNY Old Westbury P#31215	Sub	SUCF	2/2009	7,207,061	8/12
5.	SimplexGrinnell Kay Lee 212-372-4202 Mobile: 917-416-6822	NYC DOC PIN No. 07220123CPD Fire Alarm Installations	Sub	NYC DOC		5,077,775	4/2014
6.	Department Of CITIWIDE Administrative Services Whasoon Lisa Lee 212-669-8103	18 Richmond Terrace CO293ELEC 85620105401531	Prime	DCAS	7/5/2010	2,428,033	8/2012
7.	TDX Construction Anthony Mockler 718-255-5713	Jacobi DP_2 2803009999/ CR48	Prime	DASNY	3/19/2009	1,831,000	12/2010

SAJIUN ELECTRIC INC.

LICENSED ELECTRICAL CONTRACTORS

109 WEST 26TH ST, STE 2B, NEW YORK, NY 10001

8.	Dormitory Authority State of NY Zuhair Jenab 212-273-5026	2799309999 Lincoln Hospital	Prime	DASNY	7/2008	4,185,657	6/2009
9.	Dormitory Authority State of NY Zuhair Jenab 212-273-5026	2799309999 Coney Island Hospital	Prime	DASNY	8/2008	2,104,122	6/2009
10.	TA Ahern Contractors Corp. Eric Butler 845-629-4977	C0000100477	Sub	NYCSCA	12/04/2006	1,499,000	1/1/2009

Tax ID #:

13 254 6221

API E-

PIN#: 85015B0012

Contract # 4 - Electrical Work

SCHEDULE B - M/WBE Utilization Plan

Part I: M/WBE Participation Goals

Part I to be completed by contracting agency

Confidential City/Agency

APT E-Pin # 85015B0012 FMS Project ID#: PV467-CRG

Project Title/Agency Manhattan Class Company Theater Fit Out

PIN # 8502015PV0004C

Bid/Proposal

Response Date: APRIL 06, 2015

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)

This Project consists of a Theater Fit-out, including new Mechanical, Electrical, Plumbing, and Fire Alarm systems to tie into existing building services.

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>5</u> %
OR	
Black American	Unspecified %
Hispanic American	Unspecified %
Asian American	Unspecified %
Women	Unspecified %
Total Participation Goals	5 %

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 # 13 254 6221

APT E-

PIN# 85015B0012

Contract #4 - Electrical Work

SCHEDULE B - Part II: M/WBE Participation Plan

Form 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.

Tax ID #	<u>13 254 6221</u>	FMS Vendor ID #	
Business Name	<u>SATIWA ELECTRIC INC.</u>	Contact Person	<u>RICHARD SATIWA</u>
Address	<u>109 WEST 26 ST, NY, NY, 10001</u>		
Telephone #	<u>212 675 2800</u>	Email	<u>OFFICE@SATIWA ELECTRIC.COM</u>

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 1)	Calculated M/WBE Participation Amount
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.	\$	X	= \$ 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
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.	\$	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.

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? % 0

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 _____
Print Name RICHARD SAJIWA

Date 4/3/15
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: SATIWA ELECTRIC INC.

DDC Project Number: PV 467-CRG

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	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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	INTRASTATE RATE	INTERSTATE RATE
2014	.86	N/A
2013	.9	N/A
2012	.84	N/A

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 (i.e., fatality, or hospitalization of three or more employees).

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

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

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

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

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

YEAR	TOTAL NUMBERS OF HOURS WORKED BY EMPLOYEES	INCIDENT RATE
2014	53,464	0
2013	74,112	0
2012	71,688	0

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: 4/4/15

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

Title: PRESIDENT

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**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:

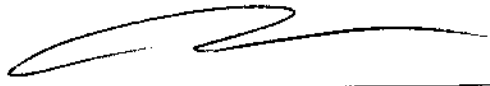
[Please Check One]

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: 4/4 . New York
2015



SIGNATURE

RICHARD SASIUN
PRINTED NAME

PRESIDENT
TITLE

Sworn to before me this
4th day of April, 2015

Julie Mitic
Notary Public

Dated:



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 X
2. Would your company like information on how to certify with the City of New York as a:
 X Minority Owned Business Enterprise _____ Locally based Business Enterprise
_____ Women Owned Business Enterprise _____ Emerging Business Enterprise
3. Please indicate if you would like assistance from SBS in identifying certified M/WBEs for contracting opportunities: Yes _____ No X

PART I: CONTRACTOR/SUBCONTRACTOR INFORMATION

4. 13-2546221
Employer Identification Number or Federal Tax I.D.
5. SAJIUN ELECTRIC INC.
Company Name
6. 109 WEST 26TH ST, NEW YORK 10001
Company Address and Zip Code
7. RICHARD SAJIUN 212-675-2800
Chief Operating Officer Telephone Number
8. SAME
Designated Equal Opportunity Compliance Officer Telephone Number
(If same as Item #7, write "same")
9. SAME
Name of Prime Contractor and Contact Person
(If same as Item #5, write "same")
10. Number of employees in your company: 41
11. Contract information:
(a) DDC (b) \$3,500,000.00
Contracting Agency (City Agency) Contract Amount

(d) 8502015PV0001C
Procurement Identification Number (PIN)

(e) _____
Contract Registration Number (CT#)

(f) TBD
Projected Commencement Date

(g) TBD
Projected Completion Date

(h) Description and location of proposed contract:

ELECTRICAL WORK AT MANHATTAN CLASS COMPANY THEATER FIT-OUT
515 WEST 52ND ST, NEW YORK NY 10019

12. Has your firm been reviewed by the Division of Labor Services (DLS) within the past 12 months and issued a Certificate of Approval? Yes ___ No x

If yes, attach a copy of certificate.

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

If yes, attach a copy of certificate.

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

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

If yes,

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

15. Has your company in the past 12 months been audited by the United States Department of Labor, Office of Federal Contract Compliance Programs (OFCCP)? Yes ___ No x

If yes,

(a) Name and address of OFCCP office.

(b) Was a Certificate of Equal Employment Compliance issued within the past 24 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.

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

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

PART II: DOCUMENTS REQUIRED

17. 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.

YES (a) Health benefit coverage/description(s) for all management, nonunion (See attached explanation) and union employees (whether company or union administered)

YES (b) Disability, life, other insurance coverage/description (See attached explanation)

___ (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?

18. 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 <u>x</u> No ___
(g) To some employees	Yes ___ No ___
(h) To all employees	Yes <u>x</u> No ___

19. Explain where and how completed I-9 Forms, with their supportive documentation, are maintained and made accessible.
KEPT ON FILE IN MAIN OFFICE

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

If yes, is the medical examination given:

- (a) Prior to a job offer Yes ___ No ___
- (b) After a conditional job offer Yes ___ No ___
- (c) After a job offer Yes ___ No ___
- (d) To all applicants Yes ___ No ___
- (e) Only to some applicants Yes ___ No ___

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

21. Do you have a written equal employment opportunity (EEO) policy? Yes x No ___

If yes, list the document(s) and page number(s) where these written policies are located.
AFFIRMATIVE ACTION PLAN - PAGE 2

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

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

23. Does your firm or collective bargaining agreement(s) have an internal grievance procedure with respect to EEO complaints? Yes x 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.

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

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

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

If yes, attach a log. See instructions.

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

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

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

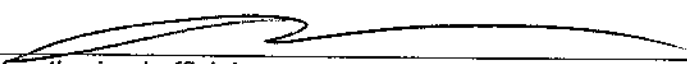
If yes, list the job(s), submit a job description and state the reason(s) for the qualification(s).

SIGNATURE PAGE

I, (print name of authorized official signing) RICHARD SAJIUN 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.

SAJIUN ELECTRIC INC.

Contractor's Name	
RICHARD SAJIUN	PRESIDENT
Name of person who prepared this Employment Report	Title
SAME	SAME
Name of official authorized to sign on behalf of the contractor	Title
212-675-2800	
Telephone Number	
	4/1/2015
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 1ST day of April 2015

Notary Public **JULIE L. ...** Authorized Signature Date 4/1/15
Notary Public, State of New York
No. 01MI3254180
Qualified in Queens County
Commission Expires Jan. 17, 2016

BID BOND I
FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS, That we, _____

Sajun Electric, Inc.

hereinafter referred to as the "Principal", and _____

U.S. Specialty Insurance Company

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 _____

10% of the Bid 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 _____

Electrical Work associated with the Manhattan Class Company Theater Fit Out located at

515 West 52nd Street, New York, NY 10019 Contract No. 4 - Electrical Work

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

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

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

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

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 25th day of March, 2015.

(Seal)

Sajun Electric, Inc. (L.S.)
Principal

By: 

(Seal)

U.S. Specialty Insurance Company
Surety

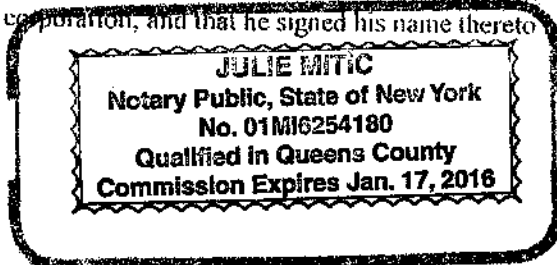
By: 

Patrick G. Weir

Attorney-in-Fact

ACKNOWLEDGEMENT OF PRINCIPAL, IF A CORPORATION

State of NY County of NY ss:
On this 4th day of April, 2015, before me personally came
RICHARD SASTUN to me known, who, being by me duly sworn, did depose and say that he
resides at 109 W 26 ST, NY, NY, 10001
that he is the PRESIDENT of SASTUN ELECTRIC INC.
the corporation described in and which executed the foregoing instrument; that he knows the seal of said
corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the
directors of said corporation, and that he signed his name thereto by like order.



Julie Mitic
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 NY County of NY ss:
On this 4th day of April, 2015, before me personally appeared
RICHARD SASTUN 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.

Julie Mitic
Notary Public

AFFIX ACKNOWLEDGEMENTS AND JUSTIFICATION OF SURETIES

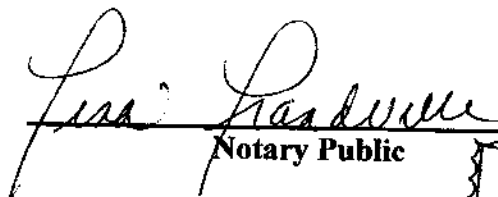
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ACKNOWLEDGEMENT OF SURETY

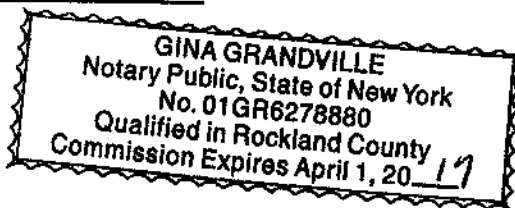
STATE OF NEW YORK

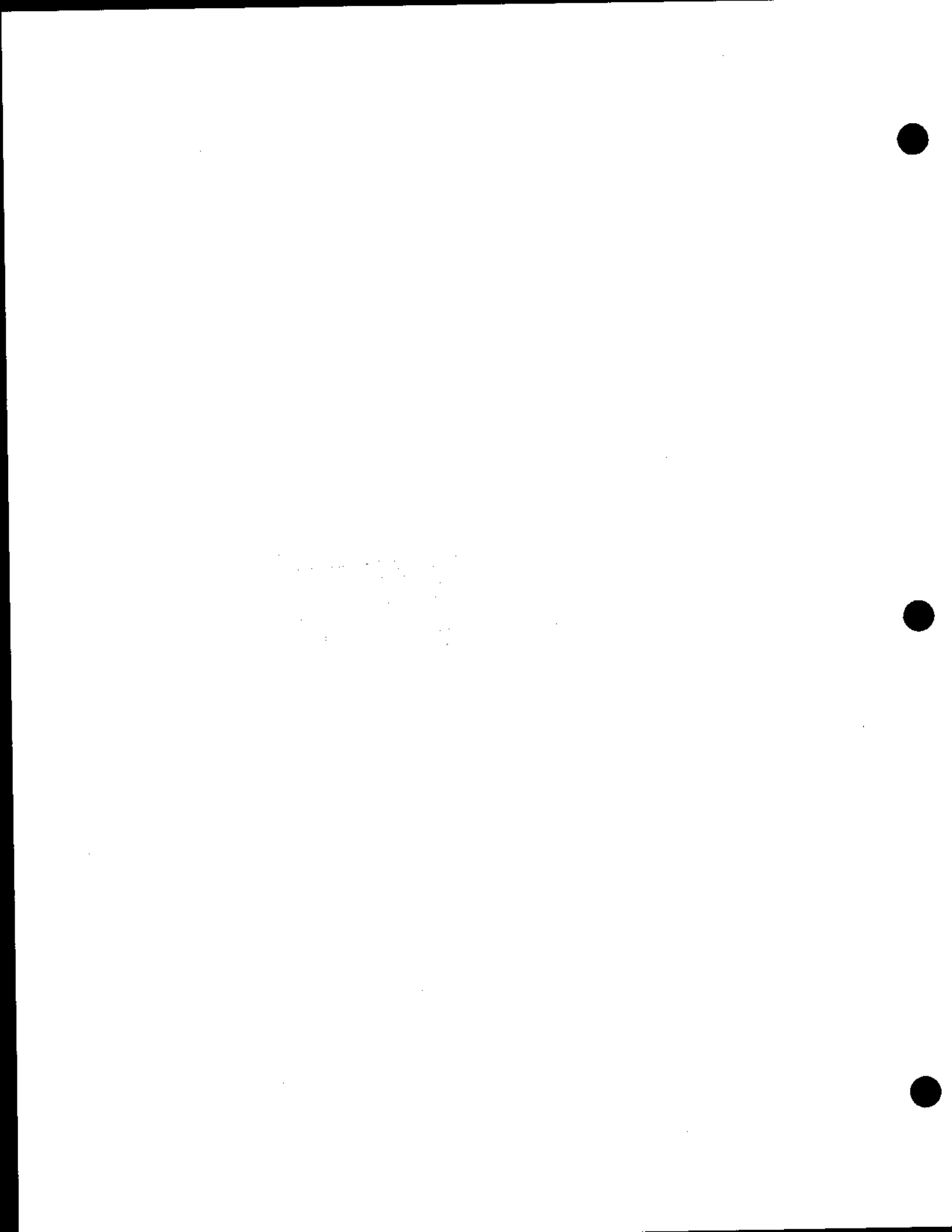
COUNTY OF ROCKLAND

On March 25, 2015 before me personally came Patrick G. Weir known, who, being by me duly sworn, did depose and say that he resides in Orangeburg, NY that he is the Attorney-in-Fact of U.S. Specialty Insurance Company, and that he signed his name thereto by order of the Board of Directors of said corporation.



Notary Public





POWER OF ATTORNEY

AMERICAN CONTRACTORS INDEMNITY COMPANY UNITED STATES SURETY COMPANY U.S. SPECIALTY INSURANCE COMPANY

KNOW ALL MEN BY THESE PRESENTS: That American Contractors Indemnity Company, a California corporation, United States Surety Company, a Maryland corporation and U.S. Specialty Insurance Company, a Texas corporation (collectively, the "Companies"), do by these presents make, constitute and appoint:

Patrick G. Weir

its true and lawful Attorney(s)-in-fact, each in their separate capacity if more than one is named above, with full power and authority hereby conferred in its name, place and stead, to execute, acknowledge and deliver any and all bonds, recognizances, undertakings or other instruments or contracts of suretyship to include riders, amendments, and consents of surety, providing the bond penalty does not exceed *****Unlimited***** Dollars (\$ ***unlimited***).

This Power of Attorney shall expire without further action on December 08, 2016. This Power of Attorney is granted under and by authority of the following resolutions adopted by the Boards of Directors of the Companies:

Be it Resolved, that the President, any Vice-President, any Assistant Vice-President, any Secretary or any Assistant Secretary shall be and is hereby vested with full power and authority to appoint any one or more suitable persons as Attorney(s)-in-Fact to represent and act for and on behalf of the Company subject to the following provisions:

Attorney-in-Fact may be given full power and authority for and in the name of and on behalf of the Company, to execute, acknowledge and deliver, any and all bonds, recognizances, contracts, agreements or indemnity and other conditional or obligatory undertakings, including any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts, and any and all notices and documents canceling or terminating the Company's liability thereunder, and any such instruments so executed by any such Attorney-in-Fact shall be binding upon the Company as if signed by the President and sealed and effected by the Corporate Secretary.

Be it Resolved, that the signature of any authorized officer and seal of the Company heretofore or hereafter affixed to any power of attorney or any certificate relating thereto by facsimile, and any power of attorney or certificate bearing facsimile signature or facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached.

IN WITNESS WHEREOF, The Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 10th day of December, 2012.

AMERICAN CONTRACTORS INDEMNITY COMPANY UNITED STATES SURETY COMPANY U.S. SPECIALTY INSURANCE COMPANY

Corporate Seals



[Signature]
Daniel P. Aguilar, Vice President

State of California

County of Los Angeles SS:

On 10th day of December, 2012, before me, Vanessa Wright, a notary public, personally appeared Daniel P. Aguilar, Vice President of American Contractors Indemnity Company, United States Surety Company and U.S. Specialty Insurance Company who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct. WITNESS my hand and official seal.

Signature [Signature] (Seal)



I, Jeannie Lee, Assistant Secretary of American Contractors Indemnity Company, United States Surety Company and U.S. Specialty Insurance Company, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney, executed by said Companies, which is still in full force and effect; furthermore, the resolutions of the Boards of Directors, set out in the Power of Attorney are in full force and effect.

In Witness Whereof, I have hereunto set my hand and affixed the seals of said Companies at Los Angeles, California this 25th day of March, 2015.

Corporate Seals

Bond No. N/A
Agency No. 12172



[Signature]
Jeannie Lee, Assistant Secretary

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U.S. SPECIALTY INSURANCE COMPANY
STATUTORY STATEMENT OF ADMITTED ASSETS,
LIABILITIES, CAPITAL AND SURPLUS (1)
December 31, 2013

Admitted Assets

Investments:
 Fixed Maturities, at amortized cost
 Common stocks
 Cash and short term investments
 Receivable for securities
Total cash and invested assets:

1,610,879,131
 153,821,416
 6,072,697
 19,379
1,770,692,623

Accrued interest income
 Premium receivable
 Recoverable from reinsurers
 Net deferred tax asset
 Furniture and equipment
 Receivable from parent, subsidiaries and affiliates

17,944,263
 79,891,095
 13,093,456
 38,476,641
 576,951
 7,914,554

Total admitted assets

157,896,860
1,928,589,483

Liabilities and Capital and Surplus

Liabilities:
 Unpaid loss and loss adjustment expense
 Commission payable
 Accrued expenses
 Taxes, licenses, and fees
 Federal income tax
 Unearned premiums
 Advance premium
 Dividends to policyholders
 Ceded reinsurance balance payable
 Funds held under reinsurance treaties
 Amounts withheld or retained for others
 Provision for reinsurance
 Payable to parent, subsidiaries and affiliates
 Payable for securities

974,999,583
 10,962,910
 4,449,770
 2,723,093
 2,802,073
 266,077,282
 11,473,367
 157,480
 57,928,358
 12,956,012
 64,945
 141,342
 2,592,504
 952,945
1,348,281,564

Total liabilities

Capital and Surplus:
 Capital Stock
 Additional paid-in and contributed capital
 Unassigned surplus

4,200,000
 187,586,442
 388,521,477
580,307,919

Total liabilities and capital and surplus

1,928,589,483

(1) - In accordance with the statutory financial statements as filed on March 1, 2014.

I, Stephen P. MacDonough, Chief Financial Officer of U.S. Specialty Insurance Company, hereby certify that to the best of my knowledge and belief, the foregoing is a full and true Statutory Statement of Admitted Assets, Liabilities and Capital and Surplus of the Company as of December 31, 2013, prepared in conformity with accounting practices prescribed or permitted by the Texas Department of Insurance. The foregoing statement should not be taken as a complete statement of financial condition of the Company. Such a statement is available upon written request at the Company's home office located at 13403 Northwest Freeway, Houston, Texas 77040.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Corporation at Houston, Texas.


 Stephen P. MacDonough
 Chief Financial Officer

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

March 31, 2015

ADDENDUM No. # 1

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

PV467-CRG

Manhattan Class Company Theater Fit Out

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. Revised Bid Opening Date:

The Bid Opening for the Contracts described below scheduled for April 6, 2015 at 2:00pm is rescheduled to April 9, 2015 at 2:00pm.

Contract #1 – General Construction Work

Contract #2 – Plumbing Work

Contract #3 – HVAC Work

Contract #4 – Electrical 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:

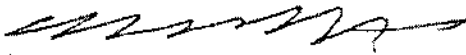
See Attachment C.

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.



Michael Nastasi
Assistant Commissioner
Cultural/ Parks Programs

SASIW ELECTRIC INC.
Name of Bidder

By: 

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

April 2, 2015

ADDENDUM No. # 2

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

PV467-CRG

Manhattan Class Company Theater Fit Out

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 Addendum to the General Conditions:**
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.



Michael Nastasi
Assistant Commissioner
Cultural/ Parks Programs

SATIUN ELECTRIC INC.

Name of Bidder

By: 

**BID BOOKLET
PART A**

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.

PROJECT ID: PV467-CRG

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

BID BOOKLET

TABLE OF CONTENTS

PART A		page
1.	Special Notice to Bidders.....	2
2.	M/WBE Program: M/WBE Utilization Plan.....	5
3.	Apprenticeship Program Requirements.....	10
4.	Bid Form.....	12
5.	Affirmation.....	17
6.	Bid Bond.....	18
7.	Contractor's Bid Breakdown	21
8.	Attachment 1 - Bid Information.....	22
PART B		
9.	Safety Questionnaire.....	23
10.	Pre-award Process	26
11.	Project Reference Form.....	28
12.	Contract Certificate.....	31
13.	Confirmation of Vendex Compliance.....	32
14.	Iran Divestment Act Compliance Report.....	33
15.	Construction Employment Report.....	35

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

SPECIAL NOTICE TO BIDDERS

BID SUBMISSION REQUIREMENTS

**THE FOLLOWING DOCUMENTS ARE TO BE COMPLETED
AND SUBMITTED WITH THE BID:**

- Bid Form, including Affirmation
- Bid Security (if required, see page 22)
- Schedule B: M/WBE Utilization Plan (if participation goals have been established)

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

- 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
- Special Experience Requirements Qualification Form (if required, see pages 3, 4)
- Bidder's Certification of Compliance with Iran Divestment Act
- Apprenticeship Program Requirements (if required, see pages 10, 11)
- Any Addenda issued prior to the receipt of bids.

**FAILURE TO SUBMIT THE NINE 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. 4:

- | | |
|------------------------|------------------------------|
| 1. Proprietary Item: | GENERATOR |
| Specification Section: | CSI 263200, S114, M204, M205 |
| Manufacturer: | Generac Model SD100 |
| Allowance Amount: | Not to Exceed \$44,036 |

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SPECIAL EXPERIENCE REQUIREMENTS

Special Experience Requirements apply as indicated below.

Bidder(s):	General Construction	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/>	NO
	HVAC Work	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/>	NO
	Electrical Work	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/>	NO
Specific Areas of Work:	General Construction	<input checked="" type="checkbox"/>	YES	<input type="checkbox"/>	NO
Manufacturer(s):	General Construction	<input checked="" type="checkbox"/>	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 033300: Cast-in-Place Concrete
- Section 033500: Special Concrete Finishes
- Section 112429: Fall Protection
- Section 116133: Theatrical Rigging
- Section 116163: Theatrical Lighting Dimming and Control
- Section 116183: Theatrical Audio Video Systems
- Section 126100: Fixed Theatre Seating
- Section 144200: Wheelchair Lifts

- (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.

- The contractor or subcontractor performing the work of this section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.

- (3) For each project submitted to 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. 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.

- (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 112429: Fall Protection
- Section 116133: Theatrical Rigging
- Section 116163: Theatrical Lighting Dimming and Control
- Section 116183: Theatrical Audio Video Systems
- Section 126100: Fixed Theatre Seating

- (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.

Qualification Form

Project ID: PV467-CRG

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 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 rodrigur@ddc.nyc.gov or via facsimile at (718) 391-1885. 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#: 85015B0009

Contract # 1 - General Construction Work

SCHEDULE B - MWBE Utilization Plan

Part I: MWBE Participation Goals

Part I to be completed by contracting agency

Contract Overview

APT E-Pin # 85015B0009 FMS Project ID#: PV467-CRG

Project Title/Agency Manhattan Class Company Theater Fit Out

PIN # 8502015PV0001C

Bid/Proposal
Response Date: APRIL 06, 2015

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)

This Project consists of a Theater Fit-out, including new Mechanical, Electrical, Plumbing, and Fire Alarm systems to tie into existing building services.

MWBE 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>35</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	35	%

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#: 85015B0010

Contract # 2 - Plumbing Work

SCHEDULE B - MWBE Utilization Plan

Part I: MWBE Participation Goals

Part I to be completed by contracting agency

Contract Overview

APT E-Pin # 85015B0010 FMS Project ID#: PV467-CRG

Project Title/Agency Manhattan Class Company Theater Fit Out

PIN # 8502015PV0002C

Bid/Proposal

Response Date: APRIL 06, 2015

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)

This Project consists of a Theater Fit-out, including new Mechanical, Electrical, Plumbing, and Fire Alarm systems to tie into existing building services.

MWBE 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>10</u>	<u>%</u>
or		
<u>Black American</u>	<u>Unspecified</u>	<u>%</u>
<u>Hispanic American</u>	<u>Unspecified</u>	<u>%</u>
<u>Asian American</u>	<u>Unspecified</u>	<u>%</u>
<u>Women</u>	<u>Unspecified</u>	<u>%</u>
Total Participation Goals	10	%

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#: 85015B0011

Contract # 3 - HVAC 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 # 85015B0011 FMS Project ID#: PV467-CRG

Project Title/Agency Manhattan Class Company Theater Fit Out

PIN # 8502015PV0003C

Bid/Proposal
Response Date: APRIL 06, 2015

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)

This Project consists of a Theater Fit-out, including new Mechanical, Electrical, Plumbing, and Fire Alarm systems to tie into existing building services.

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>11 %</u>
OR	
Black American	<u>Unspecified %</u>
Hispanic American	<u>Unspecified %</u>
Asian American	<u>Unspecified %</u>
Women	<u>Unspecified %</u>
Total Participation Goals	11 %

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#: 85015B0012

Contract # 4 - Electrical 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 # 85015B0012 FMS Project ID#: PV467-CRG

Project Title/Agency Manhattan Class Company Theater Fit Out

PIN # 8502015PV0004C

Bid/Proposal

Response Date: APRIL 06, 2015

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)

This Project consists of a Theater Fit-out, including new Mechanical, Electrical, Plumbing, and Fire Alarm systems to tie into existing building services.

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>5</u> %
or	
Black American	Unspecified %
Hispanic American	Unspecified %
Asian American	Unspecified %
Women	Unspecified %
Total Participation Goals	5 %

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#: 85015B0009

Contract #1 - General Construction Work

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				
<input type="checkbox"/> 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 Value	Agency 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				
<input type="checkbox"/> 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 Value	Adjusted 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 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 _____
Print Name _____

Date _____
Title _____

Tax ID #: _____

APT E-

PIN#: **85015B0010**

Contract #2 - Plumbing Work

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

<input type="checkbox"/> 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 Value	Agency Total Participation Goals (Line 1, Page 1)		Calculated M/WBE Participation Amount
	\$ _____	X _____	= _____	\$ 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. 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 Value	Adjusted 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 _____
Print Name _____

Date _____
Title _____

Tax ID #: _____

APT E-

PIN#: 85015B0011

Contract #3 - HVAC Work

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

<input type="checkbox"/> 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 Value	Agency Total Participation Goals (Line 1, Page 1)		Calculated M/WBE Participation Amount
	\$ _____	X _____	= _____	\$ _____ 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. 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 Value	Adjusted 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 types of 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.

✓ **Scopes of Subcontract Work**

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

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 _____
Print Name _____

Date _____
Title _____

Tax ID #: _____

APT E-

PIN#: 85015B0012

Contract #4 - Electrical Work

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

<input type="checkbox"/> 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 Value	Agency Total Participation Goal (Line 1, Page 1)		Calculated M/WBE Participation Amount
	\$ _____	X _____	= _____	\$ 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. 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 Value	Adjusted 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 / 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: _____

CITY CHIEF CONTRACTING OFFICER APPROVAL
 Signature: _____

Waiver Determination:
 Full Waiver Approved
 Waiver Denied
 Partial Waiver Approved
 Rejected Participation

APPRENTICESHIP PROGRAM REQUIREMENTS

Bidders are advised that the Apprenticeship Program Requirements set forth below apply to each contract for which a check mark is indicated before the word "Yes". Compliance with these requirements will be determined solely by the City.

General Construction	<u> x </u>	YES	<u> </u>	NO
* Note: Even if Yes is marked, the Exemption set forth below may apply.				
Plumbing Work		YES	<u> x </u>	NO
HVAC and Fire Protection Work	<u> x </u>	YES		NO
Electrical Work	<u> x </u>	YES		NO

1) Apprenticeship Program Requirements

NOTICE TO BIDDERS: Please be advised that, pursuant to the authority granted to the City under Labor Law Section 816-b, the Department of Design and Construction hereby requires that the contractor awarded a contract as a result of this Invitation for Bids, and any of its subcontractors with subcontracts worth one million dollars or over, have, prior to entering into such contract or subcontract, apprenticeship agreements appropriate for the type and scope of work to be performed that have been registered with, and approved by, the New York State Commissioner of Labor. In addition, the contractor and its subcontractors will be required to show that such apprenticeship programs have three years of current, successful experience in providing career opportunities.

The failure to prove, upon request, that these requirements have been met shall result in the contract not being awarded to the contractor or the subcontract not being approved.

Please be further advised that, pursuant to Labor Law Section 220, the allowable ratio of apprentices to journeypersons in any craft classification shall not be greater than the ratio permitted to the contractor as to its workforce on any job under the registered apprenticeship program.

2) Apprenticeship Program Questionnaire

The bidder must submit a completed and signed Apprenticeship Program Questionnaire, unless it qualifies for the exemption set forth below. The Questionnaire is set forth on the following page of the Bid Booklet.

3) Exemption

Bidders for the General Construction Contract are advised that the exemption set forth below applies if an "X" is indicated before the word "Yes".

 YES NO

Exemption: If the bidder intends to subcontract 100% of the construction work, it is not required to demonstrate that it has an Apprenticeship Agreement(s), nor is it required to submit an Apprenticeship Program Questionnaire. If the bidder qualifies for this exemption, it shall submit a letter stating that it intends to subcontract 100% of the construction work. As indicated above, the Apprenticeship Program Requirements apply to subcontracts worth one million dollars or more.

APPRENTICESHIP PROGRAM QUESTIONNAIRE

PROJECT ID: PV467-CRG

The bidder must submit a completed and signed Apprenticeship Program Questionnaire unless it qualifies for the exemption set forth on the previous page.

Name of Bidder: _____

- 1) Does the bidder have an Apprenticeship Program appropriate for the type and scope of work to be performed?
[Note: Participation may be by either direct sponsorship or through collective bargaining agreement(s).]
_____ YES _____ NO
- 2) Has the bidder's Apprenticeship Program been registered with, and approved by, the New York State Commissioner of Labor?
_____ YES _____ NO
- 3) Has the bidder's Apprenticeship Program had three years of successful experience in providing career opportunities?
_____ YES _____ NO

If the answer to Question #3 is "Yes", the bidder shall, in the space below, provide information regarding the experience the Apprenticeship Program has had in providing career opportunities. The bidder may attach additional pages if necessary.

Bidder: _____

By: _____ Title: _____
(Signature of Partner or Corporate Officer)

Date: _____

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: PV467-CRG

Manhattan Class Company Theater Fit Out
515 West 52nd Street
Manhattan 10019

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.

Alternate Bids

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

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

BID ALTERNATE #2: Requires a Total Lump Sum Price for the following: (1) all required work for Bid Alternate #1 (Project Base Bid), **plus** (2) all required work for the scope of Alternate #2 work. The scope of work for Alternate #2 is to provide acoustic wall paneling, theatrical audio video systems, and fixed theatre seating for the theater site described in the following Contract Documents:
Drawings: A-111, A-131, A-133, A-253, A-254, A-262, TA-000, TA-001, TA-102, TA-103, TA-301, TA-408, TA-411, TA-412, TA-413
Specifications: 098413, 116183, 126100
(Project Base Bid + Alternate 2 Work)

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

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BID FORM - BID ALTERNATE 1 (PROJECT BASE BID)

**PROJECT ID: PV467-CRG
Contract #1 - General Construction Work**

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

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

Total Price For
Labor

Total Price for Material Sold and
Delivered

\$ _____ +

\$ _____

Total Price for Item A= \$ _____

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

\$15,000.00

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

\$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

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 - BID ALTERNATE 2 (PROJECT BASE BID + ALTERNATE 2 WORK)

PROJECT ID: PV467-CRG
Contract #1 - General Construction Work

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

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

Total Price For
Labor

Total Price for Material Sold and
Delivered

\$ _____ +

\$ _____

Total Price for Item A= \$ _____

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

\$15,000.00

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

\$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

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

**PROJECT ID: PV467-CRG
Contract #2 - Plumbing Work**

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

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

Total Price For
Labor

Total Price for Material Sold and
Delivered

\$ _____ +

\$ _____

Total Price for Item A= \$ _____

- B. **ALLOWANCE** for Incidental Asbestos Abatement
(Section 220013 of the Specifications)

\$5,000.00

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

\$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

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

PROJECT ID: PV467-CRG
Contract #3 - HVAC and Fire Protection Work

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

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

Total Price For
Labor

Total Price for Material Sold and
Delivered

\$ _____ +

\$ _____

Total Price for Item A= \$ _____

- B. **ALLOWANCE** for Incidental Asbestos Abatement
(Section 230013 of the Specifications)

\$5,000.00

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

\$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

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

PROJECT ID: PV467-CRG
Contract #4 - Electrical Work

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

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

Total Price For Labor	+	Total Price for Material Sold and Delivered	Total Price for Item A= \$
\$ _____		\$ _____	_____

B. ALLOWANCE for Incidental Asbestos Abatement (Section 260013 of the Specifications)	<u>\$5,000.00</u>
C. AMOUNT for Proprietary Items (from page 2a)	<u>\$44,036.00</u>
TOTAL BID PRICE (Add A + B + C) (a/k/a BID PROPOSAL)	\$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

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. I 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 del contract or taxes and is not a defaulter, as surety or otherwise, upon obligation to the City of New York, and has not been declared not responsible, or disqualified, by any agency of the City of New York, nor is there any proceeding pending relating to the responsibility or qualification of the bidder to receive public contracts except _____

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

Full Name of Bidder: _____
Address: _____
City: _____ State: _____ Zip Code: _____

CHECK ONE BOX AND INCLUDE APPROPRIATE NUMBER:

A - Individual or Sole Proprietorship *
SOCIAL SECURITY NUMBER

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

C - Corporation
EMPLOYER IDENTIFICATION NUMBER

By: _____
Signature:

Title: _____

If a corporation, place seal here

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

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

BID 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.

General Construction	<u> x </u>	YES		<u> </u>	NO
Plumbing Work	<u> x </u>	YES		<u> </u>	NO
HVAC and Fire Protection Work	<u> x </u>	YES		<u> </u>	NO
Electrical Work	<u> x </u>	YES		<u> </u>	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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NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Project: Manhattan Class Company Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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							
	BID ALTERNATE #1 WORK (PROJECT BASE BID)							
01 0000	GENERAL REQUIREMENTS							
01 0000	MOBILIZATION							
	Mobilization		LS					
	Security/ Fire Guards		LS					
	LEED requirements		LS					
	Subtotal							
02 0000	EXISTING CONDITIONS							
02 4116	BUILDING DEMOLITION							
	Building Demolition:							
	Remove Door & Frame		EA					
	- Single		Pairs					
	- Double							
	Remove Doors & Glazing @ Vestibule 119							
	- Doors		Pairs					
	- Glazing		SF					
	Remove Store Front Assembly Including Door @ Vestibule 119		SF					
	Remove Gypboard Soffit Above Rear Entrance Store Front		SF					
	Remove Gypboard Partitions		SF					
	Core Drilling For Plumbing		LS					
	Core Drilling For Registers in Theater 1		LOC					
	Core Drilling For Registers in Theater 1 Balcony		LOC					
	Remove Marquee Box & Prepare Opening For New Window		LOC					
	Provide New Openings & Enlarge Extg Openings in Concrete Wall		SF					
	Protect Existing Partitions		SF					
	Provide Trench in Sidewalk & Patch For New Signage Electrical Conduit 4 LF		LF					

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NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	Remove Shutter Assembly Near Theater 2 7' X 7'		LS					
	Cut & Cap Existing Pipes		LOC					
	Pollution & Noise Control During Demolition		LS					
	Chop Out Concrete For Walk-Off Mat in Vestibule		SF					
	Chop Floor Slab @ Theater 2 Removed Door		LF					
	Chop Top Surface Of Floor Slab 1 1/2" Deep For New Electrical Feed		LF					
	Remove Wall Assembly Below Stair As Required To Accommodate New Duct Work		LS					
	Remove Gypboard Furring @ Elevator Shaft		SF					
	Remove Metal Wall Panels @ Vestibule 100		SF					
	Remove Gypboard Furring		SF					
	Demolition Control Room Level:							
	Remove Ceiling Assembly @ Vestibule		SF					
	Remove Portion Of Gypboard Wall & Prepare For New Door - 1 Location		SF					
	Remove Concrete & Window For New Door Opening @ Control Room		SF					
	Remove Portion Of Concrete Wall @ Theater 2 For Ducts 2' X 6' Opening		LOC					
	Remove Partitions		SF					
	Demolition Mezzanine:							
	Remove Concrete Floor For New Duct Work (Cut Larger For Reworking Of Slab Reinforcing)		SF					
	Remove Concrete Floor For New Stairs (Cut Larger For Reworking Of Slab Reinforcing)		SF					
	Remove Door & Frame - Single		EA					
	Remove Window @ Theater 1		SF					
	Enlarge Concrete Opening @ Removed Door		SF					
	Core Drill For Pipe Relocation @ Mezzanine Level		LOC					

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CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	Remove Portion Of Concrete Wall @ Theater 2 For Ducts 4' X 3'		LOC					
	Chop Top Surface Of Floor Slab 1 1/2" Deep For New Electrical Feed		LF					
	Building Demolition Generator:							
	Remove & Salvage Gravel Ballast		SF					
	Remove Insulation at New Posts		EA					
	Chop Concrete Roof Topping for New Posts Connection		EA					
	Core Exhaust Flue Penetration		LOC					
	Core Conduit Penetration		LOC					
	Subtotal							
03 0000	CONCRETE							
03 3000	CAST-IN-PLACE CONCRETE							
	Infill Concrete Openings @ Theater Shear Wall		CY					
	Concrete On Metal Deck @ Raised Floors, Seating & Ramps At Ground Floor Level		SF					
	Concrete Fill @ Stairs		RFT					
	Concrete Slab @ Isolation Floor Under Theater 1 Stage		SF					
	10" Reinf Concrete Floor Slab at Elev. 9' 3 1/4" - Control Room Level		SF					
	Slab On Metal Deck @ Theater 1 Control Room		SF					
	Concrete Beams @ Control Room Level		CY					
	New Reinforced Concrete Edge Slab @ Removed Slab		SF					
	Concrete Floor Patch @ Mezzanine Mech Room		SF					
	Concrete Balcony w/ Architectural Finish @ Theater 1							
	- Up-Set Beam		CY					
	- 6" Floor Slab On Metal Deck		CY					
	- 10" Floor Slab		CY					
	- 14" Floor Slab		CY					
	- 10" Concrete Beams		CY					

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	- Architecturally Finished, Lightweight Concrete Balcony Rail		CY					
	- Anchors thru Concrete Shear Wall to Suppt Mezz Balcony - Horizontal Length		LF					
	Structural Mount @ MCC Signage @ Exterior Of Building 5 A-814		CY					
	- Concrete							
	Subtotal							
03 3500	SPECIAL CONCRETE FINISHES							
	Sand Blast Finish Exposed Concrete Walls		SF					
	Scaffold		SF					
	Subtotal							
03 5300	CONCRETE FLOOR TOPPING							
	Concrete Ardex Leveling Floor Finish @ The Ground Level		SF					
	Concrete Ardex Leveling Floor Finish @ Control Room Level		SF					
	Concrete Ardex Leveling Floor Finish @ Mezzanine Level		SF					
	Misc Concrete Ardex Leveling Floor Finish		SF					
	Concrete Conditioning		SF					
	Concrete Topping Generator:							
	New Concrete Topping at Posts		EA					
	Subtotal							
04 0000	MASONRY							
04 2200	UNIT MASONRY - CMU							
	10" CMU Block Wall Type 10		SF					
	Subtotal							
05 0000	METALS							
05 1200	STRUCTURAL STEEL							
	Structural Steel Frame for Control Room Level		LBS					

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	Structural Steel For Theatre 1 Control Room		LBS					
	Structural Steel @ Lower Theatre 1 Catwalk		LBS					
	Structural Steel @ Upper Theatre 1 Catwalk		LBS					
	Structural Steel @ Theatre 1 Ceiling		LBS					
	Structural Steel @ Upper Theatre 2 Catwalk		LBS					
	Structural Steel @ Theatre 2 Ceiling For Grid		LBS					
	Structural Steel @ Equipment Mezzanine		LBS					
	Bolted Plate Connections (Steel to Concrete)		LOC					
	Sound Isolation Pads at Steel/Concrete Connections		LS					
	Structural Steel Generator:							
	Steel For Platform		LBS					
	Steel Columns		LBS					
	Post For Screen Wall		LBS					
	Top Tubes For Screen Wall		LBS					
	Bolted Plate Connections (Steel to Concrete)		LOC					
	Subtotal							
05 3000	METAL DECKING							
	Metal Deck @ Floor Framing, Ramps, & Raised Theater Seating (Ground Level)		SF					
	Metal Deck @ Control Room Floor Theater 1		SF					
	Metal Deck at Control Room Level - EL 9'-3 1/4"		SF					
	Subtotal							
05 4000	COLD FORMED METAL FRAMING							
	Built Up Floor Framing 6" 14 Gage @ Lobby Area, Theater seating & Ramps		SF					
	Subtotal							
05 5000	MISCELLANEOUS METALS							
	Painted Steel Ladder w/ Fall Enclosure in Theater 2		LF					

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	Ladder For Theater 1 Technical Balcony		RFT					
	Catwalk Steel Plate							
	- Cat Walk @ Theater 2		SF					
	- Catwalk @ Theater 1		SF					
	Stainless Steel Washer & Dryer Pan		SF					
	Unistrut @ Theater 2 Walls		LF					
	Unistrut @ Theater 2 Catwalk		LF					
	Corner Guards		EA					
	Pipe Bike Racks		EA					
	Miscellaneous Metals Generator.							
	Aluminum Screenwall		SF					
	Subtotal							
05 5100	STEEL PAN STAIRS							
	Metal Pan Stairs @ Stairs #1 & #3, Lobby, Trash & Backstage Areas		RFT					
	Subtotal							
05 7010	ORNAMENTAL GLASS RAIL SYSTEM							
	Floor Mounted Railings @ Backstage & Lobby Ramps & Stairs		LF					
	Wall Mounted Hand Rail @ Backstage & Lobby Ramps & Stairs		LF					
	Floor Mounted Railings @ Stairs #1 & #3 and Control Room		LF					
	Wall Mounted Hand Rail @ Stairs #1 & #3 and Control Room		LF					
	Floor Mounted Guard Rail @ Theater 1 Seating		LF					
	Railing @ Theater 1 Stage Ramps		LF					
	Wall Mounted SS Handrails Theater 1		LF					
	"L" Shaped SS Guard Rails @ Theater 1 Seats		LF					
	Railing @ Theater 1 Technical Galley		LF					
	Railing @ Catwalk Theater 1		LF					
	Ornamental Glass Railings @ Lobby Stairs & Ramp		LF					
	Subtotal							

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
06 0000	WOOD, PLASTICS, AND COMPOSITES							
06 2000	CARPENTRY							
	Stick Built Raised Floor Assembly W/ 6" 14Ga Metal Framing & 2 Layers Of Plywood							
	- Balcony		SF					
	- Stage & Control Room Framing		SF					
	- Trash Room		SF					
	- Theater 2		SF					
	Hardwood Vertical Fins - Sect 6/A-256		LF					
	Painted Mit Panel On Plywood Backing Riser @ Lobby Raised Floor		SF					
	Painted Plywood Mounted To Kendorf For Panels @ Dimmer Room		SF					
	Misc. Wood Blocking		LS					
	Carpentry Generator:							
	- Plywood Blocking @ Electrical Closet		SF					
	- Misc. Wood Blocking		LS					
	Subtotal							
06 4023	ARCHITECTURAL WOODWORK							
	Ground Level:							
	Rear Counter at Ticketing		LF					
	Fixed Desk W/ Storage Below @ Ticketing		LF					
	New Custom Built In Bar @ Lobby		LF					
	Millwork @ Pantry, Catering Prep Area, & Greenroom Including The Following							
	- SS Counter		LF					
	- P-Lam Base Cabinet @ Green Room		LF					
	- P-Lam Counter @ Green Room		LF					
	- Laminate Back & Side Splash		SF					
	Hardwood Base		LF					

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Location: 515 West 52nd Street, New York, NY 10019
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	18" Technical Baseboard in Theater 2		LF					
	Interior Finish Panel @ Lower Lobby Wall		SF					
	Wood Framed Oak Panel Knee Walls @ Theater 1 Seating		SF					
	Oak Cap @ Knee Walls & Back of Seating		LF					
	Painted Plywood Panels @ Theater 2		SF					
	South Wall @ Theater 1 (1 @ A256)							
	- Continuous Plywood Head		LF					
	- Continuous Plywood Sill		LF					
	- Plywood Backing		SF					
	- Vertical Plywood Slats		LF					
	Oak Shelf In Soundlock 1-3 Niches		LF					
	Control Room Level:							
	Shelving In AV Closet		LF					
	Mezzanine Level:							
	Counter @ Storage/Copy Room & Pantry		LF					
	Base Cabinet @ Storage/Copy Room & Pantry		LF					
	Laminate Backsplash		SF					
	Built In Banquette @ Lobby		LF					
	Poplar Wood Base		LF					
	Subtotal							
07 0000	THERMAL AND MOISTURE PROTECTION							
07 2100	THERMAL INSULATION							
	Liquid Applied Roofing Membrane @ New Posts		SF					
	Tapered Insulation		SF					
	Re-install Salvage Ballast		SF					
	Subtotal							
07 8100	SPRAYED FIRE-RESISTIVE MATERIALS							
	Spray On Fire Proofing		SF					
	Subtotal							

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NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Project: Manhattan Class Company Theater Fit Out
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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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 8413	FIRESTOPS AND SMOKESEALS							
	Firestops and Smoke seals		SF					
	Fire Stopping And Smoke seals (Generator)		LS					
	Subtotal							
07 9200	JOINT SEALERS							
	Joint Sealers		SF					
	Waterproof Membrane Under Tile Floors		SF					
	Subtotal							
08 0000	OPENINGS							
08 1113	STEEL DOORS AND FRAMES							
	Doors Ground Floor:							
	2'-10" X 6'-10 3/4"		EA					
	3'-6" X 6'-10 3/4"		EA					
	3' x 6'-10 3/4"		EA					
	3' x 6'-10 3/4" Fire Rated		EA					
	3' x 6'-10 3/4" w/ Full Perimeter Gasket		EA					
	(1) 3'-8" x 7'-3 3/4" & (1) 2'-4" x 7'-3 3/4"		PR					
	(1) 3'-0" x 6'-10 3/4" & (1) 2'-6" x 6'-10 3/4"		PR					
	Doors Control Room Level:							
	3' x 6'-10 3/4"		EA					
	(2) 3' x 6'-10 3/4"		PR					
	3' x 6'-10 3/4" w/ Full Perimeter Gasket		EA					
	(2) 6'-2" x 7'-5"		PR					
	3' x 6'-10 3/4" w/ Full Perimeter Gasket Acoustic Door		EA					
	Doors Mezzanine & Theater 1 Control Levels:							
	3' x 6'-10 3/4"		EA					
	(2) 2'-10" x 7'-1 3/4" w/ Full Perimeter Gasket Acoustic Door		PR					
	(2) 3' x 6'-10 3/4" w/ Full Perimeter Gasket		PR					

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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
	(2) 2'-10" X 6'-10" W/ Full Perimeter Gasket		PR					
	3' x 6'-10 3/4" w/ Full Perimeter Gasket		EA					
	Steel Doors & Frames Generator:							
	2'-0" X 6'-10 3/4"		PR					
	2'-6" X 6'-10 3/4"		PR					
	Subtotal							
08 1416	WOOD DOORS							
	Doors Ground Floor:							
	5'-8" X 8'-0"		EA					
	2'-0" X 8'-0"		EA					
	(2) 3'-8" X 6'-10 3/4" & 2'-2" X 6'-10 3/4" W/ Full Perimeter Gasket		PR					
	Doors Mezzanine & Theater 1 Control Levels:							
	5'-3" X 9'-2 1/2"		EA					
	6'-0" X 9'-2 1/2"		EA					
	7'-9" X 9'-2 1/2"		EA					
	(2) 2'-10" X 6'-10" W/ Full Perimeter Gasket		PR					
	Subtotal							
08 3113	ACCESS DOORS							
	Access Doors and Panels		LS					
	Subtotal							
08 3473	SOUND CONTROL DOOR ASSEMBLIES							
	(2) 3' x 6'-10 3/4" w/ Fire Rating & Full Perimeter Gasket		PR					
	(2) 2'-10" x 6'-10" w/ Fire Rating & Full Perimeter Gasket		PR					
	(2) 3' x 8'-10 3/4" w/ Fire Rating & Full Perimeter Gasket		PR					
	(1) 3'-0" x 6'-10 3/4" & (1) 2'-6" x 6'-10 3/4" Acoustic Rated Door		PR					
	Subtotal							

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG
Sponsor Agency: Department of Cultural Affairs

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 4313	ALUMINUM ENTRANCES AND STOREFRONTS Aluminum Framed Windows In Existing Openings STC 45 Rated Window @ Control Room Subtotal		SF SF					
08 7100	DOOR HARDWARE Existing Doors Stainless-Steel Kickplates Door Saddles Blowopen Operation (Automatic Door Opener) Material By Commissioner Door Hardware Generator: New Doors Stainless-Steel Kickplates Subtotal		SETS EA EA EA SETS EA					
08 8000	GLASS AND GLAZING Glass Partition @ Mezzanine Offices New Pivot Glazed Doors In Existing Vestibule: Double Subtotal		SF PR					
09 0000	FINISHES							
09 2900	GYPSUM DRYWALL 3 5/8" Mtl Stud, Batt Insulation, & 1 Layer Of 5/8" Gypboard On Each Side Type 1 3 5/8" Mtl Stud, Batt Insulation, & 1 Layer Of 5/8" Gypboard On 1 Side Type 2 6" Mtl Stud, Batt Insulation, & 1 Layer Of 5/8" Gypboard On Each Side Type 3 6" Mtl Stud, Batt Insulation, & 1 Layer Of 5/8" Gypboard On 1 Side Type 4		SF SF SF SF					

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CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	2 1/2" Mtl Stud, Batt Insulation, 2 Layers Of 5/8" Gypboard On One Side & 1" Shaft Liner On The Other Side Type 5		SF					
	3 5/8" Mtl Stud, Batt Insulation, & 2 Layers Of 5/8" Gypboard Each Side Type 6		SF					
	Double Stud Partition W/ Batt Insulation, 2 Layers Of 5/8" Gypboard On One Side, & 3 Layers Of 5/8" Gypboard On The Other Side Type 9		SF					
	5/8" Gyp Board on 1/2" Furring Channel on 1 Side, 5/8" Gypboard on 1 5/8" Metal Stud & Batt Insulation (On CMU Wall) Type 10		SF					
	Gyp Board Furring 1/2" Steel Furring Channel Type 11		SF					
	Gyp Board Furring W/ 2 Layers Of 5/8" Gypboard On Metal Studs Type 12		SF					
	Gypboard Fascia @ Ground Level		SF					
	Gypboard Fascia @ Control Level		SF					
	Gypboard Fascia @ Mezzanine Level		SF					
	Gypboard Soffit @ Lobby		SF					
	1/2" Gypsum Reveal Reglet Base		LF					
	Curved Gypboard Column Enclosure		SF					
	Ceilings:							
	C-1 - Paint Existing Concrete		SF					
	C-2 - GWB		SF					
	C-3 - Resiliently Hung GWB		SF					
	C-4 - New Concrete, Formed Finish (Painted Black)		SF					
	C-5 - Acoustical Ceiling Tile		SF					
	C-6 - Horizontal GWB Shaft Wall		SF					
	C-7 - Tectum Finite Panel - Painted - Includes Labor		SF					
	C-8 - Resiliently Hung GWB		SF					
	C-9 - GWB		SF					
	C-10 - 2-1/2" X 1/2" Douglas Fir		SF					
	C-11 3/4" Douglas Fir Plywood		SF					

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CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	Generator:							
	3 5/8" Mt Stud, Batt Insulation, & 2 Layers Of 5/8" Gypboard Each Side Type 6		SF					
	Subtotal							
09 3013	CERAMIC TILING							
	24" X 48" F-4 Porcelain Tile		SF					
	Wall Tile Porcelain		SF					
	Porcelain Base		LF					
	Ceramic Mosaic Tile 2" X 2" F-4B		SF					
	Walk Off Mat In Vestibule		SF					
	Subtotal							
09 6400	WOOD FLOORING							
	White Oak Tongue & Groove, 2-1/2" wide, 3/4" thick Type F5:							
	Mezzanine Level		SF					
	Finish Oak Flooring		SF					
	Masonite Flooring Over Neoprene Pad @ Theater 1 Stage - Type F6		SF					
	Performance Floor w/ Resilient Finish Over Neoprene Pad @ Ground Level - Type F9		SF					
	Subtotal							
09 6401	WOOD BLOCK FLOORING							
	4" W 1" Th Douglas Fir Endgrain Wood Block Floor: Ground Floor Level		SF					
	Subtotal							
09 6500	RESILIENT FLOORING							
	Resilient Base @ Concrete & Performance Flooring: Ground Floor Level		LF					

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DESIGN + CONSTRUCTION

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CONTRACT 1 - 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: Materials and Labor
	Control Room Level		LF					
	Mezzanine Level		LF					
	Rubber Tile		SF					
	VCT		SF					
	Subtotal							
09 6800	CARPETING							
	Ground Floor Level - Type F-8		SY					
	Mezzanine Level - Type F-8		SY					
	Subtotal							
09 8413	ACOUSTIC WALL PANELS							
	Acoustic Fabric Wrapped Wall Panel		SF					
	1/2" Duct Liner Behind Perforated Wood In Theater 2 (30% Of Area)		SF					
	Subtotal							
09 9000	PAINTING AND FINISHING							
	Paint New Gypsum Ceiling / Fascia:							
	Ground Floor Level		SF					
	Control Level		SF					
	Mezzanine Level		SF					
	Paint Walls:							
	Ground Floor Level		SF					
	Control Room Level		SF					
	Mezzanine Level		SF					
	Finish Doors:							
	Ground Floor Level		LVS					
	Control Room Level		LVS					
	Mezzanine Level		LVS					
	Paint Poplar Base		LF					

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DESIGN + CONSTRUCTION

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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
	Patch & Paint Existing Stair Walls		SF					
	Epoxy Paint @ Stair 2 Floor		SF					
	Epoxy Paint @ Stair 2 Risers		RFT					
	Painting And Finishing Generator.							
	Paint New Gypboard Ceilings		SF					
	Paint Walls		SF					
	Paint Doors		LVS					
	Subtotal							
10 0000	SPECIALTIES							
10 1400	IDENTIFYING DEVICES							
	New Illuminated Wall Mounted Signage		LS					
	Shadow Boxes @ Exterior of North Elevation (incl. labor)		EA					
	Subtotal							
10 2114	TOILET PARTITIONS							
	Standard (Stainless Steel)		EA					
	Handicapped (Stainless Steel)		EA					
	Urinal Screen (Stainless Steel)		EA					
	Subtotal							
10 2219	DEMOUNTABLE PARTITIONS (included w/ other Division 10 sections)							
10 2813	TOILET ACCESSORIES							
	Toilet Paper Dispenser		EA					
	Soap Dispenser		EA					
	Recessed Hand Dryer		EA					
	Recessed Paper Towel & Trash Receptacle		EA					
	Grab bars:							
	30"		EA					

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DESIGN + CONSTRUCTION

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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
	42"		EA					
	48"		EA					
	60"		EA					
	Bathroom Mirrors		SF					
	Dressing Room Mirrors		SF					
	Rehearsal Room & Wardrobe Mirrors		SF					
	Corkboard @ Dressing Rooms		SF					
	Subtotal							
10 4416	FIRE EXTINGUISHERS AND CABINETS							
	Fire extinguishers and cabinets		EA					
	Subtotal							
11 0000	EQUIPMENT							
11 2429	FALL PROTECTION							
	Theater 1 Fall Protection		LS					
	Theater 2 Fall Protection		LS					
	Subtotal							
11 3100	APPLIANCES							
	111 Catering / Prep Area:							
	Refrigerator		EA					
	128 Pantry:							
	Ice Maker		EA					
	Dishwasher		EA					
	Refrigerator		EA					
	120 Green Room:							
	Refrigerator		EA					
	Dishwasher		EA					
	159 Wardrobe:							
	Washer		EA					

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CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	Dryer		EA					
	218 Pantry							
	Refrigerator		EA					
	Dishwasher		EA					
	Subtotal							
11 6133	THEATRICAL RIGGING							
	Theater 1 Rigging		LS					
	Theater 2 Rigging		LS					
	Subtotal							
11 6163	THEATRICAL LIGHTING DIMMING AND CONTROL							
	Large Theatr 1 Ltg Controls - mat'l		LS					
	Small Theatr 2 Ltg Controls - mat'l		LS					
	Rehearsal Ltg Controls - mat'l		LS					
	Subtotal							
11 6183	THEATRICAL AUDIO VIDEO SYSTEMS							
	Theater 1 Performance Sound Playback & Reinforcement		LS					
	Theater 2 Performance Playback & Reinforcement		LS					
	Building Wide Audio Video System:							
	Production Video & Projection Infrastructure		LS					
	Assistive Listening System		LS					
	Production Intercom System		LS					
	Program Monitor / Page System		LS					
	Facility-Wide Racks, Patching & Networking		LS					
	Custom AV Plates, Panels, Wiring		LS					
	Subtotal							

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DESIGN + CONSTRUCTION

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CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG
 Sponsor Agency: Department of Cultural Affairs

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
12 0000	FURNISHINGS							
12 0500	UPHOLSTERY		LS					
	Upholstery							
	Subtotal							
14 0000	CONVEYINGSYSTEMS							
14 4200	WHEELCHAIR LIFTS		LS					
	1 Landing Wheelchair Lift							
	Subtotal							
	TOTAL CONTRACT 1 - GENERAL CONSTRUCTION WORK, BID ALTERNATE 1 (PROJECT BASE BID)							
	BID ALTERNATE #2 WORK							
09 0000	FINISHES							
09 8413	ACOUSTIC WALL PANELS		SF					
	Wall Panel - Painted (incl. labor)							
	Subtotal							
11 0000	EQUIPMENT							
11 6183	THEATRICAL AUDIO VIDEO SYSTEMS							
	Theater 1 Performance Sound Playback & Reinforcement		LS					
	Theater 1 Performance Surround sound Loud Speakers		LS					
	Theater 2 Performance Playback & Reinforcement		LS					
	Production Video & Projection Infrastructure		LS					
	Production Intercom System		LS					
	Subtotal							

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DESIGN + CONSTRUCTION

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CONTRACT 1 - GENERAL CONSTRUCTION WORK

DDC ID: PV467-CRG
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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
12 0000	FURNISHINGS							
12 6100	FIXED AUDIENCE SEATING							
	Theater 1 Audience Seating (243 Ea)		LS					
	Subtotal							
	TOTAL CONTRACT 1 - GENERAL CONSTRUCTION WORK, BID ALTERNATE 2: (PROJECT BASE BID + BID ALTERNATE 2 WORK)							

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NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - PLUMBING WORK

DDC ID: PV467-CRG
 Sponsor Agency: Department of Cultural Affairs

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 2 - PLUMBING WORK							
22 0000	PLUMBING							
22 0000	GENERAL PROVISIONS FOR PLUMBING							
	Mobilization		LS					
	Demolition		LS					
	Flushing and Disinfection		LS					
	Leak Detection		LS					
	Seismic Restraint and Certification		LS					
	Valve Tags, Pipe Identification		LS					
	Subtotal							
22 0513	MOTORS AND STARTERS (included w/ other Division 22 sections)							
22 0523	PIPING, VALVES AND FITTINGS							
	Sanitary Waste and Vent Piping:							
	4" No Hub Cast Iron Pipe		LF					
	3" No Hub Cast Iron Pipe		LF					
	2" No Hub Cast Iron Pipe		LF					
	1 1/2" No Hub Cast Iron Pipe		LF					
	No Hub Cast Iron Fittings		EA					
	Hangers		EA					
	D2 Floor Drains		EA					
	D3 Coated Floor Drains		EA					
	D6 Floating Floor Drains		EA					
	Floor Sinks		EA					
	Funnel Floor Drains		EA					
	Water Closet Carriers		EA					
	Urinal Carriers		EA					
	Lavatory Carriers		EA					
	Floor Sleeves		EA					

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CONTRACT 1 - PLUMBING WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	Wall Cleanouts		EA					
	Connections to Existing		EA					
	No Hub Couplings, etc.		LS					
	Rain Leader Piping:							
	6" No Hub Cast Iron Pipe		LF					
	No Hub Cast Iron Fittings		EA					
	Hangers		EA					
	Floor Sleeves		EA					
	No Hub Couplings, etc.		LS					
	Domestic Water Piping:							
	2" L Copper Tubing		LF					
	1 1/2" L Copper Tubing		LF					
	1 1/4" L Copper Tubing		LF					
	1" L Copper Tubing		LF					
	3/4" L Copper Tubing		LF					
	1/2" L Copper Tubing		LF					
	Wrought Copper Fittings		EA					
	Hangers		EA					
	150# Bronze Ball Valves		EA					
	150# Bronze Check Valves		EA					
	150# Bronze Strainers		EA					
	150# Bronze Drain Valves		EA					
	Water Hammer Arrestors		EA					
	Trap Primers		EA					
	Interior Hosebibbs		EA					
	Thermometers		EA					
	Tie Ins to Existing		EA					
	Floor Sleeves		EA					
	Solder, Flux, Gas, etc.		LS					
	Generator:							
	Misc Pipe and Fitting for Rooftop Fuel Storage Tank		EA					
	Subtotal							

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DESIGN + CONSTRUCTION

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CONTRACT 1 - PLUMBING WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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 0548	EQUIPMENT BASES AND VIBRATION CONTROL							
	W1 2 Wall Mounted Water Closets		EA					
	U1 Wall Hung Urinals		EA					
	L1 Wall Hung Lavatories		EA					
	L2 Under Mount Lavatories		EA					
	SH Shower Valves, Drains		EA					
	S1 Under Mount Singlr Bowl Stainless Sink		EA					
	S2 Under Mount Single Bowl Stainless Sink		EA					
	S3 Drop In Sink ette w/ Drain Board		EA					
	S4 18 Gallon Utility Tub Set		EA					
	S5 19 Gallon Utility Tub Set		EA					
	DF Drinking Fountain		EA					
	Washing Machine Box		EA					
	WH 1 Electric Storage Water Heater 120 Gallon, 54 GPH, 12 KW		EA					
	WH 2 Electric Storage Water Heater 30 Gallon, 6 GPH, 1.5 KW		EA					
	WH 2 Electric Storage Water Heater 30 Gallon, 10 GPH, 2.3 KW		EA					
	Thermostatic Mixing Valves		EA					
	Domestic Hot Water Expansion Tank		EA					
	Subtotal							
22 0700	INSULATION							
	1" Thk Fiberglass Insulation		LF					
	Fiberglass Pipe Insulation		LF					
	Subtotal							
22 0800	COMMISSIONING OF PLUMBING (included w/ other Division 22 sections)							
22 2000	PUMPING EQUIPMENT							
	Domestic Hot Water Recirculation Pump		EA					
	Subtotal							
	TOTAL CONTRACT 2 - PLUMBING WORK							

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DESIGN + CONSTRUCTION

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 3 - HEATING, VENTILATION AND AIR CONDITIONING WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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 3 - HEATING, VENTILATION AND AIR CONDITIONING WORK							
21 0000	FIRE SUPPRESSION							
21 0000	GENERAL PROVISIONS FOR FIRE SUPPRESSION							
	Mobilization							
	Fire Protection Demolition:							
	Large Bore Pipe Demolition		LF					
	Medium Bore Pipe Demolition		LF					
	Fire Department Vaive Demolition		EA					
	Fire Department Connection Demolition		EA					
	Bulk Mains and Risers:							
	6" Blk Stl Pipe Stan Wt Grooved		LF					
	4" Blk Stl Pipe Sch 40 Grooved		LF					
	3" Blk Stl Pipe Sch 40 Grooved		LF					
	2 1/2" Blk Stl Pipe Sch 40 Grooved		LF					
	2" Blk Stl Pipe Sch 40 T&C		LF					
	Grooved Fittings		EA					
	125# Cast Iron Fittings		EA					
	Hangers		EA					
	250# Cast Iron Gate Valves		EA					
	250# Cast Iron Check Valve		EA					
	Ball Drip		EA					
	Floor Control Valves		EA					
	125# Cast Iron Pressure Reducing Valves		EA					
	Siamese Fire Department Connection		EA					
	3" Deluge Vaive Assembly		EA					
	Fire Department Hose Valves		EA					
	Fire Hose Cabinets		EA					
	Tamper Switches		EA					
	Flow Detectors		EA					
	Lubricants, etc.		EA					

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NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Project: Manhattan Class Company Theater Fit Out
Location: 515 West 52nd Street, New York, NY 10019
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 3 - HEATING, VENTILATION AND AIR CONDITIONING WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	Sprinkler Heads and Branch Piping:							
	165 Degree Concealed Pendants Heads w/ Branch Piping		EA					
	165 Degree Upright Heads w/ Branch Piping		EA					
	Exposed Open Head w/ Branch Piping		EA					
	165 Degree Sidewall Heads w/ Branch Piping		EA					
	Drain, Fill Vent		LS					
	Heat Sensors		EA					
	Wiring Points		EA					
	Subtotal							
21 0800	COMMISSIONING OF FIRE SUPPRESSION (included w/ section 210000)							
23 0000	HEATING, VENTILATING AND AIR CONDITIONING							
23 0000	GENERAL PROVISIONS FOR HVAC WORK							
	Seismic Restraint and Certification		LS					
	Temporary Heating and Cooling		LS					
	Testing Adjusting and Balancing		MH					
	Pipe Identification, Valve Tags		LS					
	Subtotal							
23 0050	DEMOLITION AND REMOVALS FOR HVAC							
	Small Duct Demolition		SF					
	Subtotal							
23 0513	MOTORS AND STARTERS							
	Variable Frequency Drives		EA					
	Magnetic Motor Starters		EA					
	Subtotal							

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CONTRACT 3 - HEATING, VENTILATION AND AIR CONDITIONING WORK

DDC ID: PV467-CRG
 Sponsor Agency: Department of Cultural Affairs

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 0523	PIPING, VALVES AND FITTINGS							
	Chilled Water:							
	4" Blk Stl Pipe Sch 40 PE		LF					
	3" Blk Stl Pipe Sch 40 PE		LF					
	2 1/2" Blk Stl Pipe Sch 40 PE		LF					
	2" L Copper Tubing		LF					
	1 1/2" L Copper Tubing		LF					
	1 1/4" L Copper Tubing		LF					
	1" L Copper Tubing		LF					
	3/4" L Copper Tubing		LF					
	150# Buttweld Fittings		EA					
	Wrought Copper Fittings		EA					
	Hangers		EA					
	125# Cast Iron Gate Valves		EA					
	150# Bronze Ball Valves		EA					
	125# Cast Iron Control Valves		EA					
	150# Bronze Control Valves		EA					
	150# Bronze 3 Way Control Valves		EA					
	125# Cast Iron Strainers		EA					
	150# Bronze Strainers		EA					
	125# Cast Iron Balancing Valves		EA					
	150# Bronze Balancing Valves		EA					
	Heating Hot Water:							
	3" Blk Stl Pipe Sch 40 PE		LF					
	2" L Copper Tubing		LF					
	1 1/2" L Copper Tubing		LF					
	1 1/4" L Copper Tubing		LF					
	1" L Copper Tubing		LF					
	3/4" L Copper Tubing		LF					
	150# Buttweld Fittings		EA					
	Wrought Copper Fittings		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
	Hangers		EA					
	150# Bronze Ball Valves		EA					
	150# 3 Way Control Valves		EA					
	150# Bronze Control Valves		EA					
	150# Bronze Balancing Valves		EA					
	150# Bronze Strainers		EA					
	Tie Into Existing		EA					
	Pressure Temperature Plugs		EA					
	Pressure Gauges		EA					
	Thermometers		EA					
	150# Bronze Drain Valves		EA					
	Manual Air Vents		EA					
	Air Conditioning Condensate Piping:							
	1 1/2" L Copper Tubing		LF					
	3/4" L Copper Tubing		LF					
	Wrought Copper Fittings		EA					
	Hangers		EA					
	Fan Coil Condensate Drain Pans		EA					
	Rod, Gas, Solder, Flux, etc.		LS					
	Generator Exhaust:							
	5" Blk Stl Pipe Stan Wt PE		LF					
	150# Buttweld Fittings		EA					
	Hangers		EA					
	Roof Ventilated Thimble/Flashing		EA					
	Counter Weighed Rain Cap		EA					
	Guy Wires		LS					
	Floor Sleeve		EA					
	Hang Muffler		EA					
	Rod, Gas, Solder, Flux, etc.		LS					
	Subtotal							

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DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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	EQUIPMENT BASES AND VIBRATION CONTROL							
	Air Handler Vibration Isolators		SETS					
	Fan Coil Unit Vibration Isolators		SETS					
	Fan Vibration Isolators		SETS					
	Piping Vibration Isolation		LS					
	Subtotal							
23 0549	NOISE CONTROL							
	1 1/2" Thk Duct Liner		SF					
	Subtotal							
23 0700	HVAC INSULATION							
	2 hr Fire Rated Wrap		SF					
	Fiberglass Pipe Insulation w/ Figs		LF					
	Generator:							
	4" Thk Calcium Silicate Pipe Insulation		LF					
	Aluminum Jacket		SF					
	Subtotal							
23 0800	COMMISSIONING OF HVAC (included w/ other Division 23 sections)							
23 0923	CONTROLS AND INSTRUMENTATION							
	AHU 1 Central Station Air Handling Unit 4,100 CFM w/ HW, CHW Coils, Humidifier		PTS					
	AHU 2 Central Station Air Handling Unit 4,665 CFM w/ HW, CHW Coils, Humidifier		PTS					
	AHU 3 Central Station Air Handling Unit 4,000 CFM w/ HW, CHW Coils, Humidifier		PTS					
	AHU 4 Central Station Air Handling Unit 7,655 CFM w/ Hw, CHW Coils, Humidifier		PTS					

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CONTRACT 3 - HEATING, VENTILATION AND AIR CONDITIONING WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	AHU 5A Central Station Air Handling Unit 2,300 CFM w/ HW, CHW Coils		PTS					
	AHU 5B Central Station Air Handling Unit 2,300 CFM w/ HW, CHW Coils		PTS					
	VAV Box w/ HW Coil 16" Inlet		PTS					
	VAV Box w/ HW Coil 9" Inlet		PTS					
	VAV Box w/ HW Coil 8" Inlet		PTS					
	VAV Box w/ HW Coil 7" Inlet		PTS					
	VAV Box w/ HW Coil 6" Inlet		PTS					
	VAV Box w/ HW Coil 5" Inlet		PTS					
	VAV Box w/ HW Coil 4" Inlet		PTS					
	VAV Box 16" Inlet		PTS					
	VAV Box 14" Inlet		PTS					
	VAV Box 12" Inlet		PTS					
	VAV Box 10" Inlet		PTS					
	VAVBox 9" Inlet		PTS					
	VAV Box 5" Inlet		PTS					
	Fan Coil Unit 33 MBH Cooling		PTS					
	Fan Coil Unit 18 MBH Cooling		PTS					
	Fan Coil Unit 24 MBH Cooling, 14 MBH Heating		PTS					
	SEF 1 Utility Set 21,150 CFM @ 7.05", 60 HP		PTS					
	SEF 2 Utility Set 23,850 CFM @ 6.96", 60 HP		PTS					
	RLF 1 Inline Fan 4,500 CFM @ 1", 1 1/2 HP		PTS					
	EF 1 Dryer Booster Fan 100 CFM @ .75", 1/3 HP		PTS					
	EF 4 Roof Fan 150 CFM @ .25", 1/4 HP		PTS					
	EF 5 Inline Fan 100 CFM @ .75", 1/3 HP		PTS					
	EF 6 Roof Fan 1,000 CFM @ .5", 1/3 HP		PTS					
	Hydronic Cabinet Unit Heater 15 MBH		PTS					
	Miscellaneous Monitoring Points		PTS					
	Operators Work Station		EA					
	Subtotal							

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DESIGN + CONSTRUCTION

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CONTRACT 3 - HEATING, VENTILATION AND AIR CONDITIONING WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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 2000	PUMPING EQUIPMENT							
	Air Conditioning Condensate Pumps w/ Reservoirs		EA					
	Subtotal							
23 3000	DUCTWORK AND AIR OUTLETS							
	Galvanized Ductwork		LBS					
	Double Walled Plenums w/ Stainless Interior		SF					
	1 Slot x 7 Foot Diffusers		EA					
	Supply Air Diffusers		EA					
	Supply Air Grilles		EA					
	Mushroom Supply Air Diffusers		EA					
	Return Air Grilles		EA					
	Exhaust Air Grilles		EA					
	Canvas Flexible Connections		EA					
	Cable Operated Dampers		EA					
	Volume Dampers		EA					
	Fire Smoke Dampers		EA					
	Smoke Dampers		EA					
	Motorized Dampers		EA					
	Wire Mesh Screens		EA					
	Access Doors		EA					
	Roof Curbs		EA					
	Subtotal							
23 3700	AIR HANDLING AND TREATMENT							
	AHU 1 Central Station Air Handling Unit 4,100 CFM w/ HW, CHW Coils, Humidifier		EA					
	AHU 2 Central Station Air Handling Unit 4,665 CFM w/ HW, CHW Coils, Humidifier		EA					
	AHU 3 Central Station Air Handling Unit 4,000 CFM w/ HW, CHW Coils, Humidifier		EA					

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DESIGN + CONSTRUCTION

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CONTRACT 3 - HEATING, VENTILATION AND AIR CONDITIONING WORK

DDC ID: PV467-CRG

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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
	AHU 4 Central Station Air Handling Unit 7,655 CFM w/ HW, CHW Coils, Humidifier		EA					
	AHU 5A Central Station Air Handling Unit 2,300 CFM w/ HW, CHW Coils		EA					
	AHU 5B Central Station Air Handling Unit 2,300 CFM w/ HW, CHW Coils		EA					
	SA 3S Sound Attenuator 30x26x60		EA					
	SA 3R Sound Attenuator 36x33x36		EA					
	SA F8S,R Sound Attenuators 36x12x24		EA					
	SA F4S,R Sound Attenuators 24x18x36		EA					
	VAV Box w/ HW Coil 16" Inlet		EA					
	VAV Box w/ HW Coil 9" Inlet		EA					
	VAV Box w/ HW Coil 8" Inlet		EA					
	VAV Box w/ HW Coil 7" Inlet		EA					
	VAV Box w/ HW Coil 6" Inlet		EA					
	VAV Box w/ HW Coil 5" Inlet		EA					
	VAV Box w/ HW Coil 4" Inlet		EA					
	VAV Box 16" Inlet		EA					
	VAV Box 14" Inlet		EA					
	VAV Box 12" Inlet		EA					
	VAV Box 10" Inlet		EA					
	VAV Box 9" Inlet		EA					
	VAV Box 5" Inlet		EA					
	Fan Coil Unit 33 MBH Cooling		EA					
	Fan Coil Unit 18 MBH Cooling		EA					
	Fan Coil Unit 24 MBH Cooling, 14 MBH Heating		EA					
	SEF 1 Utility Set 21,150 CFM @ 7.05", 60 HP		EA					
	SEF 2 Utility Set 23,850 CFM @ 6.96", 60 HP		EA					
	RLF 1 Inline Fan 4,500 CFM @ 1", 1 1/2 HP		EA					
	EF 1 Dryer Booster Fan 100 CFM @ .75", 1/3 HP		EA					
	EF 4 Roof Fan 150 CFM @ .25", 1/4 HP		EA					

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CONTRACT 3 - HEATING, VENTILATION AND AIR CONDITIONING WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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.
	EF 5 Inline Fan 100 CFm @ .75", 1/3 HP		EA					
	EF 6 Roof Fan 1,000 CFm @ .5", 1/3 HP		EA					
	Hydronic Cabinet Unit Heater 15 MBH		EA					
	Subtotal							
	TOTAL CONTRACT 3 - HEATING, VENTILATION AND AIR CONDITIONING WORK							

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DESIGN + CONSTRUCTION

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CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 4 - ELECTRIC WORK

DDC ID: PV467-CRG
 Sponsor Agency: Department of Cultural Affairs

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 4 - ELECTRIC WORK							
26 0000	ELECTRICAL							
26 0000	GENERAL PROVISIONS FOR ELECTRICAL							
	Mobilization		LS					
	Short Circuit/Coordination Study		LS					
	Temp Power and Lighting		SF					
	Subtotal							
26 0050	DEMOLITION AND REMOVALS FOR ELECTRICAL							
	Misc Demo		SF					
	Subtotal							
26 0500	BASIC MATERIALS FOR ELECTRICAL							
	Conductors and Cables:							
	MC Cable		LF					
	#12 CU		LF					
	#10 CU		LF					
	#6 CU		LF					
	#4 CU		LF					
	#3/0 CU		LF					
	#4/0 CU		LF					
	350 Mcm CU		LF					
	500 Mcm		LF					
	400 Amp Term @ Ex Switch		EA					
	Generator:							
	#12 Controls		LF					
	#10 CU		LF					
	#2 CU		LF					
	#3/0 CU		LF					
	600 Mcm		LF					
	Hangers and Supports:							

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DESIGN + CONSTRUCTION

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CONTRACT 4 - ELECTRIC WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	Hangers and Supports		LS					
	Hangers and Supports - Generators		LS					
	Raceways, Boxes and Fittings:							
	3/4" EMT CDT		LF					
	1" EMT CDT		LF					
	1 1/4" EMT CDT		LF					
	2" EMT CDT		LF					
	2 1/2" EMT CDT		LF					
	3" EMT CDT		LF					
	3 1/2" EMT CDT		LF					
	Service Ground Box		EA					
	Bond to Bldg Steel Generator:		EA					
	3/4" EMT CDT		LF					
	1" EMT CDT		LF					
	1 1/4" EMT CDT		LF					
	2" EMT CDT		LF					
	4" EMT CDT		LF					
	400 Amp Wireway		LS					
	Wiring Devices:							
	Duplex Receptacles		EA					
	Junction Boxes/Misc		EA					
	Receptacles GFI		EA					
	Receptacles GFI Quad		EA					
	Receptacles Quad		EA					
	WP Sign Conn		EA					
	6-Pilot Switch Bank		EA					
	LV Transformer		EA					
	Floor Power Outlet		EA					
	TVSS:							
	Surge Protection Device		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
26 0548	ELECTRICAL VIBRATION AND NOISE CONTROL Vibration, Noise Control		LS					
	Subtotal							
26 0800	COMMISSIONING OF ELECTRICAL (included w/ other Division 26 sections)							
26 0943	ARCHITECTURAL DIMMING SYSTEMS							
	Switches		EA					
	Dimmer Switches		EA					
	Occupancy Sensor		EA					
	OS Power Pack		EA					
	Vacancy Sensor		EA					
	24-Ckt Dimming Pnl		EA					
	24-Zone Control Unit		EA					
	4-Button Scene Selector		EA					
	Time Clock		EA					
	Subtotal							
26 0962	BRANCH CIRCUIT TRANSFER SYSTEMS							
	Nema 1 Starter FBO		EA					
	Nema 2 Starter FBO		EA					
	Nema 3 Starter FBO		EA					
	Subtotal							
26 2212	COMPUTER-GRADE ISOLATION TRANSFORMERS							
	75 Kva Transformer		EA					
	300 Kva Transformer, zig zag		EA					
	Subtotal							
26 2416	PANELBOARDS							
	100 Amp Panel Board		EA					

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CONTRACT 4 - ELECTRIC WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
	225 Amp Panel Board		EA					
	400 Amp Panel Board		EA					
	600 Amp Panel Board		EA					
	800 Amp Distr Board		EA					
	600 Amp Switch/CB in Ex Swbd Generator:		EA					
	100 Amp Switch/CB in Ex Swbd		EA					
	400 Amp Switch/CB in Ex Swbd		EA					
	Manual Snap Switch Starter, VAV		EA					
	Overhead Door Controller FBO		EA					
	20/2 Amp Disconnect		EA					
	30 Amp Disconnect		EA					
	60 Amp Disconnect		EA					
	60 HP VFD FBO		EA					
	400 Amp Encl Ckt Brkr @ Xfmr		EA					
	800 Amp Disconnect @ Xfmr		EA					
	400 Amp Fuse		EA					
	60 Amp Company Switch		EA					
	100 Amp Company Switch		EA					
	200 Amp Company Switch		EA					
	Subtotal							
26 3200	EMERGENCY POWER SYSTEM							
	Generator:							
	30 Amp Disconnect (block heater)		EA					
	200 Amp Disconnect		EA					
	400 Amp Encl Ckt Brkr		EA					
	100 KW EM Generator, WP/Sound Encl		LS					
	EG Annunciator Panel		LS					
	Rigging		LS					
	Subtotal							

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CONTRACT 4 - ELECTRIC WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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 3623	AUTOMATIC TRANSFER SWITCH							
	Autotransfer Sw 100A		EA					
	Autotransfer Sw 400A		EA					
	Autotransfer Sw 600A		EA					
	Subtotal							
26 5000	SERVICE LIGHTING							
	Type B1, no spec		EA					
	Type B1A, no spec		EA					
	Type B4, no spec		EA					
	Type B5, no spec		EA					
	Type B6, no spec		EA					
	Type B2, no spec		LF					
	Type B2A Track, no spec		LF					
	Type B3 Track Lt, no spec		EA					
	Subtotal							
26 5100	ARCHITECTURAL LIGHTING							
	Type L2		EA					
	Type L2A 8'		EA					
	Type L2B 8'		EA					
	Type L2C 4'		EA					
	Type L7		EA					
	Type L8		EA					
	Type L8A		EA					
	Type L10		EA					
	Type L11		EA					
	Type L12		EA					
	Type L12A		EA					
	Type L12B		EA					
	Type L12D		EA					

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NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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CONTRACT 4 - ELECTRIC WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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 L14		EA					
	Type L15		EA					
	Type L16		EA					
	Type L17		EA					
	Type L18		EA					
	Type L19		EA					
	Type L19A		EA					
	Type L20		EA					
	Type L20A		EA					
	Type L21		EA					
	Type L22		EA					
	Type L23		EA					
	Type L23A		EA					
	Type L24		EA					
	Type L25		EA					
	Type L26		EA					
	Type L27		EA					
	Type L28		EA					
	Type L36		EA					
	Type L39		EA					
	Type L40		EA					
	Type L42		EA					
	Type L43		EA					
	Type L50		EA					
	LV Xfmr		EA					
	LED Driver		EA					
	Flr Junc Box, Aisle Seat Power Feed		EA					
	Type Exit		EA					
	Type L1A		LF					
	Type L1B		LF					
	Type L6		LF					

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DESIGN + CONSTRUCTION

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CONTRACT 4 - ELECTRIC WORK

DDC ID: PV467-CRG
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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
	Type L9 LED		LF					
	Type L13,13A		LF					
	Type L13C		LF					
	Type L13D		LF					
	Type L13H		LF					
	Type L14A		LF					
	Type L14B		LF					
	Type L29		LF					
	Type L33		LF					
	Type L39B		LF					
	Type L44		LF					
	Type L37 Track		LF					
	Type L38 LED Track Lt		EA					
	Subtotal							
26 5561	THEATRICAL SYSTEMS ELECTRICAL REQUIREMENTS							
	Large Theatr 1 Ltg Controls - Install		LS					
	Samll Theatr 2 Ltg Controls - Install		LS					
	Rehearsal Ltg Controls - Install		LS					
	TD Junc Box 2ckt HR		EA					
	TD Junc Box 3ckt HR		EA					
	TD Junc Box 6ckt HR		EA					
	TD Junc Box 6ckt HR, Pipe Mt		EA					
	Receptacle , Pipe Mt		EA					
	Single Trust Panel Term Box 40Ckt		EA					
	Theater Rigging Motor Controller FBO		EA					
	Mounting Pipe		LF					
	Plug Strip		LF					
	30 Amp Receptacle		EA					
	Circuitry:							
	3/4" Emt, 4#10		LF					

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CONTRACT 4 - ELECTRIC WORK

DDC ID: PV467-CRG
Sponsor Agency: Department of Cultural Affairs

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
	1" Emt, 10#10		LF					
	Subtotal							
27 0000	COMMUNICATIONS							
27 0528	TELECOMMUNICATION AND DATA WIRING SYSTEM							
	Communications Eqpt Room:							
	POE		LS					
	MDF, Term Boards		LS					
	Main Tel Ground Bar		EA					
	Tel Ground Bar		EA					
	3-Cell Innerduct		LF					
	4" EMT Cdt		LF					
	1" EMT Cdt		LF					
	Communications Horizontal Cabling:							
	Cat 6 Cable		LF					
	25 Pair Cat 5E Cable		LF					
	24 Strand Fiber Optic		LF					
	Communications Devices:							
	WAP Outlet		EA					
	Tel Outlet w/ Stubup 1c		EA					
	Tel/Data Outlet w/ Stubup 2c		EA					
	Tel/Data Outlet w/ Stubup 3c		EA					
	Floor T/D Outlet 4c		EA					
	AV System, empty conduit		SF					
	Subtotal							
28 0000	ELECTRONIC SAFETY AND SECURITY							
28 0500	COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY							
	Security System Empty conduit		SF					
	Subtotal							

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NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Project: Manhattan Class Company Theater Fit Out
 Location: 515 West 52nd Street, New York, NY 10019
 Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 4 - ELECTRIC WORK

DDC ID: PV467-CRG

Sponsor Agency: Department of Cultural Affairs

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
28 1100	SECURITY SYSTEM							
	Door Contact		EA					
	Glass Break		EA					
	Cardreader		EA					
	Camera		EA					
	DVR		EA					
	Subtotal							
28 3100	ADDRESSABLE FIRE ALARM SYSTEM							
	1 1/4" Rigid, Riser Cables		LF					
	Teflon Cable		LF					
	Pull Station		EA					
	Audible/Visual		EA					
	Smoke Detector		EA					
	Strobe		EA					
	Duct Detector		EA					
	Central Equipment (new FACP, tie in ex)		LS					
	Install Smoke Purge Panel/FBO		EA					
	Fu Cutout		EA					
	Door Operator Interface FAI		EA					
	Misc Connections, Modules		EA					
	FSD Connections, 120V		EA					
	Pull Station, reloc exist		EA					
	Audible/Visual, reloc exist		EA					
	Subtotal							
	TOTAL CONTRACT 4 - ELECTRIC WORK							

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NON-PLA

**ATTACHMENT 1 - BID INFORMATION
PROJECT ID: PV467-CRG**

DESCRIPTION AND LOCATION OF WORK:

MANHATTAN CLASS COMPANY THEATER FIT OUT
515 West 52nd Street
Manhattan, New York 10019

E-PIN: 85015B0009 / DDC PIN: 8502015PV0001C; E-PIN: 85015B0010 / DDC PIN: 8502015PV0002C
E-PIN: 85015B0011 / DDC PIN: 8502015PV0003C ; E-PIN: 85015B0012 / DDC PIN: 8502015PV0004C

DOCUMENTS AVAILABLE AT:

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

SUBMISSION OF BIDS BEFORE BID OPENING:

TIME TO SUBMIT:

On or Before: **MONDAY, APRIL 06, 2015**

BIDS MUST BE CLOCKED IN PRIOR TO BID OPENING

PLACE TO SUBMIT:

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

BID OPENING:

PLACE OF BID OPENING:	Department of Design and Construction Contract Section 30-30 Thomson Avenue – First Floor Long Island City, NY 11101
DATE AND HOUR:	MONDAY, APRIL 06, 2015 AT 2:00 PM
	LATE BIDS WILL NOT BE ACCEPTED

PRE-BID WALK-THRU AND CONFERENCE:

PLACE	Manhattan Class Company Theater 515 West 52 nd Street Manhattan, New York 10019
DATE AND HOUR	WEDNESDAY, MARCH 25, 2015 AT 10:00 AM
MANDATORY OR OPTIONAL	OPTIONAL

BID SECURITY:

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

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

PERFORMANCE AND PAYMENT SECURITY:

Required for Contracts in 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) 391-3170 or (718) 391-1016 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	INTRASTATE RATE	INTERSTATE 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 (i.e., fatality, or hospitalization of three or more employees).

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

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

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

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

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).
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- 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:

___ Minority Owned Business Enterprise	___ Locally Based Business Enterprise
___ Women Owned Business Enterprise	___ Emerging Business Enterprise
___ 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) _____ (b) _____
Contracting Agency (City Agency) Contract Amount

(c) _____ (d) _____
Procurement Identification Number (PIN) Contract Registration Number (CT#)

(e) _____ (f) _____
Projected Commencement Date 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 subcontractor 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
- (A) Apprentice
- (TRN) Trainee
- (TOT) Total by Column

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				
	(1) White Non Hisp.	(2) Black Non Hisp.	(3) Hisp.	(4) Asian	(5) Native Amer.	(6) White Non Hisp.	(7) Black Non Hisp.	(8) Hisp.	(9) Asian	(10) Native Amer.
Union Affiliation, if applicable										
Total (Col. #1-10):	J									
Total Minority, Male & Female (Col. #2,3,4,5,7,8,9, & 10):	H									
Total Female (Col. #6 - 10):	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.
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 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			
	(1) White Non Hisp.	(2) Black Non Hisp.	(3) Hisp.	(4) Asian	(5) Native Amer.	(6) White Non Hisp.	(7) Black Non Hisp.	(8) Hisp.	(9) Asian	(10) Native Amer.
J										
H										
A										
TRN										
TOT										

Total (Col. #1-10):

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

Total Female
(Col. #6 - 10):

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.
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)?

FMS ID: PV467-CRG



**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
CONTRACT NO. 2	PLUMBING WORK
CONTRACT NO. 3	HVAC + FIRE PROTECTION WORK
CONTRACT NO. 4	ELECTRICAL WORK

Manhattan Class Company Theater Fit Out

LOCATION: 515 West 52nd Street
BOROUGH: Manhattan 10019
CITY OF NEW YORK

Contractor _____

Dated _____, 20____

Entered in the Comptroller's Office _____

First Assistant Bookkeeper _____

Dated _____, 20____





PROJECT ID: PV467-CRG

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

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VOLUME 2 OF 3

**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

**Manhattan Class Company Theater Fit
Out**

LOCATION:
BOROUGH:
CITY OF NEW YORK

515 West 52nd Street
Manhattan 10019

CONTRACT NO. 1
CONTRACT NO. 2
CONTRACT NO. 3
CONTRACT NO. 4

GENERAL CONSTRUCTION WORK
PLUMBING WORK
HVAC + FIRE PROTECTION WORK
ELECTRICAL WORK

Department of Cultural Affairs

Andrew Berman Architects

Date: December 30, 2014

5-108





NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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DEPARTMENT OF DESIGN AND CONSTRUCTION
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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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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

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) including, but not limited to "Respiratory Protection" (29 CFR 1910.134), "Permit-Required Confined Spaces" (29 CFR 1910.146), and "Hazard Communication" (29 CFR 1910.1200);
- ❑ New York State Department of Labor Industrial Code Rule 23 – Protection in Construction, Demolition and Excavation;
- ❑ New York City Construction Codes, Title 28
- ❑ NYC Department of Transportation Title 34 Chapter 2 – Highway Rules
- ❑ New York State Department of Labor Industrial Code Rule 753
- ❑ NYC Local Law No. 113 (2005) Noise Control Code

In addition, all regulations promulgated by the NYC Department of Transportation, including requirements for Maintenance and Protection of Traffic (MPT), are applicable when contained in contract specifications. While MPT is a significant component of work in our Infrastructure Division, it does not supersede or exempt Contractors from complying with other applicable health and safety standards (for example, excavating and trenching standards, operation of heavy equipment and compliance with City environmental and noise regulations).

I. PURPOSE

The purpose of this policy is to ensure that Contractors perform their work and supervise their employees in accordance with all applicable federal, state and city rules and regulations. Further, Contractors will be expected to minimize or eliminate jobsite and public hazard, through a planning, inspection, auditing and corrective action process. The goal is to control risks so that injuries, illnesses and accidents to contractors' employees, DDC employees and the general public, as well as damage to city-owned and private property, are reduced to the lowest level feasible.

III. DEFINITIONS

Agency Chief Contracting Officer (ACCO): The ACCO shall mean the person delegated authority by the Commissioner to organize and supervise the procurement activity of subordinate Agency staff in conjunction with the CCPO.

Competent Person: As defined by OSHA, an individual who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees or the general public, and who has authorization to take prompt corrective measures to eliminate them.

Construction Safety Auditor: A representative of the QACS Construction Safety Unit who provides inspection and assessment services to enhance health and safety on all DDC construction projects. The activities of the Construction Safety Auditor include performing site surveys, reviewing health and safety plans, reviewing construction permits, and rendering technical advice and assistance to DDC Resident Engineers and Project Managers.

Construction Safety Unit: A part of QACS within the Division of Technical Support that assesses contractor safety on DDC jobsites and advises responsible parties of needed corrective actions.

Construction Superintendent: A representative of the contractor responsible for overseeing performance of the required construction work. This individual must engage in sound construction practices, and is responsible to maintain a safe work site. In the case of a project involving the demolition, alteration or new construction of buildings, the Construction Superintendent must be licensed by the NYC Department of Buildings.

Contractor: For purposes of these Safety Requirements, the term "Contractor" shall mean any person or entity that enters into a contract for the performance of construction work on a DDC project. The term "Contractor" shall include any person or entity which enters into any of the following types of contracts: (1) a prime construction contract for a specific project, (2) a prime construction contract using the Job Order Contracting System ("JOCS Contract"), and (3) a subcontract with a CM/Builder ("First Tier Subcontract").

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

Job Hazard Assessment (JHA): A process of identifying site-specific hazards that may be present during construction and establishing the means and methods to reduce or eliminate those hazards.

Jobsite Safety Coordinator: A person designated by the Contractor to be onsite during all activities. This individual shall have received, at a minimum, the OSHA 10-hour construction safety program. Other examples of acceptable training are the 30-hour OSHA Safety and Health Standards for the Construction Industry training program (OSHA 510) or a degree/certificate in a safety and health from a college-level curriculum. This person does not necessarily have to be dedicated full-time to site safety, but must have sufficient experience and authority to undertake corrective action and must qualify to be a competent person. For certain projects, as defined in NYC Construction Codes - Title 28, this person may be required to have a Site Safety Manager's License issued by the NYC DOB.

Qualified Person: As defined by OSHA, an individual who, by possession of a recognized degree, certificate, license or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his or her ability to solve problems relating to the subject matter, the work, or the project. Qualified Persons are required under regulation to address issues pertaining, but without limit, to fall protection, scaffold design and trenching and shoring, among others.

Resident Engineer (RE) / Construction Project Manager (CPM): Representative of the Commissioner duly designated by the Commissioner to be his/her representative at the site of the work. (The RE/CPM may be a third-party consultant, including a CM, retained by DDC.)

Safety Program: Established by the Contractor that covers all operations of that Contractor and establishes the Contractor's overall safety policy, regulatory compliance plan and minimum safety standards. The Safety Program must be submitted prior to the commencement of work at the site and is subject to review and acceptance by the Construction Safety Unit.

Safety Questionnaire: Used by DDC to evaluate Contractor's current and past safety performance. It is required to be completed by all Contractors initially when submitting bids for Construction work, or when being pre-qualified and updated annually or as requested by the DDC.

Site Safety Plan: A site-specific safety plan developed by the Contractor for a specific project. The Site Safety Plan must identify hazards associated with the project, and include specific safety precautions and training appropriate and necessary to complete the work. The Site Safety Plan must be submitted prior to the commencement of work at the site and is subject to review and acceptance by the Construction Safety Unit.

Unsafe or Unhealthy Condition: A condition that could be potentially hazardous to the health and safety of personnel or the public, and/or damaging to equipment, machinery, property or the environment.

Weekly Safety Meetings: Weekly documented jobsite safety meetings, given to all jobsite personnel by contractor, with the purpose of discussing general safety topics and job specific requirements encountered at the DDC work site.

IV. RESPONSIBILITIES

All persons who manage, perform, and provide support for construction projects shall conduct operations in compliance with the requirements identified in this Policy and all applicable governing regulatory agency requirements and guidelines pertaining to safety in construction.

A. Resident Engineer / Construction Project Manager / Construction Manager

- Monitors the issuance of safety-related permits, approvals and drawings and maintains copies on site.
- Monitors construction-related work activities to confirm that they are conducted in accordance with DDC policies and all applicable regulations that pertain to construction safety.
- Maintains documentation and periodically attends weekly safety meeting.
- Notifies the Construction Safety Unit and the ACCO's Insurance and Risk Management Unit of project-related accidents and emergencies, as per DDC's Construction Safety Emergency Protocol.
- Gathers facts related to all accidents and prepares DDC Accident Reports.
- Notifies the Construction Safety Unit of outside regulatory agency inspections and forwards a copy of the inspection report within three days of its receipt.
- Monitors the conditions at the site for conformance with the Site Safety Plan and DDC construction documents.
- Notifies the contractor and DDC in the event that any condition or activity exists that is not in compliance with the Site Safety Plan, applicable federal, state or local codes or any condition that presents a potential risk of injury to the public or workers or possible damage to property.
- Notifies DDC of any emergency condition and directs the contractor to provide such labor, materials, equipment and supervision to abate such conditions.
- Reports gross safety violations to the Construction Safety Unit immediately.

A. Contractors

- Complete a Safety Questionnaire and submit with its bid or as part of a pre-qualification package.
- Provide a Written Job Hazard Assessment (JHA) that identifies expected safety issues of the work to be performed. JHA shall be included with the Site Safety Plan submitted by the contractor.
- Submit a Site Safety Plan and Safety Program within 15 days of issuance of the Notice to Proceed, or as otherwise directed. The Site Safety Plan and Safety Program are subject to review and acceptance by the Construction Safety Unit prior to the commencement of work at the site. The Site Safety Plan shall be revised and updated as necessary.
- Ensure that all employees are aware of the hazards associated with the project through formal and informal training and/or other communications. Conduct and document weekly safety meetings for the duration of the project. Documentation to be provided to the RE/CPM/CM on a monthly basis.
- Name a Construction Superintendent, if required.
- Name a Job Site Safety Coordinator. The Contractor will be required to identify the Job Site Safety Coordinator in the Site Safety Plan.
- Comply with all mandated federal, state and local safety and health rules and regulations.
- Comply with all provisions of the Site Safety Plan.
- As part of the Site Safety Plan, prepare a site specific MPT (if not otherwise provided in the contract documents) and comply with all of its provisions.
- Conduct and document site-specific safety orientation for Contractor personnel to review the hazards associated with the project as identified in the Site Safety Plan and the specific safety procedures and controls that will be used to protect workers, the general public and property. The Job Site Safety Coordinator will conduct this training prior to mobilization and provide documentation to the RE/CPM/CM.
- Provide, replace and adequately maintain at or around the project site, suitable and sufficient signage, lights, barricades and enclosures (fences, sidewalk sheds, netting, bracing, etc.).
- Report unsafe conditions or hazards to the DDC RE/CPM/CM as soon as practical, but no more than 24 hours after discovery, and take action to remove or abate such conditions.

- Report any accident involving injuries to workers or the general public, as well as property damage, to the DDC RE/CPM/CM within two (2) hours.
- Notify the DDC RE/CPM/CM within two (2) hours of the start of an inspection by any regulatory agency personnel, including OSHA.
- Maintain all records pertaining to all required compliance documents and accident and injury reports.
- Respond to DDC recommendations on safety, which shall in no way relieve the Contractor of its responsibilities for safety on the project. The Contractor has sole responsibility for safety.

V. SAFETY QUESTIONNAIRE

DDC requires that all Contractors provide information regarding their current and past safety and environmental performance and programs. This will be accomplished by the use of the DDC Safety Questionnaire. As a part of the bid submittal package, the contractor must submit a completed DDC Safety Questionnaire listing their workers' compensation experience modification rating and OSHA Incidence Rates for the three (3) years prior to the date of the bid opening. DDC may request a Contractor to update its Questionnaire at any time or to provide more detailed information. The Contractor must provide the requested update within 30 days.

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

- Criteria 1: OSHA Injury and Illness Rates (I&IR) are no greater than the average for the industry (based on the most current Bureau of Labor Statistics data for the Contractors SIC code); and
- Criteria 2: Insurance workers compensation Experience Modification Rate (EMR) equal to or less than 1.0; and
- Criteria 3: Any willful violations issued by OSHA or NYC DOB within the last three years; and
- Criteria 4: A fatality (worker or member of public) experienced on or near Contractor's worksite within the last three (3) years; and
- Criteria 5: An unacceptable rating by QACS based on past performance on DDC projects; and
- Criteria 6: Contractor has in place an acceptable corporate safety program and its employees shall have completed all documented relative safety training; and
- Criteria 7: Contractor shall provide OSHA Injury Records (currently OSHA 300 Log) for the last three (3) years.

If the Contractor fails to meet the basic criteria listed above, the Construction Safety Unit may request, through the ACCO, more detail concerning the Contractor's safety experience. DDC may request the Contractor to provide copies of, among other things, OSHA records, OSHA and DOB citations, EPA citations and written Safety Programs.

VI. SAFETY PROGRAM AND SITE SAFETY PLAN

Within fifteen (15) days of issuance of the Notice to Proceed, or as otherwise directed, the Contractor shall submit the following: (1) Safety Program, and (2) Site Safety Plan. The Safety Program shall set forth the Contractor's overall safety policy, regulatory compliance plan and minimum safety standard, and the Site Safety Plan shall identify hazards associated with the project, and include specific safety precautions and training appropriate and necessary to complete the work. The Safety Program and the Site Safety Plan are subject to review and acceptance by the Construction Safety Unit prior to the commencement of work at the site. Failure by the contractor to submit an acceptable Site Safety Plan and Safety Program shall be grounds for default.

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

1. **Responsibility and Organization:** Identify the person or persons with authority and responsibility for implementing the Site Safety Plan. Provide an organization chart and define levels of authority and responsibility. Identify the Competent Person, the Construction Superintendent (if required), the Job Safety Coordinator and the Qualified Person required for this project.
2. **Communication:** Establish a system for communicating with employees and subcontractors on matters relating to worker and public safety and health and environmental protection, including provisions designed to encourage employees to inform the employer of hazards at the worksite without fear of reprisal. An emergency response notification protocol is to be established that also includes after hours contact numbers. The plan must also include provisions for weekly safety meetings held by the Job Site Safety Coordinator.
3. **Job Hazard Assessment:** A written document submitted by the contractor, used to identify expected job hazards and public safety risks and state the specific means and methods to reduce, control or eliminate those hazards. This part of the Site Safety Plan must also include how on-going evaluations of those risks and hazards will be carried out, including plans for periodic inspections to identify unsafe conditions, work practices and public safety hazards.
4. **Accident/Exposure Investigation:** Establish a procedure to investigate and report occupational and public injury or illness, property damage, vehicle accidents or other mishaps.
5. **Hazard Correction:** Establish means, methods and/or procedures for correcting unsafe or unhealthy conditions that might be exposing both the public and workers to hazards. Corrective actions must be taken immediately when observed or discovered. Should an imminent hazard exist which cannot be immediately abated without endangering employees, the public and/or property, remove or restrict all exposed persons from the area except those necessary to correct the existing condition. Employees necessary to correct the hazardous condition shall be provided the necessary safeguards. When corrective actions cannot be taken immediately, temporary measures should be taken until such time permanent measures are taken to eliminate the potential risks or hazards
6. **Training:** Describe site-specific hazard training programs. In addition to the required safety orientation, additional site specific training, in the form of required weekly safety meetings, will be required. Contractors must also initiate training when: a) new employees are hired; b) employees are given new job assignments for which training has not been previously received; c) new substances, processes, procedures or equipment are introduced that might represent a new public or worker hazard; d) the employee is made aware of a new or previously unrecognized hazard; e) new supervisors are assigned to familiarize themselves with the safety and health hazards to which employees under their immediate direction and control may be exposed; and f) after a jobsite incident or accident has occurred.
7. **Recordkeeping:** Establish procedures to maintain records of scheduled and periodic inspections, weekly safety meetings, and training records. Updated records shall be maintained at the jobsite, accessible to the Construction Safety Auditors and/or Quality Assurance Auditors/RE/CPM, and retained in accordance with DDC policy.

The most critical component of the Site Safety Plan is the Job Hazard Assessment section. This section must address specific hazards that are anticipated throughout the project. Each Site Safety Plan must address, at a minimum:

- Public and pedestrian safety
- Fall protection
- Electrical hazards
- Scaffolding
- Fire protection
- Emergency notification & response
- Housekeeping / debris removal
- Dust control
- Maintenance and protection of traffic
- Trenching and excavating
- Heavy equipment operations
- Material / equipment storage
- Environmental contamination
- Sheeting and shoring
- Alcohol and Drug Abuse Policy

The following additional hazards must be addressed, if applicable, based on the contract safety specifications and/or the results of the JHA (the list is not all-inclusive):

- Basic Personal Protective Equipment
- Compressed Air
- Compressed Gas Cylinders
- Cranes, Derricks and Hoists
- Demolition
- Electrical safety
- Excavations and Trenching
- Fall Protection – Floor openings/Stairways
- Fall Protection – Guardrails Toe boards etc
- Fall Protection – Leading Edge
- Fall Protection – Personal Fall Protection Devices
- Fire Protection and Fire Prevention
- Hazard Communication (RIGHT TO KNOW)
- Hazardous Energy & Lock Out / Tag Out
- Housekeeping/ Sanitation
- Maintenance and Protection of Traffic (MPT)
- Man Lifts /Aerial Lifts
- Marine Operations
- Motor Vehicle Safety
- Overhead Power lines
- Permit Required Confined Space
- Portable Ladders
- Powered Actuated Tools
- Powered Material Handling Equipment
- Scaffolds – Mobile
- Scaffolds – Stationary
- Scaffolds – Suspended
- Slings
- Steel Erection
- Welding and Cutting (Hot Work)
- Airborne Contaminants – Particulates – General
- Asbestos
- Blood borne Pathogens
- Hearing Protection
- Lead in Construction
- Mercury in Construction
- PCB's
- Respiratory Protection
- Silica
- Thermal Stress
- West Nile Virus
- Rodents and Vermin
- Noise Mitigation Plan

Certain DDC programs, such as Job Order Contracting System (JOCS), may not necessarily require Site Safety Plans. The JOCS contractor will be required to submit a Safety Program. In addition, certain DDC Operating Units may establish program or client-specific safety requirements. The contractor's Site Safety Plan must address such program or client specific safety requirements.

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

As part of the construction kick-off meeting, a Site Safety Plan review will be part of the agenda. A QACS representative will participate in this meeting with the contractor prior to the start of the project for the purpose of:

- A. Reviewing the safety issues detailed in the contract.
- B. Reviewing the Site Safety Plan.
- C. Reviewing any new issues or information that was not previously addressed.
- D. Discussing planned inspections and audits of the site by DDC personnel.

VIII. EVALUATION DURING WORK IN PROGRESS

The Contractor's adherence to these Safety Requirements will be monitored throughout the project. This will be accomplished by the following:

- A. Use of a safety checklist by a representative of the Construction Safety Unit or other designated DDC representative or Consultant during regular, unannounced inspections of the job site. Field Exit Conferences will be held with the RE/CPM, Contractor Superintendents or Safety Representatives.
- B. The RE/CPM will continually monitor the safety and environmental performance of the contractor's employees and work methods. Deficiencies shall be brought to the attention of the contractor's representative on site for immediate correction. The DDC representative will maintain a written record of these deficiencies and forward them to the Construction Safety Unit on a weekly basis. Any critical deficiencies shall be immediately reported to QACS phone# (718) 391-1624 or (718) 391-1911.
- C. If the Contractor's safety performance during the project is not up to DDC standards (safety performance measure, accident/incident rate, etc.) the Director- QACS, or designee will meet with the Contractor's safety representative, the DDC project manager, the RE/CPM, or the DDC Environmental Specialist (if environmental issues are involved). The purpose of this meeting is to 1) determine the level of non-compliance; 2) explain and clarify the safety/environmental provisions; 3) agree on a future course of action to correct the deficiencies.
- D. If the deficiencies continue to occur with inadequate attention by the contractor, this shall, among other remedies available, be grounds for default.
- E. The contractor shall inform the Construction Safety Unit and ACCO Insurance and Risk Management Unit of all medical injuries or illnesses that require doctors' treatment resulting from an on-the-job incident within 24 hours of the occurrence. The Construction Safety Unit shall also be immediately informed of all fatalities, catastrophic accidents with more than one employee hospitalized, any injuries to members of the general public and major equipment damage (e.g., property damage, equipment rollovers, loads dropped from crane). QACS shall maintain a record of all contractor injuries and illnesses during the project and provide regular reports to the Agency.
- F. The Construction Safety Unit shall be immediately notified at the start of any NYS-DOL/ NYC-COSH/ OSHA/ EPA inspections. The Director of Quality Assurance & Construction Safety shall maintain a log of all contractor OSHA/EPA inspections and citations during the project.

IX. SAFETY PERFORMANCE EVALUATION

The contractor's safety record, including all DDC inspection results, will be considered as part of the Contractor's performance evaluation at the conclusion of the project. Poor safety performance during the course of the project shall be a reason to rate a Contractor unsatisfactory which will be reflected in the City's Vendex system and will be considered for future procurement actions as set forth in the City's Procurement Policy Board Rules.

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CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT

December 2013



**CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

CHAPTER I

THE CONTRACT AND DEFINITIONS

ARTICLE 1.	THE CONTRACT	1
ARTICLE 2.	DEFINITIONS	1

CHAPTER II

THE WORK AND ITS PERFORMANCE

ARTICLE 3.	CHARACTER OF THE WORK	4
ARTICLE 4.	MEANS AND METHODS OF CONSTRUCTION	4
ARTICLE 5.	COMPLIANCE WITH LAWS	5
ARTICLE 6.	INSPECTION	10
ARTICLE 7.	PROTECTION OF WORK AND OF PERSONS AND PROPERTY; NOTICES AND INDEMNIFICATION	11

CHAPTER III

TIME PROVISIONS

ARTICLE 8.	COMMENCEMENT AND PROSECUTION OF THE WORK	12
ARTICLE 9.	PROGRESS SCHEDULES	12
ARTICLE 10.	REQUESTS FOR INFORMATION OR APPROVAL	13
ARTICLE 11.	NOTICE OF CONDITIONS CAUSING DELAY AND DOCUMENTATION OF DAMAGES CAUSED BY DELAY	13
ARTICLE 12.	COORDINATION WITH OTHER CONTRACTORS	17
ARTICLE 13.	EXTENSION OF TIME FOR PERFORMANCE	18
ARTICLE 14.	COMPLETION AND FINAL ACCEPTANCE OF THE WORK	21
ARTICLE 15.	LIQUIDATED DAMAGES	22
ARTICLE 16.	OCCUPATION OR USE PRIOR TO COMPLETION	22

CHAPTER IV

SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 17.	SUBCONTRACTS	23
ARTICLE 18.	ASSIGNMENTS	25

**CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

**CHAPTER V
CONTRACTOR'S SECURITY AND GUARANTY**

ARTICLE 19.	SECURITY DEPOSIT	26
ARTICLE 20.	PAYMENT GUARANTEE	26
ARTICLE 21.	RETAINED PERCENTAGE	29
ARTICLE 22.	INSURANCE	29
ARTICLE 23.	MONEY RETAINED AGAINST CLAIMS	35
ARTICLE 24.	MAINTENANCE AND GUARANTY	36

**CHAPTER VI
CHANGES, EXTRA WORK AND DOCUMENTATION OF CLAIM**

ARTICLE 25.	CHANGES	37
ARTICLE 26.	METHODS OF PAYMENT FOR OVERRUNS AND EXTRA WORK	37
ARTICLE 27.	RESOLUTION OF DISPUTES	40
ARTICLE 28.	RECORD KEEPING FOR EXTRA OR DISPUTED WORK	44
ARTICLE 29.	OMITTED WORK	45
ARTICLE 30.	NOTICE AND DOCUMENTATION OF COSTS AND DAMAGES; PRODUCTION OF FINANCIAL RECORDS	45

**CHAPTER VII
POWERS OF THE RESIDENT ENGINEER, THE ENGINEER
OR ARCHITECT AND THE COMMISSIONER**

ARTICLE 31.	THE RESIDENT ENGINEER	46
ARTICLE 32.	THE ENGINEER OR ARCHITECT OR PROJECT MANAGER	47
ARTICLE 33.	THE COMMISSIONER	47
ARTICLE 34.	NO ESTOPPEL	48

**CHAPTER VIII
LABOR PROVISIONS**

ARTICLE 35.	EMPLOYEES	48
ARTICLE 36.	NO DISCRIMINATION	50
ARTICLE 37.	LABOR LAW REQUIREMENTS	52
ARTICLE 38.	PAYROLL REPORTS	57
ARTICLE 39.	DUST HAZARDS	58

**CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

CHAPTER IX

PARTIAL AND FINAL PAYMENTS

ARTICLE 40.	CONTRACT PRICE	58
ARTICLE 41.	BID BREAKDOWN ON LUMP SUM	58
ARTICLE 42.	PARTIAL PAYMENTS	58
ARTICLE 43.	PROMPT PAYMENT	59
ARTICLE 44.	SUBSTANTIAL COMPLETION PAYMENT	59
ARTICLE 45.	FINAL PAYMENT	60
ARTICLE 46.	ACCEPTANCE OF FINAL PAYMENT	61
ARTICLE 47.	APPROVAL BY PUBLIC DESIGN COMMISSION	62

CHAPTER X

CONTRACTOR'S DEFAULT

ARTICLE 48.	COMMISSIONER'S RIGHT TO DECLARE CONTRACTOR IN DEFAULT	62
ARTICLE 49:	EXERCISE OF THE RIGHT TO DECLARE DEFAULT	64
ARTICLE 50.	QUITTING THE SITE	64
ARTICLE 51.	COMPLETION OF THE WORK	64
ARTICLE 52.	PARTIAL DEFAULT	64
ARTICLE 53.	PERFORMANCE OF UNCOMPLETED WORK	65
ARTICLE 54.	OTHER REMEDIES	65

CHAPTER XI

MISCELLANEOUS PROVISIONS

ARTICLE 55.	CONTRACTOR'S WARRANTIES	66
ARTICLE 56.	CLAIMS AND ACTIONS THEREON	66
ARTICLE 57.	INFRINGEMENT	66
ARTICLE 58.	NO CLAIM AGAINST OFFICERS, AGENTS OR EMPLOYEES	67
ARTICLE 59.	SERVICES OF NOTICES	67
ARTICLE 60.	UNLAWFUL PROVISIONS DEEMED STRICKEN FROM CONTRACT	67
ARTICLE 61.	ALL LEGAL PROVISIONS DEEMED INCLUDED	67
ARTICLE 62.	TAX EXEMPTION	67
ARTICLE 63.	INVESTIGATION(S) CLAUSE	69
ARTICLE 64.	TERMINATION BY THE CITY	71
ARTICLE 65.	CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE	73

**CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

**CHAPTER XI (CONT'D)
MISCELLANEOUS PROVISIONS**

ARTICLE 66.	PARTICIPATION IN AN INTERNATIONAL BOYCOTT	74
ARTICLE 67.	LOCALLY BASED ENTERPRISE PROGRAM	74
ARTICLE 68.	ANTITRUST	75
ARTICLE 69.	MACBRIDE PRINCIPLES PROVISIONS	75
ARTICLE 70.	ELECTRONIC FILING/NYC DEVELOPMENT HUB	77
ARTICLE 71.	PROHIBITION OF TROPICAL HARDWOODS	77
ARTICLE 72.	CONFLICTS OF INTEREST	78
ARTICLE 73.	MERGER CLAUSE	78
ARTICLE 74.	STATEMENT OF WORK	78
ARTICLE 75.	COMPENSATION TO BE PAID TO CONTRACTOR	78
ARTICLE 76.	ELECTRONIC FUNDS TRANSFER	78
ARTICLE 77.	RECORDS RETENTION	79
ARTICLE 78.	PARTICIPATION BY MINORITY-OWNED AND WOMEN-OWNED ENTERPRISES IN CITY PROCUREMENT	79
SIGNATURES		85
ACKNOWLEDGMENT BY CORPORATION		86
ACKNOWLEDGMENT BY PARTNERSHIP		86
ACKNOWLEDGMENT BY INDIVIDUAL		86
ACKNOWLEDGMENT BY COMMISSIONER		87
AUTHORITY		88
COMPTROLLER'S CERTIFICATE		88
MAYOR'S CERTIFICATE		89
PERFORMANCE BOND #1		90
PERFORMANCE BOND #2		94
PAYMENT BOND		98

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 11.1, 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

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: _____ Dollars, (\$ _____), this said sum being the amount at which the Contract was awarded to the Contractor at a public letting thereof, based upon the Contractor's bid for the Contract.

ARTICLE 76. ELECTRONIC FUNDS TRANSFER

76.1 In accordance with Section 6-107.1 of the Administrative Code, the Contractor agrees to accept payments under this Contract from the City by electronic funds transfer (EFT). An EFT is any transfer of funds, other than a transaction originated by check, draft or similar paper instrument, which is initiated through an electronic terminal, telephonic instrument or computer or magnetic tape so as to order, instruct or authorize a financial institution to debit or credit an account. Prior to the first payment made under this Contract, the Contractor shall designate one financial institution or other authorized payment agent and shall complete the attached "EFT Vendor Payment Enrollment Form" in order to provide the Commissioner of the City Department of Finance with information necessary for the Contractor to receive electronic funds transfer payments through a designated financial institution or authorized payment agent. The crediting of the amount of a payment to the appropriate account on the books of a financial institution or other authorized payment agent designated by the Contractor shall constitute full satisfaction by the City for the amount of the payment under this Contract. The account information supplied by the Contractor to facilitate the electronic funds transfer shall remain confidential to the fullest extent provided by Law.

76.2 The Commissioner may waive the application of the requirements of this Article 76 to payments on contracts entered into pursuant to Section 315 of the City Charter. In addition, the Commissioner of the Department of Finance and the Comptroller may jointly issue standards pursuant to

which the Agency may waive the requirements of this Article 76 for payments in the following circumstances: (i) for individuals or classes of individuals for whom compliance imposes a hardship; (ii) for classifications 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.

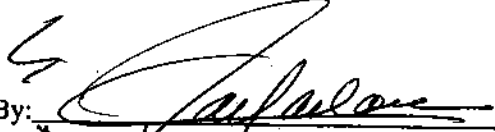
5. Whenever Agency has reason to believe that an MBE and/or WBE is not qualified for certification, or is participating in a contract in a manner that does not serve a commercially useful function (as defined in Section 6-129(c)(8)), or has violated any provision of Section 6-129, Agency shall notify 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

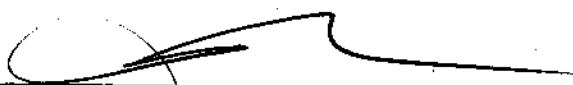
By: 
Deputy Commissioner

CONTRACTOR: Sajjan Electric 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 NY County of NY ss:

On this 29 day of FEB, before me personally came RICHARD SAIJILU to me known, who, being by me duly sworn did depose and say that he resides at NEW YORK that he is the PRESIDENT

of the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he signed his name thereto by like order.

Simone Smith
Notary Public or Commissioner of Deeds

SIMONE SMITH
Commissioner of Deed
City of New York No. 4-67
Certificate Filed in New York C
Commission Expires 07/01/16

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:

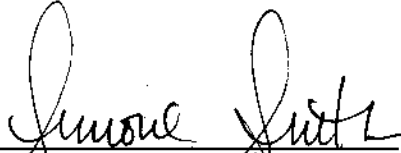
On this _____ day of _____, before me personally appeared _____ to me known, and known to me to be the person described in and who executed the foregoing instrument; and acknowledged that he executed the same.

Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT BY COMMISSIONER

State of New York County of Queens ss:

On this 2nd day of March 2016 before me personally came Eric Macfarlane 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

SIMONE SMITH
Commissioner of Deeds
City of New York No. 4-6780
Certificate Filed in New York County
Commission Expires 07/01/16

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

Three million five hundred
eighty-four thousand dollars

Dollars (\$ 3,584,000.00)

is chargeable to the fund of the Department of Design and Construction entitled Code

Department of Design and Construction

I hereby certify that the specifications contained herein comply with the terms and conditions of the BUDGET.


Deputy Commissioner

COMPTROLLER'S CERTIFICATE

The City of New York _____

Pursuant to the provisions of Section 6-101 of the Administrative Code of the City of New York, I hereby certify that there remains unapplied and unexpended a balance of the above mentioned fund applicable to this Contract sufficient to pay the estimated expense of executing the same viz:

\$ _____

Comptroller

**MAYOR'S CERTIFICATE OR
CERTIFICATE OF THE DIRECTOR
OF THE BUDGET**

Performance Bond #1 (Pages 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;

EXECUTED IN FOUR (4) ORIGINALS

BOND NO. 22826

Payment Bond (Pages 98 to 101): Use for any contract for which a Payment Bond is required.

PAYMENT BOND

PAYMENT BOND (Page 1)

KNOW ALL PERSONS BY THESE PRESENTS, That we, Sajiun Electric, Inc.

hereinafter referred to as the "Principal", and U.S. Specialty Insurance Company

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

Three Million, Five Hundred Eighty-four Thousand Dollars and 00/100

~~(\$3,584,000.00)~~ Dollars, lawful money of the United States, for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal is about to enter, or has entered, into a Contract in writing with the City for

Electrical Work associated with the Manhattan Class Company Theater Fit Out
Borough of Manhattan

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 assignments, 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 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 24th day of February, 2016

(Seal)

Sajun Electric, Inc. (L.S.)
Principal

By: _____

(Seal)

U.S. Specialty Insurance Company
Surety

By: _____

Patrick G. Weir, Attorney-in-Fact

(Seal)

Surety

By: _____

(Seal)

Surety

By: _____

(Seal)

Surety

By: _____

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by a duly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Contract.

Payment Bond (Pages 100 to 103): Use for any contract for which a Payment Bond is required.

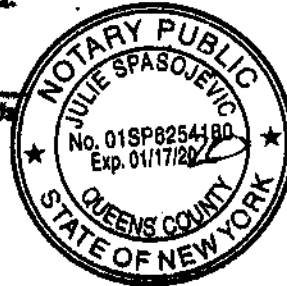
PAYMENT BOND (Page 4)

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of NY County of NY ss:

On this 24th day of Feb, 2016, before me personally came Richard Salion to me known, who, being by me duly sworn did depose and say that he resides at NEW YORK that he is the PRESIDENT of the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he signed his name thereto by like order.

Julie Spasojewic
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 he acknowledged that he executed the same.

Notary Public or Commissioner of Deeds

Each executed bond should be accompanied by: (a) appropriate acknowledgments of the respective parties; (b) appropriate duly certified copy of Power of Attorney or other certificate of authority where bond is executed by agent, officer or other representative of Principal or Surety; (c) a duly certified extract from By-Laws or resolutions of Surety under which Power of Attorney or other certificate of authority of its agent, officer or representative was issued, and (d) certified copy of latest published financial statement of assets and liabilities of Surety.

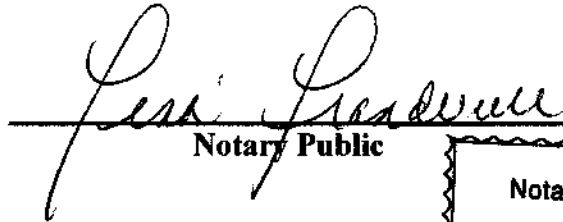
Affix Acknowledgments and Justification of Sureties.

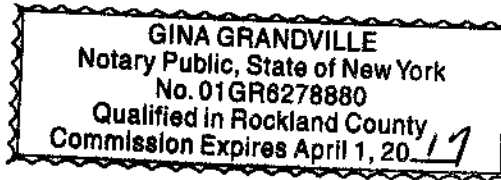
ACKNOWLEDGEMENT OF SURETY

STATE OF NEW YORK

COUNTY OF ROCKLAND

On 02-24-16 before me personally came Patrick G. Weir known, who, being by me duly sworn, did depose and say that he resides in Orangeburg, NY that he is the Attorney-in-Fact of U.S. Specialty Insurance Company, and that he signed his name thereto by order of the Board of Directors of said corporation.


Notary Public



POWER OF ATTORNEY

AMERICAN CONTRACTORS INDEMNITY COMPANY UNITED STATES SURETY COMPANY U.S. SPECIALTY INSURANCE COMPANY

KNOW ALL MEN BY THESE PRESENTS: That American Contractors Indemnity Company, a California corporation, United States Surety Company, a Maryland corporation and U.S. Specialty Insurance Company, a Texas corporation (collectively, the "Companies"), do by these presents make, constitute and appoint:

Patrick G. Weir

its true and lawful Attorney(s)-in-fact, each in their separate capacity if more than one is named above, with full power and authority hereby conferred in its name, place and stead, to execute, acknowledge and deliver any and all bonds, recognizances, undertakings or other instruments or contracts of suretyship to include riders, amendments, and consents of surety, providing the bond penalty does not exceed *****Unlimited***** Dollars (\$ ***unlimited***).

This Power of Attorney shall expire without further action on December 08, 2016. This Power of Attorney is granted under and by authority of the following resolutions adopted by the Boards of Directors of the Companies:

Be it Resolved, that the President, any Vice-President, any Assistant Vice-President, any Secretary or any Assistant Secretary shall be and is hereby vested with full power and authority to appoint any one or more suitable persons as Attorney(s)-in-Fact to represent and act for and on behalf of the Company subject to the following provisions:

Agency-in-Fact may be given full power and authority for and in the name of and on behalf of the Company, to execute, acknowledge and deliver, any and all bonds, recognizances, contracts, agreements or indemnity and other conditional or obligatory undertakings, including any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts, and any and all notices and documents canceling or terminating the Company's liability thereunder, and any such instruments so executed by any such Attorney-in-Fact shall be binding upon the Company as if signed by the President and sealed and effected by the Corporate Secretary.

Be it Resolved, that the signature of any authorized officer and seal of the Company heretofore or hereafter affixed to any power of attorney or any certificate relating thereto by facsimile, and any power of attorney or certificate bearing facsimile signature or facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached.

IN WITNESS WHEREOF, The Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 10th day of December, 2012.

AMERICAN CONTRACTORS INDEMNITY COMPANY UNITED STATES SURETY COMPANY U.S. SPECIALTY INSURANCE COMPANY

Corporate Seals



[Signature] Daniel P. Aguilar, Vice President

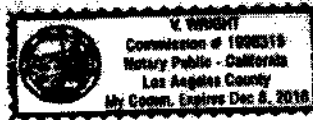
State of California

County of Los Angeles SS:

On 10th day of December, 2012, before me, Vanessa Wright, a notary public, personally appeared Daniel P. Aguilar, Vice President of American Contractors Indemnity Company, United States Surety Company and U.S. Specialty Insurance Company who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct. WITNESS my hand and official seal.

Signature [Signature] (Seal)



I, Jeannie Lee, Assistant Secretary of American Contractors Indemnity Company, United States Surety Company and U.S. Specialty Insurance Company, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney, executed by said Companies, which is still in full force and effect; furthermore, the resolutions of the Boards of Directors, set out in the Power of Attorney are in full force and effect.

In Witness Whereof, I have hereunto set my hand and affixed the seals of said Companies at Los Angeles, California this 24th day of February, 2016.

Corporate Seals

Bond No. 22826 Agency No. 12172



[Signature] Jeannie Lee, Assistant Secretary

Kan't Kopy 'K1
Security Paper

- Hidden Pantograph
- Color Match
- Artificial Watermark
- Anti-Copy Coin Rub
- Erasure Protection
- Security Features Box
- Microprint Protection
- Acid Free

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- Acid Free

U.S. SPECIALTY INSURANCE COMPANY
STATUTORY STATEMENT OF ADMITTED ASSETS,
LIABILITIES, CAPITAL AND SURPLUS (1)
 December 31, 2014

Admitted Assets

Investments:
 Fixed Maturities, at amortized cost
 Common stocks
 Cash and short term investments
 Receivable for securities
Total cash and invested assets:

1,602,021,248
 141,837,243
 10,816,340
 874,471
1,755,549,302

Liabilities and Capital and Surplus

Liabilities:
 Unpaid loss and loss adjustment expense
 Commission payable
 Accrued expenses
 Taxes, licenses, and fees
 Federal income tax
 Unearned premiums
 Advance premium
 Dividends to policyholders
 Ceded reinsurance balance payable
 Funds held under reinsurance treaties
 Amounts withheld or retained for others
 Provision for reinsurance
 Payable to parent, subsidiaries and affiliates
 Payable for securities

17,055,937
 70,185,819
 11,559,494
 33,882,202
 2,586,857

Total liabilities

Capital and Surplus:
 Capital Stock
 Additional paid-in and contributed capital
 Unassigned surplus

135,270,309
1,890,819,611

Total admitted assets

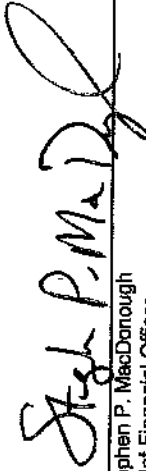
Total liabilities and capital and surplus

4,200,000
 187,779,428
 385,087,116
577,066,544
1,890,819,611

(1) - In accordance with the statutory financial statements as filed on March 1, 2015.

I, Stephen P. MacDonough, Chief Financial Officer of U.S. Specialty Insurance Company, hereby certify that to the best of my knowledge and belief, the foregoing is a full and true Statutory Statement of Admitted Assets, Liabilities and Capital and Surplus of the Company as of December 31, 2014, prepared in conformity with accounting practices prescribed or permitted by the Texas Department of Insurance. The foregoing statement should not be taken as a complete statement of financial condition of the Company. Such a statement is available upon written request at the Company's home office located at 13403 Northwest Freeway, Houston, Texas 77040.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Corporation at Houston, Texas.


 Stephen P. MacDonough
 Chief Financial Officer

EXECUTED IN FOUR (4) ORIGINALS

BOND NO. 22826

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, Sajiun Electric, Inc.

hereinafter referred to as the "Principal", and U.S. Specialty Insurance Company

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

Three Million, Five Hundred Eighty-four Thousand Dollars and 00/100-----

(\$ 3,584,000.00-----) Dollars, lawful money of the United States, for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal is about to enter, or has entered, into a Contract in writing with the City for Electrical Work associated with the Manhattan Class Company Theater Fit Out
Borough of Manhattan

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 #1 (Pages 22 to 25): 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)

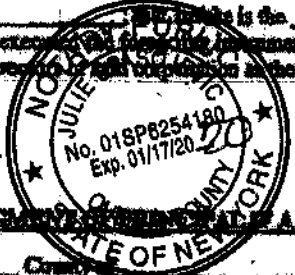
ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

State of NY County of NY ss:

On this 24th day of Feb, 2016 before me personally came RICHARD SALON to me known, who, being by me duly sworn did depose and say that he/she resides at NEW YORK

and that he/she is the President of the corporation described in and which executed the foregoing instrument; and that he/she signed his/her name to the foregoing instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

Julie Grosser
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 _____

and 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 in 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 when bond is executed by agent, officer or other representative of Principal or Surety; (c) a duly certified extract from By-Laws or resolutions of Surety under which Power of Attorney or other certificate of authority of its agent, officer or representative was issued, and (d) certified copy of latest published financial statement of assets and liabilities of Surety.

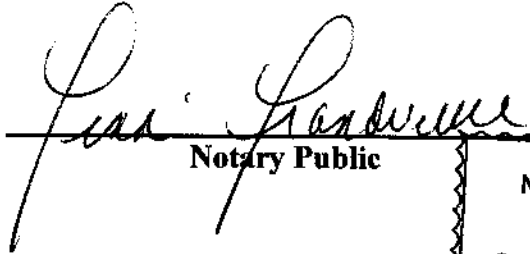
Affix Acknowledgments and Justification of Sureties.

ACKNOWLEDGEMENT OF SURETY

STATE OF NEW YORK

COUNTY OF ROCKLAND

On 02-24-16 before me personally came Patrick G. Weir known, who, being by me duly sworn, did depose and say that he resides in Orangeburg, NY that he is the Attorney-in-Fact of U.S. Specialty Insurance Company, and that he signed his name thereto by order of the Board of Directors of said corporation.



Notary Public

GINA GRANDVILLE
Notary Public, State of New York
No. 01GR6278880
Qualified in Rockland County
Commission Expires April 1, 2017

POWER OF ATTORNEY

AMERICAN CONTRACTORS INDEMNITY COMPANY UNITED STATES SURETY COMPANY U.S. SPECIALTY INSURANCE COMPANY

KNOW ALL MEN BY THESE PRESENTS: That American Contractors Indemnity Company, a California corporation, United States Surety Company, a Maryland corporation and U.S. Specialty Insurance Company, a Texas corporation (collectively, the "Companies"), do by these presents make, constitute and appoint:

Patrick G. Weir

its true and lawful Attorney(s)-in-fact, each in their separate capacity if more than one is named above, with full power and authority hereby conferred in its name, place and stead, to execute, acknowledge and deliver any and all bonds, recognizances, undertakings or other instruments or contracts of suretyship to include riders, amendments, and consents of surety, providing the bond penalty does not exceed *****Unlimited***** Dollars (\$ ***unlimited***)

This Power of Attorney shall expire without further action on December 08, 2016. This Power of Attorney is granted under and by authority of the following resolutions adopted by the Boards of Directors of the Companies:

Be it Resolved, that the President, any Vice-President, any Assistant Vice-President, any Secretary or any Assistant Secretary shall be and is hereby vested with full power and authority to appoint any one or more suitable persons as Attorney(s)-in-Fact to represent and act for and on behalf of the Company subject to the following provisions:

Attorney-in-Fact may be given full power and authority for and in the name of and on behalf of the Company, to execute, acknowledge and deliver, any and all bonds, recognizances, contracts, agreements or indemnity and other conditional or obligatory undertakings, including any and all consents for the release of retained percentages and/or final estimates on engineering and construction contracts, and any and all notices and documents canceling or terminating the Company's liability thereunder, and any such instruments so executed by any such Attorney-in-Fact shall be binding upon the Company as if signed by the President and sealed and effected by the Corporate Secretary.

Be it Resolved, that the signature of any authorized officer and seal of the Company heretofore or hereafter affixed to any power of attorney or any certificate relating thereto by facsimile, and any power of attorney or certificate bearing facsimile signature or facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached.

IN WITNESS WHEREOF, The Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 10th day of December, 2012.

AMERICAN CONTRACTORS INDEMNITY COMPANY UNITED STATES SURETY COMPANY U.S. SPECIALTY INSURANCE COMPANY

Corporate Seals



Daniel P. Aguilar, Vice President

State of California

County of Los Angeles SS:

On 10th day of December, 2012, before me, Vanessa Wright, a notary public, personally appeared Daniel P. Aguilar, Vice President of American Contractors Indemnity Company, United States Surety Company and U.S. Specialty Insurance Company who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct. WITNESS my hand and official seal.

Signature

V. Wright

(Seal)



I, Jeannie Lee, Assistant Secretary of American Contractors Indemnity Company, United States Surety Company and U.S. Specialty Insurance Company, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney, executed by said Companies, which is still in full force and effect; furthermore, the resolutions of the Boards of Directors, set out in the Power of Attorney are in full force and effect.

In Witness Whereof, I have hereunto set my hand and affixed the seals of said Companies at Los Angeles, California this 24th day of February, 2016.

Corporate Seals

Bond No. 22826 Agency No. 12172



Jeannie Lee, Assistant Secretary

Kan't Kopy - K1
Security Paper:

- Hidden Pantograph
- Color Match
- Artificial Watermark
- Anti-Copy Coin Rub
- Erasure Protection
- Security Features Box
- Microprint Protection
- Acid Free

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U.S. SPECIALTY INSURANCE COMPANY
STATUTORY STATEMENT OF ADMITTED ASSETS,
LIABILITIES, CAPITAL AND SURPLUS (1)
 December 31, 2014

Admitted Assets

Investments:	
Fixed Maturities, at amortized cost	1,602,021,248
Common stocks	141,837,243
Cash and short term investments	10,816,340
Receivable for securities	874,471
Total cash and invested assets:	<u>1,755,549,302</u>

Investment income due and accrued	17,055,937
Premium receivable	70,185,819
Recoverable from reinsure's	11,559,494
Net deferred tax asset	33,882,202
Receivable from parent, subsidiaries and affiliates	2,586,857
Total admitted assets	<u>135,270,309</u>
	<u>1,890,819,611</u>

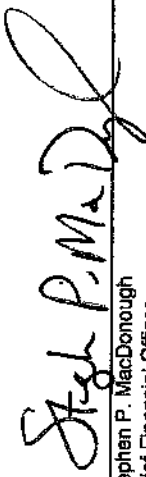
Liabilities and Capital and Surplus

Liabilities:		949,092,017
Unpaid loss and loss adjustment expense		14,318,325
Commission payable		3,819,077
Accrued expenses		2,633,443
Taxes, licenses, and fees		4,627,949
Federal income tax		251,639,646
Unearned premiums		12,818,837
Advance premium		223,004
Dividends to policyholders		52,236,359
Ceded reinsurance balance payable		13,245,873
Funds held under reinsurance treaties		5,816
Amounts withheld or retained for others		743,000
Provision for reinsurance		6,561,950
Payable to parent, subsidiaries and affiliates		1,787,971
Payable for securities		<u>1,313,753,067</u>
Total liabilities		
Capital and Surplus:		4,200,000
Capital Stock		187,779,428
Additional paid-in and contributed capital		385,087,116
Unassigned surplus		<u>577,066,544</u>
Total liabilities and capital and surplus		<u>1,890,819,611</u>

(1) - In accordance with the statutory financial statements as filed on March 1, 2015.

I, Stephen P. MacDonough, Chief Financial Officer of U.S. Specialty Insurance Company, hereby certify that to the best of my knowledge and belief, the foregoing is a full and true Statutory Statement of Admitted Assets, Liabilities and Capital and Surplus of the Company as of December 31, 2014, prepared in conformity with accounting practices prescribed or permitted by the Texas Department of Insurance. The foregoing statement should not be taken as a complete statement of financial condition of the Company. Such a statement is available upon written request at the Company's home office located at 13403 Northwest Freeway, Houston, Texas 77040.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Corporation at Houston, Texas.


 Stephen P. MacDonough
 Chief Financial Officer

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) _____ (L.S.)
Principal

By: _____

(Seal) _____
Surety

By: _____

(Seal) _____
Surety

By: _____

(Seal) _____
Surety

By: _____

Bond Premium Rate _____

Bond Premium Cost _____

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by a duly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Contract.

Performance Bond #1 (Pages 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) _____ (L.S.)
Principal

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

TABLE OF CONTENTS

<u>CLASSIFICATION</u>	<u>PAGE</u>
ASBESTOS HANDLER	5
BLASTER	5
BOILERMAKER.....	7
BRICKLAYER.....	8
CARPENTER - BUILDING COMMERCIAL	9
CARPENTER - HEAVY CONSTRUCTION WORK.....	10
CEMENT & CONCRETE WORKER.....	11
CEMENT MASON.....	11
CORE DRILLER	12
DERRICKPERSON AND RIGGER	14
DIVER.....	14
DOCKBUILDER - PILE DRIVER.....	15
DRIVER: TRUCK (TEAMSTER)	16
ELECTRICIAN	18
ELECTRICIAN - ALARM TECHNICIAN.....	22
ELECTRICIAN-STREET LIGHTING WORKER	23
ELEVATOR CONSTRUCTOR	24
ELEVATOR REPAIR & MAINTENANCE.....	25
ENGINEER	26
ENGINEER - CITY SURVEYOR AND CONSULTANT.....	31
ENGINEER - FIELD (BUILDING CONSTRUCTION)	32
ENGINEER - FIELD (HEAVY CONSTRUCTION)	33
ENGINEER - FIELD (STEEL ERECTION)	34
ENGINEER - OPERATING	35
FLOOR COVERER.....	42
GLAZIER	43
GLAZIER - REPAIR & MAINTENANCE	44
HEAT AND FROST INSULATOR.....	45
HOUSE WRECKER	46
IRON WORKER - ORNAMENTAL.....	47
IRON WORKER - STRUCTURAL.....	48
LABORER	48
LANDSCAPING	49
MARBLE MECHANIC.....	51
MASON TENDER	52

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

MASON TENDER (INTERIOR DEMOLITION WORKER).....	53
METALLIC LATHER.....	54
MILLWRIGHT	55
MOSAIC MECHANIC.....	56
PAINTER	57
PAINTER - SIGN.....	57
PAINTER - STRIPER.....	58
PAINTER - STRUCTURAL STEEL.....	59
PAPERHANGER	60
PAVER AND ROADBUILDER.....	61
PLASTERER	63
PLASTERER - TENDER.....	63
PLUMBER	64
PLUMBER (MECHANICAL EQUIPMENT AND SERVICE).....	65
PLUMBER (RESIDENTIAL RATES FOR 1, 2 AND 3 FAMILY HOME CONSTRUCTION).....	66
PLUMBER: PUMP & TANK.....	67
POINTER - WATERPROOFER, CAULKER MECHANIC (EXTERIOR BUILDING RENOVATION).....	67
ROOFER.....	68
SANDBLASTER - STEAMBLASTER.....	69
SHEET METAL WORKER.....	70
SHEET METAL WORKER - SPECIALTY	71
SHIPYARD WORKER.....	72
SIGN ERECTOR.....	73
STEAMFITTER	74
STEAMFITTER - REFRIGERATION AND AIR CONDITIONER	75
STONE MASON - SETTER.....	77
TAPER.....	78
TELECOMMUNICATION WORKER.....	79
TILE FINISHER.....	80
TILE LAYER - SETTER	80
TIMBERPERSON	81
TUNNEL WORKER	82
WELDER.....	84

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

ASBESTOS HANDLER

(Hazardous Material; Disturbs, removes, encapsulates, repairs, or encloses friable asbestos material)

Asbestos Handler

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$36.00

Supplemental Benefit Rate per Hour: \$15.45

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$45.70

Supplemental Benefit Rate per Hour: \$39.69

Blaster (Hydraulic)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$46.49

Supplemental Benefit Rate per Hour: \$39.69

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Blaster - Trac Drill Hydraulic

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$41.20
Supplemental Benefit Rate per Hour: \$39.69

Blaster - Wagon: Air Trac: Quarry Bar: Drillrunners

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$40.44
Supplemental Benefit Rate per Hour: \$39.69

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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$39.43
Supplemental Benefit Rate per Hour: \$39.69

Blaster - Powder Carriers

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$35.66
Supplemental Benefit Rate per Hour: \$39.69

Blaster - Hydraulic Trac Drill Chuck Tender

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$34.42
Supplemental Benefit Rate per Hour: \$39.69

Blaster - Chuck Tender & Nipper

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$33.69
Supplemental Benefit Rate per Hour: \$39.69

Blaster - Magazine Keepers: (Watch Person)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$20.30
Supplemental Benefit Rate per Hour: \$39.69

Overtime Description

Magazine Keepers:

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$50.45

Supplemental Benefit Rate per Hour: \$41.31.

Supplemental Note: For time and one half overtime - \$61.37; For double overtime - \$81.43.

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$47.78
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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day
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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$49.88

Supplemental Benefit Rate per Hour: \$44.10

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day
Washington's Birthday
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
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$48.35

Supplemental Benefit Rate per Hour: \$46.12

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election Day

Thanksgiving Day

Christmas Day

Paid Holidays

None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(Carpenters District Council)

CEMENT & CONCRETE WORKER

Cement & Concrete Worker

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$42.38

Supplemental Benefit Rate per Hour: \$26.17

Supplemental Note: \$28.92 on Saturdays; \$31.67 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)

CEMENT MASON

Cement Mason

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$35.71

Supplemental Benefit Rate per Hour: \$21.69

Core Driller Helper

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$28.60

Supplemental Benefit Rate per Hour: \$21.69

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Core Driller Helper(Third year in the industry)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$25.74

Supplemental Benefit Rate per Hour: \$21.69

Core Driller Helper (Second year in the industry)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$22.88

Supplemental Benefit Rate per Hour: \$21.69

Core Driller Helper (First year in the industry)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$20.02

Supplemental Benefit Rate per Hour: \$21.69

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.

(Carpenters District Council)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

DERRICKPERSON AND RIGGER

Derrick Person & Rigger

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$42.25

Supplemental Benefit Rate per Hour: \$47.81

Supplemental Note: The above supplemental rate applies for work performed in Manhattan, Bronx, Brooklyn and Queens. \$49.23 - 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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$61.30

Supplemental Benefit Rate per Hour: \$46.12

Diver Tender (Marine)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$43.45

Supplemental Benefit Rate per Hour: \$46.12

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$48.35

Supplemental Benefit Rate per Hour: \$46.12

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates

Off shift work commencing between 5:00 P.M. and 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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$38.86

Supplemental Benefit Rate per Hour: \$40.44

Supplemental Note: Over 40 hours worked: time and one half rate \$16.94, double time rate \$22.59

Driver - Tractor Trailer

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$38.88

Supplemental Benefit Rate per Hour: \$41.70

Supplemental Note: For over 40 hours worked: at time and one half - \$15.90; at double time - \$21.21

Driver - Euclid & Turnapull Operator

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$39.44

Supplemental Benefit Rate per Hour: \$41.70

Supplemental Note: Over 40 hours worked: time and one half rate \$15.90, double time rate \$21.21

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day
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

Driver Redi-Mix (Sand & Gravel)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$36.05

Supplemental Benefit Rate per Hour: \$38.60

Supplemental Note: Over 40 hours worked: time and one half rate \$13.53, double time rate \$18.04

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$53.00

Supplemental Benefit Rate per Hour: \$47.54

Effective Period: 5/13/2015 - 6/30/2015

Wage Rate per Hour: \$54.00

Supplemental Benefit Rate per Hour: \$50.03

Electrician "A" (Regular Day Overtime)

Effective Period: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$79.50

Supplemental Benefit Rate per Hour: \$50.86

Effective Period: 5/13/2015 - 6/30/2015

Wage Rate per Hour: \$81.00

Supplemental Benefit Rate per Hour: \$53.41

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Electrician "A" (Day Shift)

Effective Period: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$53.00

Supplemental Benefit Rate per Hour: \$47.54

Effective Period: 5/13/2015 - 6/30/2015

Wage Rate per Hour: \$54.00

Supplemental Benefit Rate per Hour: \$50.03

Electrician "A" (Day Shift Overtime After 8 hours)

Effective Period: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$79.50

Supplemental Benefit Rate per Hour: \$50.86

Effective Period: 5/13/2015 - 6/30/2015

Wage Rate per Hour: \$81.00

Supplemental Benefit Rate per Hour: \$53.41

Electrician "A" (Swing Shift)

Effective Period: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$62.19

Supplemental Benefit Rate per Hour: \$54.07

Effective Period: 5/13/2015 - 6/30/2015

Wage Rate per Hour: \$63.36

Supplemental Benefit Rate per Hour: \$56.94

Electrician "A" (Swing Shift Overtime After 7.5 hours)

Effective Period: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$93.29

Supplemental Benefit Rate per Hour: \$57.97

Effective Period: 5/13/2015 - 6/30/2015

Wage Rate per Hour: \$95.04

Supplemental Benefit Rate per Hour: \$60.91

Electrician "A" (Graveyard Shift)

Effective Period: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$69.66

Supplemental Benefit Rate per Hour: \$59.59

~~Effective Period: 5/13/2015 - 6/30/2015~~

Wage Rate per Hour: \$70.97

Supplemental Benefit Rate per Hour: \$62.78

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Electrician "A" (Graveyard Shift Overtime After 7 hours)

Effective Period: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$104.49

Supplemental Benefit Rate per Hour: \$63.96

Effective Period: 5/13/2015 - 6/30/2015

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.

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 \$23.63. Effective 5/13/2015 - \$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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$27.00

Supplemental Benefit Rate per Hour: \$20.32

First and Second Year "M" Wage Rate Per Hour - Hired on or before 5/10/07: \$26.30

First and Second Year "M" Supplemental Rate- Hired on or before 5/10/07: \$19.96

First and Second Year "M" Wage Rate Per Hour - Hired after 5/10/07: \$22.50

First and Second Year "M" Supplemental Rate- Hired after 5/10/07: \$18.06

Effective Period: 5/13/2015 - 6/30/2015

Wage Rate per Hour: \$27.50

Supplemental Benefit Rate per Hour: \$20.82

First and Second Year "M" Wage Rate Per Hour - Hired on or before 5/10/07: \$26.80

First and Second Year "M" Supplemental Rate- Hired on or before 5/10/07: \$20.46

First and Second Year "M" Wage Rate Per Hour - Hired after 5/10/07: \$23.00

First and Second Year "M" Supplemental Rate- Hired after 5/10/07: \$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: 7/1/2014 - 5/12/2015

Wage Rate per Hour: \$40.50

Supplemental Benefit Rate per Hour: \$22.01

First and Second Year "M" Wage Rate Per Hour - Hired on or before 5/10/07: \$39.45

First and Second Year "M" Supplemental Rate- Hired on or before 5/10/07: \$21.61

First and Second Year "M" Wage Rate Per Hour - Hired after 5/10/07: \$33.75

First and Second Year "M" Supplemental Rate- Hired after 5/10/07: \$19.47

Effective Period: 5/13/2015 - 6/30/2015

Wage Rate per Hour: \$41.25

Supplemental Benefit Rate per Hour: \$22.54

First and Second Year "M" Wage Rate Per Hour - Hired on or before 5/10/07: \$40.20

First and Second Year "M" Supplemental Rate- Hired on or before 5/10/07: \$22.14

First and Second Year "M" Wage Rate Per Hour - Hired after 5/10/07: \$34.50

First and Second Year "M" Supplemental Rate- Hired after 5/10/07: \$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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

(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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$30.40

Supplemental Benefit Rate per Hour: \$13.90

Supplemental Note: \$12.40 only after 8 hours worked in a day

Overtime Description

Time and one half the regular rate for work on the following holidays: Columbus Day, Veterans Day, Day after Thanksgiving.

Double time the regular rate for work on the following holidays: New Year's day, Martin Luther King Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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

(Local #3)

ELECTRICIAN-STREET LIGHTING WORKER

Electrician - Electro Pole Electrician

Effective Period: 7/1/2014 - 5/19/2015
Wage Rate per Hour: \$53.00
Supplemental Benefit Rate per Hour: \$49.34

Effective Period: 5/20/2015 - 6/30/2015
Wage Rate per Hour: \$54.00
Supplemental Benefit Rate per Hour: \$51.86

Electrician - Electro Pole Foundation Installer

Effective Period: 7/1/2014 - 5/19/2015
Wage Rate per Hour: \$40.18
Supplemental Benefit Rate per Hour: \$37.73

Effective Period: 5/20/2015 - 6/30/2015
Wage Rate per Hour: \$40.93
Supplemental Benefit Rate per Hour: \$39.46

Electrician - Electro Pole Maintainer

Effective Period: 7/1/2014 - 5/19/2015
Wage Rate per Hour: \$34.40
Supplemental Benefit Rate per Hour: \$34.00

Effective Period: 5/20/2015 - 6/30/2015
Wage Rate per Hour: \$35.05
Supplemental Benefit Rate per Hour: \$35.51

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 3/16/2015

Wage Rate per Hour: \$58.23

Supplemental Benefit Rate per Hour: \$29.47

Effective Period: 3/17/2015 - 6/30/2015

Wage Rate per Hour: \$59.55

Supplemental Benefit Rate per Hour: \$31.07

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 3/16/2015

Wage Rate per Hour: \$46.00

Supplemental Benefit Rate per Hour: \$28.78

Effective Period: 3/17/2015 - 6/30/2015

Wage Rate per Hour: \$46.92

Supplemental Benefit Rate per Hour: \$30.91

Overtime Description

For Service Work: Double time - all work performed on Sundays, Holidays, and between midnight and 7:00am.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Time and one half the regular rate for Sunday.

Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays

New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

For Modernization Work (4pm to 12:30am) - regularly hourly rate plus a (15%) fifteen percent differential.

Vacation

Employer contributes 8% of regular basic hourly rate as vacation pay for employees with more than 15 years of service, and 6% for employees with 5 to 15 years of service, and 4% for employees with less than 5 years of service.

(Local #1)

ENGINEER

Engineer - Heavy Construction Operating Engineer I

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$61.05**

Supplemental Benefit Rate per Hour: **\$31.93**

Supplemental Note: \$57.46 on overtime

Shift Wage Rate: **\$97.68**

Engineer - Heavy Construction Operating Engineer II

Backhoes, Basin Machines, Groover, Mechanical Sweepers, Bobcat, Boom Truck, Barrier Transport (Barrier Mover) & machines of similar nature. Operation of Churn Drills and machines of a similar nature, Stetco Silent Hoist and machines of similar nature, Vac-Alls, Meyers Machines, John Beam and machines of a similar nature, Ross Carriers and Travel Lifts and machines of a similar nature, Bulldozers, Scrapers and Turn-a-Pulls: Tugger Hoists (Used exclusively for handling excavated material); Tractors with attachments, Hyster and Roustabout Cranes, Cherry pickers. Austin Western, Grove and machines of a similar nature, Scoopmobiles, Monorails, Conveyors, Trenchers: Loaders-Rubber Tired and Tractor: Barber Greene and Eimco Loaders and Eimco Backhoes; Mighty Midget and similar breakers and Tampers, Curb and Gutter Pavers and Motor Patrol, Motor Graders and all machines of a similar nature. Locomotives 10 Tons or under. Mini-Max, Break-Tech and machines of a similar nature; Milling machines, robotic and demolition machines and machines of a similar nature, shot blaster, skid steer machines and machines of a similar nature including bobcat, pile rig rubber-tired excavator (37,000 lbs. and under), 2 man auger.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$59.24**

Supplemental Benefit Rate per Hour: **\$31.93**

Supplemental Note: \$57.46 on overtime

Shift Wage Rate: **\$94.78**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$56.22**

Supplemental Benefit Rate per Hour: **\$31.93**

Supplemental Note: \$57.46 on overtime

Shift Wage Rate: **\$89.95**

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$58.97**

Supplemental Benefit Rate per Hour: **\$31.93**

Supplemental Note: \$57.46 on overtime

Shift Wage Rate: **\$94.35**

Engineer - Heavy Construction Maintenance Engineer II

On Base Mounted Tower Cranes

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$77.30**

Supplemental Benefit Rate per Hour: **\$31.93**

Supplemental Note: \$57.46 on overtime

Shift Wage Rate: **\$123.68**

Engineer - Heavy Construction Maintenance Engineer III

On Generators, Light Towers

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$39.10**

Supplemental Benefit Rate per Hour: **\$31.93**

Supplemental Note: \$57.46 on overtime

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Shift Wage Rate: \$62.56

Engineer - Heavy Construction Maintenance Engineer IV

On Pumps and Mixers including mud sucking

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$40.11

Supplemental Benefit Rate per Hour: \$31.93

Supplemental Note: \$57.46 on overtime

Shift Wage Rate: \$64.18

Engineer - Heavy Construction Oilers I

Gradalls, Cold Planer Grader, Concrete Pumps, Driving Truck Cranes, Driving and Operating Fuel and Grease Trucks.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$53.22

Supplemental Benefit Rate per Hour: \$31.93

Supplemental Note: \$57.46 on overtime

Shift Wage Rate: \$85.15

Engineer - Heavy Construction Oilers II

All gasoline, electric, diesel or air operated Shovels, Draglines, Backhoes, Keystones, Pavers, Guniting Machines, Battery of Compressors, Crawler Cranes, two-person Trenching Machines.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$36.97

Supplemental Benefit Rate per Hour: \$31.93

Supplemental Note: \$57.46 on overtime

Shift Wage Rate: \$59.15

Engineer - Steel Erection Maintenance Engineers

Derrick, Travelers, Tower, Crawler Tower and Climbing Cranes

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$57.05

Supplemental Benefit Rate per Hour: \$31.93

Supplemental Note: \$57.46 on overtime

Shift Wage Rate: \$91.28

Engineer - Steel Erection Oiler I

On a Truck Crane

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$53.43

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$31.93
Supplemental Note: \$57.46 on overtime
Shift Wage Rate: \$85.49

Engineer - Steel Erection Oiler II

On a Crawler Crane

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$40.84
Supplemental Benefit Rate per Hour: \$31.93
Supplemental Note: \$57.46 on overtime
Shift Wage Rate: \$65.34

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
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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$54.04

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$31.93
Supplemental Note: \$57.46 on overtime

Engineer - Building Work Maintenance Engineers II

On Pumps, Generators, Mixers and Heaters

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$42.10
Supplemental Benefit Rate per Hour: \$31.93
Supplemental Note: \$57.46 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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$51.40
Supplemental Benefit Rate per Hour: \$31.93
Supplemental Note: \$57.46 on overtime

Engineer - Building Work Oilers II

Oilers on Crawler Cranes, Backhoes, Trenching Machines, Gunite Machines, Compressors (three or more in Battery).

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$38.31
Supplemental Benefit Rate per Hour: \$31.93
Supplemental Note: \$57.46 on overtime

Overtime Description

On jobs of more than one shift, if an Employee fails to report for work through any cause over which the Employer has no control, the Employee on duty will continue to work at the rate of single time.

Overtime

Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.
Double time the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day
Lincoln's Birthday
President's Day
Memorial Day
Independence Day
Labor Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$35.55

Supplemental Benefit Rate per Hour: \$17.65

Instrument Person

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$29.41

Supplemental Benefit Rate per Hour: \$17.65

Rodperson

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$25.54

Supplemental Benefit Rate per Hour: \$17.65

Overtime Description

Overtime Benefit Rate - \$23.63 per hour (time & one half) \$29.95 per hour (double time).

Time and one half the regular rate after an 8 hour day, Time and one half the regular rate for Saturday for the first eight hours worked, Double time the regular time rate for Saturday for work performed in excess of eight hours, Double time the regular rate for Sunday and Double time the regular rate for work on a holiday.

Paid Holidays

New Year's Day
Lincoln's Birthday
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$55.40

Supplemental Benefit Rate per Hour: \$30.62

Supplemental Note: Overtime Benefit Rate - \$42.73 per hour (time & one half) \$54.84 per hour (double time).

Field Engineer - BC Instrument Person

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$43.10

Supplemental Benefit Rate per Hour: \$30.62

Supplemental Note: Overtime Benefit Rate - \$42.73 per hour (time & one half) \$54.84 per hour (double time).

Field Engineer - BC Rodperson

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$27.96

Supplemental Benefit Rate per Hour: \$30.62

Supplemental Note: Overtime Benefit Rate - \$42.73 per hour (time & one half) \$54.84 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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$62.61

Supplemental Benefit Rate per Hour: \$30.62

Supplemental Note: Overtime benefit rate - \$42.73 per hour (time & one half), \$54.84 per hour (double time).

Field Engineer - HC Instrument Person

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$46.00

Supplemental Benefit Rate per Hour: \$30.62

Supplemental Note: Overtime benefit rate - \$42.73 per hour (time & one half), \$54.84 per hour (double time).

Field Engineer - HC Rodperson

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$38.61

Supplemental Benefit Rate per Hour: \$30.62

Supplemental Note: Overtime benefit rate - \$42.73 per hour (time & one half), \$54.84 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~~

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(Operating Engineer Local #15-D)

ENGINEER - FIELD (STEEL ERECTION)

Field Engineer - Steel Erection Party Chief

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$58.50

Supplemental Benefit Rate per Hour: \$30.62

Supplemental Note: Overtime benefit rate - \$42.73 per hour (time & one half), \$54.84 per hour (double time).

Field Engineer - Steel Erection Instrument Person

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$45.53

Supplemental Benefit Rate per Hour: \$30.62

Supplemental Note: Overtime benefit rate - \$42.73 per hour (time & one half), \$54.84 per hour (double time).

Field Engineer - Steel Erection Rodperson

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$30.43

Supplemental Benefit Rate per Hour: \$30.62

Supplemental Note: Overtime benefit rate - \$42.73 per hour (time & one half), \$54.84 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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$67.70**

Supplemental Benefit Rate per Hour: **\$28.60**

Supplemental Note: **\$51.75** overtime hours

Shift Wage Rate: **\$108.32**

Operating Engineer - Road & Heavy Construction II

Backhoes, Power Shovels, Hydraulic Clam Shells, Steel Erection, Moles and machines of a similar nature.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$70.10**

Supplemental Benefit Rate per Hour: **\$28.60**

Supplemental Note: **51.75** overtime hours

Shift Wage Rate: **\$112.16**

Operating Engineer - Road & Heavy Construction III

Mine Hoists, Cranes, etc. (Used as Mine Hoists)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$72.34**

Supplemental Benefit Rate per Hour: **\$28.60**

Supplemental Note: **\$51.75** overtime hours

Shift Wage Rate: **\$115.74**

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$70.63**

Supplemental Benefit Rate per Hour: **\$28.60**

Supplemental Note: **\$51.75** overtime hours

Shift Wage Rate: **\$113.01**

Operating Engineer - Road & Heavy Construction V

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Pile Drivers & Rigs (employing Dock Builder foreperson): Derrick Boats, Tunnel Shovels.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$69.23

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$110.77

Operating Engineer - Road & Heavy Construction VI

Mixers (Concrete with loading attachment), Concrete Pavers, Cableways, Land Derricks, Power Houses (Low Air Pressure Units).

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$65.76

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$105.22

Operating Engineer - Road & Heavy Construction VII

Barrier Movers , Barrier Transport and Machines of a Similar Nature.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$53.08

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$84.93

Operating Engineer - Road & Heavy Construction VIII

Utility Compressors

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$41.18

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$51.93

Operating Engineer - Road & Heavy Construction IX

Horizontal Boring Rig

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$62.53

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$100.05

Operating Engineer - Road & Heavy Construction X

Elevators (manually operated as personnel hoist).

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$57.46

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$91.94

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$44.63

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$71.41

Operating Engineer - Road & Heavy Construction XII

All Drills and Machines of a similar nature.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$66.45

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$106.32

Operating Engineer - Road & Heavy Construction XIII

Concrete Pumps, Concrete Plant, Stone Crushers, Double Drum Hoist, Power Houses (other than above).

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$64.34

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$102.94

Operating Engineer - Road & Heavy Construction XIV

Concrete Mixer

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$61.53

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$98.45

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$41.44
Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.75 overtime hours
Shift Wage Rate: \$66.30

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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$58.74
Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$93.98

Operating Engineer - Road & Heavy Construction XVII

On-Site concrete plant engineer, On-site Asphalt Plant Engineer, and Vibratory console.

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$59.21
Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.75 overtime hours
Shift Wage Rate: \$94.74

Operating Engineer - Road & Heavy Construction XVIII

Tower Crane

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$85.00
Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.75 overtime hours
Shift Wage Rate: \$136.00

Operating Engineer - Paving I

Asphalt Spreaders, Autogrades (C.M.I.), Roto/Mil

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$65.76

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.75 overtime hours
Shift Wage Rate: \$105.22

Operating Engineer - Paving II

Asphalt Roller

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$64.04
Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.75 overtime hours
Shift Wage Rate: \$102.46

Operating Engineer - Paving III

Asphalt Plants

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$54.17
Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.75 overtime hours
Shift Wage Rate: \$86.67

Operating Engineer - Concrete I

Cranes

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$70.32
Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.75 overtime hours

Operating Engineer - Concrete II

Compressors

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$41.76
Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.75 overtime hours

Operating Engineer - Concrete III

Micro-traps (Negative Air Machines), Vac-All Remediation System.

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$56.16
Supplemental Benefit Rate per Hour: \$28.60
Supplemental Note: \$51.75 overtime hours

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Operating Engineer - Steel Erection I

Three Drum Derricks

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$73.37

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$117.39

Operating Engineer - Steel Erection II

Cranes, 2 Drum Derricks, Hydraulic Cranes, Fork Lifts and Boom Trucks.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$70.50

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$112.80

Operating Engineer - Steel Erection III

Compressors, Welding Machines.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$41.84

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$66.94

Operating Engineer - Steel Erection IV

Compressors - Not Combined with Welding Machine.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$39.85

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Shift Wage Rate: \$63.76

Operating Engineer - Building Work I

Forklifts, Plaster (Platform machine), Plaster Bucket, Concrete Pump and all other equipment used for hoisting material.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$57.82

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$43.28

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Operating Engineer - Building Work III

Double Drum

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$65.83

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Operating Engineer - Building Work IV

Stone Derrick, Cranes, Hydraulic Cranes Boom Trucks.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$69.74

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Operating Engineer - Building Work V

Dismantling and Erection of Cranes, Relief Engineer.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$64.26

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Operating Engineer - Building Work VI

4 Pole Hoist, Single Drum Hoists.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$63.58

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

Operating Engineer - Building Work VII

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Rack & Pinion and House Cars

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$50.53

Supplemental Benefit Rate per Hour: \$28.60

Supplemental Note: \$51.75 overtime hours

For New House Car projects started after 7/1/11 only: Wage Rate per Hour \$40.31

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

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$49.88**

Supplemental Benefit Rate per Hour: **\$44.10**

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Paid Holidays

1/2 day on Christmas Eve if work is performed in the A.M.

1/2 day on New Year's Eve if work is performed in the A.M.

Shift Rates

Two shifts may be utilized with the first shift working 8:00 A.M. to the end of the shift at the straight time of pay. The second shift will receive one hour at double time rate for the last hour of the shift. (eight for seven, nine for eight).

(Carpenters District Council)

GLAZIER

(New Construction, Remodeling, and Alteration)

Glazier

Effective Period: 7/1/2014 - 10/31/2014

Wage Rate per Hour: **\$42.50**

Supplemental Benefit Rate per Hour: **\$35.09**

Supplemental Note: Supplemental Benefit Overtime Rate: **\$43.59**

Effective Period: 11/1/2014 - 6/30/2015

Wage Rate per Hour: **\$42.85**

Supplemental Benefit Rate per Hour: **\$35.59**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Supplemental Note: Supplemental Benefit Overtime Rate: \$44.09

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
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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$23.60

Supplemental Benefit Rate per Hour: \$19.04

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Overtime

Time and one half the regular rate after an 8 hour day.
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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$56.98

Supplemental Benefit Rate per Hour: \$34.81

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$34.51**

Supplemental Benefit Rate per Hour: **\$25.59**

House Wrecker - Tier B

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$24.02**

Supplemental Benefit Rate per Hour: **\$19.12**

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Paid Holidays

None

(Mason Tenders District Council)

IRON WORKER - ORNAMENTAL

Iron Worker - Ornamental

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$42.70

Supplemental Benefit Rate per Hour: \$45.77

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)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

IRON WORKER - STRUCTURAL

Iron Worker - Structural

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$47.75

Supplemental Benefit Rate per Hour: \$65.35

Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Overtime Description

Monday through Friday- the first eight hours are paid at straight time, the 9th and 10th hours are paid at time and one-half the regular rate, all additional weekday overtime is paid at double the regular rate. Saturdays- the first eight hours are paid at time and one-half the regular rate, double time thereafter. Sunday-all shifts are paid at double time.

Overtime

Time and one half the regular rate after an 8 hour day.

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)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$39.85

Supplemental Benefit Rate per Hour: \$34.88

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

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)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$25.75
Supplemental Benefit Rate per Hour: \$13.80

Landscaper (3 - 6 years experience)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$24.75
Supplemental Benefit Rate per Hour: \$13.80

Landscaper (up to 3 years experience)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$22.25
Supplemental Benefit Rate per Hour: \$13.80

Groundperson

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$22.25
Supplemental Benefit Rate per Hour: \$13.80

Tree Remover / Pruner

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$30.75
Supplemental Benefit Rate per Hour: \$13.80

Landscaper Sprayer (Pesticide Applicator)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$20.75
Supplemental Benefit Rate per Hour: \$13.80

Watering - Plant Maintainer

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$15.75
Supplemental Benefit Rate per Hour: \$13.80

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Paid Holidays

New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Shift Rates

Work performed on a 4pm to 12am shift has a 15% differential. Work performed on a 12am to 8am shift has a 20% differential.

(Local #175)

MARBLE MECHANIC

Marble Setter

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: **\$50.85**

Supplemental Benefit Rate per Hour: **\$34.21**

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: **\$51.15**

Supplemental Benefit Rate per Hour: **\$34.87**

Marble Finisher

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: **\$39.99**

Supplemental Benefit Rate per Hour: **\$33.34**

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: **\$40.26**

Supplemental Benefit Rate per Hour: **\$33.90**

Marble Polisher

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: **\$35.96**

Supplemental Benefit Rate per Hour: **\$25.92**

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: **\$36.25**

Supplemental Benefit Rate per Hour: **\$26.28**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Overtime Description

Supplemental Benefit contributions are to be made at the applicable overtime rates. Time and one half the regular rate after a 7 hour day or time and one half the regular rate after an 8 hour day - chosen by Employer at the start of the project and then would last for the full duration of the project.

Overtime

Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

(Local #7)

MASON TENDER

Mason Tender

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$36.05

Supplemental Benefit Rate per Hour: \$26.74

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day
President's Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates

The Employer may work two (2) shifts with the first shift at the straight time wage rate and the second shift receiving eight (8) hours paid for seven (7) hours work at the straight time wage rate.

(Local #79)

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$34.99**

Supplemental Benefit Rate per Hour: **\$21.10**

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$24.18**

Supplemental Benefit Rate per Hour: **\$15.42**

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

(Local #79)

METALLIC LATHER

Metallic Lather

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$42.03

Supplemental Benefit Rate per Hour: \$41.07

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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 (½) hour for lunch. Off-Hour Start shall commence after 3:30 P.M. and shall conclude by 6:00 A.M. The first consecutive seven (7) hours shall be at straight time with a differential of twelve dollars (\$12.00) per hour. Fringes shall be paid at the straight time rate.

(Local #46)

MILLWRIGHT

Millwright

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$48.44

Supplemental Benefit Rate per Hour: \$50.52

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$45.23**

Supplemental Benefit Rate per Hour: **\$36.59**

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$47.56 per hour.

Mosaic Mechanic - Mosaic & Terrazzo Finisher

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$43.63**

Supplemental Benefit Rate per Hour: **\$36.57**

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$47.54 per hour.

Mosaic Mechanic - Machine Operator Grinder

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$43.63**

Supplemental Benefit Rate per Hour: **\$36.57**

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$47.54 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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$39.50

Supplemental Benefit Rate per Hour: \$26.12

Supplemental Note: \$30.75 on overtime

Spray & Scaffold / Decorative / Sandblast

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$42.50

Supplemental Benefit Rate per Hour: \$26.12

Supplemental Note: \$30.75 on overtime

Overtime

Time and one half the regular rate after a 7 hour day.

Time and one half the regular rate for Saturday.

Time and one half the regular rate for Sunday.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Thanksgiving Day

Christmas Day

Paid Holidays

None

(District Council of Painters #9)

PAINTER - SIGN

Designer

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$36.15

Supplemental Benefit Rate per Hour: \$9.66

Journey person

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$33.62

Supplemental Benefit Rate per Hour: \$9.66

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Time and one half the regular rate for Sunday.

Double time the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Election Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Shift Rates

All work performed outside the regular 8 hour work day (either 7:00 A.M to 3:30 P.M or 8:00 A.M. to 4:30 P.M) shall be paid at time and one half the regular hourly rate.

(Local #8A-28A)

PAINTER - STRIPER

Striper (paint)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$34.00

Supplemental Benefit Rate per Hour: \$12.60

Supplemental Note: Overtime Supplemental Benefit rate - \$8.35 New Hire Rate (0-3 months) - \$0.00

Lineperson (thermoplastic)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$38.00

Supplemental Benefit Rate per Hour: \$12.60

Supplemental Note: Overtime Supplemental Benefit rate - \$8.35; New Hire Rate (0-3 months) - \$0.00

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Double time the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day
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: 7/1/2014 - 9/30/2014

Wage Rate per Hour: \$47.00

Supplemental Benefit Rate per Hour: \$33.58

Effective Period: 10/1/2014 - 6/30/2015

Wage Rate per Hour: \$48.75

Supplemental Benefit Rate per Hour: \$34.58

Painter - Power Tool

Effective Period: 7/1/2014 - 9/30/2014

Wage Rate per Hour: \$53.00

Supplemental Benefit Rate per Hour: \$33.58

Effective Period: 10/1/2014 - 6/30/2015

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$54.75

Supplemental Benefit Rate per Hour: \$34.58

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: 7/1/2014 - 6/30/2015

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.

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$44.19

Supplemental Benefit Rate per Hour: \$35.15

Paver & Roadbuilder - Laborer

Paving and road construction work, regardless of material used, including but not limited to preparation of job sites, removal of old surfaces, asphalt and/or concrete, by whatever method, including but not limited to milling; laying of concrete; laying of asphalt for temporary, patchwork, and utility paving (but not production paving); site preparation and incidental work before the installation of rubberized materials and similar surfaces; installation and repair of temporary construction fencing; slurry seal coating, maintenance of safety surfaces; play equipment installation, and other related work.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$40.32

Supplemental Benefit Rate per Hour: \$35.15

Production Paver & Roadbuilder - Screed Person

(Production paving is asphalt paving when using a paving machine or on a project where a paving machine is traditionally used)

Adjustment of paving machinery on production paving jobs.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$45.24

Supplemental Benefit Rate per Hour: \$35.15

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Production Paver & Roadbuilder - Raker

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$44.73
Supplemental Benefit Rate per Hour: \$35.15

Production Paver & Roadbuilder - Shoveler

General laborer (except removal of surfaces - see Paver and Roadbuilder-Laborer) including but not limited to tamper, AC paint and liquid tar work.

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$41.44
Supplemental Benefit Rate per Hour: \$35.15

Overtime Description

Veteran's Day is a Paid Holiday for employees working on production paving.

If an employee works New Year's Day or Christmas Day, they receive the single time rate plus 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 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)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

PLASTERER

Plasterer

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$42.43

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 (½) hour to eat with this time being included in the seven (7) hours of work.

(Local #530)

PLASTERER - TENDER

Plasterer - Tender

Effective Period: 7/1/2014 - 6/30/2015

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$35.53

Supplemental Benefit Rate per Hour: \$26.31

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$65.27

Supplemental Benefit Rate per Hour: \$25.78

Supplemental Note: Overtime supplemental benefit rate per hour: \$40.78

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$52.24

Supplemental Benefit Rate per Hour: \$20.20

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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)

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$38.27

Supplemental Benefit Rate per Hour: \$12.84

Overtime

~~Time and one half the regular rate after an 8 hour day.~~

Time and one half the regular rate for Saturday.

Time and one half the regular rate for Sunday.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).

New Year's Day
President's Day
Memorial Day
Independence Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

(Plumbers Local # 1)

PLUMBER (RESIDENTIAL RATES FOR 1, 2 AND 3 FAMILY HOME CONSTRUCTION)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$45.19

Supplemental Benefit Rate per Hour: \$18.79

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

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(Plumbers Local #1)

PLUMBER: PUMP & TANK
Oil Trades (Installation and Maintenance)

Plumber - Pump & Tank

Effective Period: 7/1/2014 - 6/30/2015

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

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015

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)

ROOFER

Roofer

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$40.70

Supplemental Benefit Rate per Hour: \$28.67

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$46.21

Supplemental Benefit Rate per Hour: \$43.89

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$36.97

Supplemental Benefit Rate per Hour: \$43.89

Sheet Metal Worker - Duct Cleaner

Effective Period: 7/1/2014 - 6/30/2015

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Paid Holidays

None

Shift Rates

Work that can only be performed outside regular working hours (seven hours of work between 7:30 A.M. and 3:30 P.M.) - First shift (work between 3:30 P.M. and 11:30 P.M.) - 10% differential above the established hourly rate.
Second shift (work between 11:30 P.M. and 7:30 A.M.) - 15% differential above the established hourly rate.

For Fan Maintenance: On all full shifts of fan maintenance work the straight time hourly rate of pay will be paid for each shift, including nights, Saturdays, Sundays, and holidays. No journey person engaged in fan maintenance shall work in excess of forty (40) hours in any work week.

(Local #28)

**SHEET METAL WORKER - SPECIALTY
(Decking & Siding)**

Sheet Metal Specialty Worker

The first worker to perform this work must be paid at the rate of the Sheet Metal Worker. The second and third workers shall be paid the Specialty Worker Rate. The ratio of One Sheet Metal Worker, then Two Specialty Workers shall be utilized thereafter.

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$40.78

Supplemental Benefit Rate per Hour: \$23.38

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

None

(Local #28)

SHIPYARD WORKER

Shipyard Mechanic - First Class

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$23.83
Supplemental Benefit Rate per Hour: \$2.87

Shipyard Mechanic - Second Class

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$15.44
Supplemental Benefit Rate per Hour: \$2.54

Shipyard Laborer - First Class

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$19.28
Supplemental Benefit Rate per Hour: \$2.69

Shipyard Laborer - Second Class

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$12.36
Supplemental Benefit Rate per Hour: \$2.43

Shipyard Dockhand - First Class

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$22.68
Supplemental Benefit Rate per Hour: \$2.82

Shipyard Dockhand - Second Class

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$14.22
Supplemental Benefit Rate per Hour: \$2.50

Overtime Description

Work performed on holiday is paid double time the regular hourly wage rate plus holiday pay.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
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

SIGN ERECTOR
(Sheet Metal, Plastic, Electric, and Neon)

Sign Erector

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$44.20
Supplemental Benefit Rate per Hour: \$44.10

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$53.25**

Supplemental Benefit Rate per Hour: **\$51.04**

Supplemental Note: Overtime supplemental benefit rate: **\$101.34**

Overtime

Double time the regular rate after a 7 hour day.

Double time the regular time rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$53.25**

Supplemental Benefit Rate per Hour: **\$51.04**

Supplemental Note: Overtime supplemental benefit rate: **\$101.34**

Overtime

Double time the regular rate after an 8 hour day.

Double time the regular time rate for Saturday.

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Veteran's Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Paid Holidays

None

Shift Rates

May be performed outside of the regular workday except Saturday, Sunday and Holidays. A shift shall consist of eight working hours. All work performed in excess of eight hours shall be paid at double time. No shift shall commence after 7:00 P.M. on Friday or 7:00 P.M. the day before holidays. All work performed after 12:01 A.M. Saturday or 12:01 A.M. the day before a Holiday will be paid at double time. When shift work is performed the wage rate for regular time worked is a thirty percent premium together with fringe benefits.

On Transit Authority projects, where work is performed in the vicinity of tracks all shift work on weekends and holidays may be performed at the regular shift rates.

Local #638

STEAMFITTER - REFRIGERATION AND AIR CONDITIONER (Maintenance and Installation Service Person)

Refrigeration and Air Conditioner Mechanic

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: **\$38.30**

Supplemental Benefit Rate per Hour: **\$12.76**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Refrigeration and Air Conditioner Service Person V

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$31.47
Supplemental Benefit Rate per Hour: \$11.55

Refrigeration and Air Conditioner Service Person IV

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$26.07
Supplemental Benefit Rate per Hour: \$10.52

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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$22.38
Supplemental Benefit Rate per Hour: \$9.76

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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$18.56
Supplemental Benefit Rate per Hour: \$9.06

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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$13.57
Supplemental Benefit Rate per Hour: \$8.30

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day
Independence Day
Labor Day
Veteran's Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$46.56

Supplemental Benefit Rate per Hour: \$36.40

Overtime

Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

New Year's Day
Washington's Birthday
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

1/2 day on Christmas Eve if work is performed in the A.M.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 12/30/2014

Wage Rate per Hour: \$45.32

Supplemental Benefit Rate per Hour: \$22.66

Effective Period: 12/31/2014 - 6/30/2015

Wage Rate per Hour: \$45.82

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.

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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$39.18

Supplemental Benefit Rate per Hour: \$13.19

Supplemental Note: The above rate applies for Manhattan, Bronx, Brooklyn, Queens. \$12.64 for Staten Island only.

Overtime

Time and one half the regular rate after a 7 hour day.

Time and one half the regular rate for Saturday.

Time and one half the regular rate for Sunday.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).

New Year's Day

Lincoln's Birthday

Washington's Birthday

Memorial Day

Independence Day

Labor Day

Columbus Day

Election Day

Veteran's Day

Thanksgiving Day

Christmas Day

Paid Holidays

New Year's Day

Lincoln's Birthday

Washington's Birthday

Memorial Day

Independence Day

Labor Day

Columbus Day

Election Day

Veteran's Day

Thanksgiving Day

Christmas Day

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: **\$38.80**
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.

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

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Tile Layer - Setter

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$49.88

Supplemental Benefit Rate per Hour: \$32.36

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

Timberperson

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$44.33

Supplemental Benefit Rate per Hour: \$45.39

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

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
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: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$54.20

Supplemental Benefit Rate per Hour: \$48.20

Tunnel Workers (Compressed Air Rates)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$52.31

Supplemental Benefit Rate per Hour: \$46.59

Top Nipper (Compressed Air Rates)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$51.35

Supplemental Benefit Rate per Hour: \$45.78

Outside Lock Tender, Outside Gauge Tender, Muck Lock Tender (Compressed Air Rates)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$50.42

Supplemental Benefit Rate per Hour: \$44.91

Bottom Bell & Top Bell Signal Person: Shaft Person (Compressed Air Rates)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$50.42
Supplemental Benefit Rate per Hour: \$44.92

Changehouse Attendant: Powder Watchperson (Compressed Air Rates)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$43.94
Supplemental Benefit Rate per Hour: \$42.55

Blasters (Free Air Rates)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$51.72
Supplemental Benefit Rate per Hour: \$46.03

Tunnel Workers (Free Air Rates)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$49.48
Supplemental Benefit Rate per Hour: \$44.06

All Others (Free Air Rates)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$45.73
Supplemental Benefit Rate per Hour: \$40.75

Microtunneling (Free Air Rates)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$39.58
Supplemental Benefit Rate per Hour: \$35.25

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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.

TABLE OF CONTENTS

<u>CLASSIFICATION</u>	<u>PAGE</u>
ASBESTOS HANDLER.....	3
BOILERMAKER.....	3
BRICKLAYER.....	4
CARPENTER.....	5
CEMENT MASON.....	6
CEMENT AND CONCRETE WORKER.....	6
DERRICKPERSON & RIGGER (STONE).....	7
DOCKBUILDER/PILE DRIVER.....	8
ELECTRICIAN.....	8
ELEVATOR CONSTRUCTOR.....	11
ELEVATOR REPAIR & MAINTENANCE.....	12
ENGINEER.....	13
ENGINEER - OPERATING.....	14
FLOOR COVERER.....	14
GLAZIER.....	15
HEAT & FROST INSULATOR.....	16
HOUSE WRECKER.....	17
IRON WORKER - ORNAMENTAL.....	17
IRON WORKER - STRUCTURAL.....	18
LABORER (FOUNDATION, CONCRETE, EXCAVATING, STREET PIPE LAYER & COMMON)....	19
MARBLE MECHANICS.....	19
MASON TENDER.....	21
METALLIC LATHER.....	21
MILLWRIGHT.....	22
PAVER AND ROADBUILDER.....	23
PAINTER.....	24
PAINTER - STRUCTURAL STEEL.....	24
PLASTERER.....	25
PLUMBER.....	26
POINTER - WATERPROOFER, CAULKER MECHANIC (EXTERIOR BUILDING RENOVATION) .	27
ROOFER.....	27
SHEET METAL WORKER.....	28
SIGN ERECTOR.....	29
STEAMFITTER.....	31
STONE MASON - SETTER.....	31
TAPER.....	32
TILE LAYER - SETTER.....	33
TIMBERPERSON.....	33

ASBESTOS HANDLER

(Ratio of Apprentice Journeyperson: 1 to 1, 1 to 3)

Asbestos Handler (First 1000 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 78% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$15.45

Asbestos Handler (Second 1000 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$15.45

Asbestos Handler (Third 1000 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 83% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$15.45

Asbestos Handler (Fourth 1000 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 89% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$15.45

(Local #78)

BOILERMAKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Boilermaker (First Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$29.74

Boilermaker (Second Year: 1st Six Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$31.40

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Boilermaker (Second Year: 2nd Six Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$33.05

Boilermaker (Third Year: 1st Six Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyperson's rat
Supplemental Benefit Rate Per Hour: \$34.69

Boilermaker (Third Year: 2nd Six Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 85% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$36.34

Boilermaker (Fourth Year: 1st Six Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$38.00

Boilermaker (Fourth Year: 2nd Six Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$39.65

(Local #5)

BRICKLAYER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Bricklayer (First 750 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Second 750 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 60% of Journeyperson's rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Third 750 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 70% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Fourth 750 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Fifth 750 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 90% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$17.10

Bricklayer (Sixth 750 Hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 95% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$17.10

(Bricklayer District Council)

CARPENTER

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Carpenter (First Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 40% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$30.25

Carpenter (Second Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$30.25

Carpenter (Third Year)

Effective Period: 7/1/2014 - 6/30/2015

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Wage Rate Per Hour: 65% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$30.25

Carpenter (Fourth Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$30.25

(Carpenters District Council)

CEMENT MASON
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Cement Mason (First Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 50% of Journeyman's Rate

Cement Mason (Second Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 60% of Journeyman's Rate

Cement Mason (Third Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 70% of Journeyman's Rate

(Local #780)

CEMENT AND CONCRETE WORKER
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 3)

Cement & Concrete Worker (0 - 500 hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$18.04

Cement & Concrete Worker (501 - 1000 hours)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 65% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$18.87

Cement & Concrete Worker (1001 - 2000 hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 65% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$24.25

Cement & Concrete Worker (2001 - 4000 hours)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Benefit Rate Per Hour: \$25.07

(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: 7/1/2014 - 6/30/2015
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: 7/1/2014 - 6/30/2015
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: 7/1/2014 - 6/30/2015
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: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 90% of Journeyman's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyman's rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

(Local #197)

DOCKBUILDER/PILE DRIVER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Dockbuilder/Pile Driver (First Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$31.26

Dockbuilder/Pile Driver (Second Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$31.26

Dockbuilder/Pile Driver (Third Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$31.26

Dockbuilder/Pile Driver (Fourth Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$31.26

(Carpenters District Council)

ELECTRICIAN
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Electrician (First Term: 0-6 Months)

Effective Period: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$12.50
Supplemental Benefit Rate per Hour: \$11.10
Overtime Supplemental Rate Per Hour: \$11.93

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 5/13/2015 - 6/30/2015
Wage Rate per Hour: \$13.00
Supplemental Benefit Rate per Hour: \$11.61
Overtime Supplemental Rate Per Hour: \$12.47

Electrician (First Term: 7-12 Months)

Effective Period: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$13.50
Supplemental Benefit Rate per Hour: \$11.62
Overtime Supplemental Rate Per Hour: \$12.51

Effective Period: 5/13/2015 - 6/30/2015
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: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$14.50
Supplemental Benefit Rate per Hour: \$12.13
Overtime Supplemental Rate Per Hour: \$13.08

Effective Period: 5/13/2015 - 6/30/2015
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: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$15.50
Supplemental Benefit Rate per Hour: \$12.64
Overtime Supplemental Rate Per Hour: \$13.66

Effective Period: 5/13/2015 - 6/30/2015
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: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$16.50
Supplemental Benefit Rate per Hour: \$13.15
Overtime Supplemental Rate Per Hour: \$14.23

Effective Period: 5/13/2015 - 6/30/2015
Wage Rate per Hour: \$17.00

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$13.65
Overtime Supplemental Rate Per Hour: \$14.77

Electrician (Third Term: 7-12 Months)

Effective Period: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$17.50
Supplemental Benefit Rate per Hour: \$13.65
Overtime Supplemental Rate Per Hour: \$14.81

Effective Period: 5/13/2015 - 6/30/2015
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: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$18.50
Supplemental Benefit Rate per Hour: \$14.16
Overtime Supplemental Rate Per Hour: \$15.38

Effective Period: 5/13/2015 - 6/30/2015
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: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$20.50
Supplemental Benefit Rate per Hour: \$15.18
Overtime Supplemental Rate Per Hour: \$16.53

Effective Period: 5/13/2015 - 6/30/2015
Wage Rate per Hour: \$21.00
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: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$22.50
Supplemental Benefit Rate per Hour: \$18.06
Overtime Supplemental Rate Per Hour: \$19.47

Effective Period: 5/13/2015 - 6/30/2015
Wage Rate per Hour: \$23.00
Supplemental Benefit Rate per Hour: \$18.56
Overtime Supplemental Rate Per Hour: \$20.00

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Electrician (Fifth Term: 13-18 Months - Hired on or after 5/10/07)

Effective Period: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$27.00
Supplemental Benefit Rate per Hour: \$20.32
Overtime Supplemental Rate Per Hour: \$22.01

Effective Period: 5/13/2015 - 6/30/2015
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: 7/1/2014 - 5/12/2015
Wage Rate per Hour: \$26.30
Supplemental Benefit Rate per Hour: \$19.96
Overtime Supplemental Rate Per Hour: \$21.61

Effective Period: 5/13/2015 - 6/30/2015
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: 7/1/2014 - 3/16/2015
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$25.46

Effective Period: 3/17/2015 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$26.94

Elevator (Constructor) - Second Year

Effective Period: 7/1/2014 - 3/16/2015
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$25.86

Effective Period: 3/17/2015 - 6/30/2015
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$27.35

Elevator (Constructor) - Third Year

Effective Period: 7/1/2014 - 3/16/2015
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: \$26.66

Effective Period: 3/17/2015 - 6/30/2015
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: \$28.17

Elevator (Constructor) - Fourth Year

Effective Period: 7/1/2014 - 3/16/2015
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: \$27.46

Effective Period: 3/17/2015 - 6/30/2015
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: \$29.00

(Local #1)

**ELEVATOR REPAIR & MAINTENANCE
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)**

Elevator Service/Modernization Mechanic (First Year)

Effective Period: 7/1/2014 - 3/16/2015
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Per Hour: \$24.85

Effective Period: 3/17/2015 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Per Hour: \$26.87

Elevator Service/Modernization Mechanic (Second Year)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 3/16/2015
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Benefit Per Hour: \$25.24

Effective Period: 3/17/2015 - 6/30/2015
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Benefit Per Hour: \$27.27

Elevator Service/Modernization Mechanic (Third Year)

Effective Period: 7/1/2014 - 3/16/2015
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Per Hour: \$26.02

Effective Period: 3/17/2015 - 6/30/2015
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Per Hour: \$28.08

Elevator Service/Modernization Mechanic (Fourth Year)

Effective Period: 7/1/2014 - 3/16/2015
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Per Hour: \$26.81

Effective Period: 3/17/2015 - 6/30/2015
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Per Hour: \$28.89

(Local #1)

ENGINEER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Engineer - First Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$22.49
Supplemental Benefit Rate per Hour: \$20.68

Engineer - Second Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$28.11
Supplemental Benefit Rate per Hour: \$20.68

Engineer - Third Year

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$20.92
Supplemental Benefit Rate per Hour: \$20.68

Engineer - Fourth Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$33.73
Supplemental Benefit Rate per Hour: \$20.68

(Local #15)

ENGINEER - OPERATING
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 5)

Operating Engineer - First Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour 40% of Journeyman's Rate
Supplemental Benefit Per Hour: \$18.60

Operating Engineer - Second Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyman's Rate
Supplemental Benefit Per Hour: \$18.60

Operating Engineer - Third Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 60% of Journeyman's Rate
Supplemental Benefit Per Hour: \$18.60

(Local #14)

FLOOR COVERER
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Floor Coverer (First Year)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.25

Floor Coverer (Second Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.25

Floor Coverer (Third Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.25

Floor Coverer (Fourth Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.25

(Carpenters District Council)

GLAZIER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Glazier (First Year)

Effective Period: 7/1/2014 - 10/31/2014
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Rate Per Hour: \$12.97

Effective Period: 11/1/2014 - 6/30/2015
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Rate Per Hour: \$13.12

Glazier (Second Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$22.25

Glazier (Third Year)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 10/31/2014
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: \$24.75

Effective Period: 11/1/2014 - 6/30/2015
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: \$25.10

Glazier (Fourth Year)

Effective Period: 7/1/2014 - 10/31/2014
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: \$29.87

Effective Period: 11/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.02

(Local #1281)

**HEAT & FROST INSULATOR
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)**

Heat & Frost Insulator (First Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Heat & Frost Insulator (Second Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Heat & Frost Insulator (Third Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 70% of Journeyperson's rate

Heat & Frost Insulator (Fourth Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

(Local #12)

**HOUSE WRECKER
(TOTAL DEMOLITION)
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 3)**

House Wrecker - First Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$20.52
Supplemental Benefit Rate per Hour: \$16.60

House Wrecker - Second Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$21.67
Supplemental Benefit Rate per Hour: \$16.60

House Wrecker - Third Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$23.27
Supplemental Benefit Rate per Hour: \$16.60

House Wrecker - Fourth Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$25.83
Supplemental Benefit Rate per Hour: \$16.60

(Mason Tenders District Council)

**IRON WORKER - ORNAMENTAL
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)**

Iron Worker (Ornamental) - 1st Ten Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyman's rate
Supplemental Rate Per Hour: \$35.15

Iron Worker (Ornamental) - 11 -16 Months

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 55% of Journeyman's rate
Supplemental Rate Per Hour: \$36.21

Iron Worker (Ornamental) - 17 - 22 Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 60% of Journeyman's rate
Supplemental Rate Per Hour: \$37.27

Iron Worker (Ornamental) - 23 - 28 Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 70% of Journeyman's rate
Supplemental Rate Per Hour: \$39.40

Iron Worker (Ornamental) - 29 - 36 Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Rate Per Hour: \$41.52

(Local #580)

**IRON WORKER - STRUCTURAL
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 6)**

Iron Worker (Structural) - 1st Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$24.98
Supplemental Benefit Rate per Hour: \$45.53

Iron Worker (Structural) - 7- 18 Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$25.58
Supplemental Benefit Rate per Hour: \$45.53

Iron Worker (Structural) - 19 - 36 months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$26.18
Supplemental Benefit Rate per Hour: \$45.53

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

(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: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 50% of Journeyman's rate

Supplemental Rate Per Hour: \$34.88

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - Second 1000 hours

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 60% of Journeyman's rate

Supplemental Rate Per Hour: \$34.88

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - Third 1000 hours

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 75% of Journeyman's rate

Supplemental Rate Per Hour: \$34.88

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - Fourth 1000 hours

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 90% of Journeyman's rate

Supplemental Rate Per Hour: \$34.88

(Local #731)

MARBLE MECHANICS

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Cutters & Setters - First 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

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: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Cutters & Setters - Third 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Cutters & Setters - Fourth 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Cutters & Setters - Fifth 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 85% of Journeyperson's rate

Cutters & Setters - Sixth 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 95% of Journeyperson's rate

Polishers & Finishers - First 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

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: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Polishers & Finishers - Third 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Polishers & Finishers - Fourth 750 Hours

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
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: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$20.99
Supplemental Benefit Rate per Hour: \$17.86

Mason Tender - Second Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$22.14
Supplemental Benefit Rate per Hour: \$17.86

Mason Tender - Third Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$23.84
Supplemental Benefit Rate per Hour: \$17.86

Mason Tender - Fourth Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$26.50
Supplemental Benefit Rate per Hour: \$17.86

(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)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$28.11
Supplemental Benefit Rate per Hour: \$22.79

Metallic Lather (Second Year - Called Prior to 6/29/11)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$32.71
Supplemental Benefit Rate per Hour: \$24.44

Metallic Lather (Third Year - Called Prior to 6/29/11)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$37.77
Supplemental Benefit Rate per Hour: \$25.59

Metallic Lather (First Year -Called On Or After 6/29/11)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$17.71
Supplemental Benefit Rate per Hour: \$19.85

Metallic Lather (Second Year - Called On Or After 6/29/11)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$22.81
Supplemental Benefit Rate per Hour: \$19.85

Metallic Lather (Third Year - Called On Or After 6/29/11)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$27.91
Supplemental Benefit Rate per Hour: \$19.85

(Local #46)

MILLWRIGHT
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Millwright (First Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$26.64

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$32.84

Millwright (Second Year)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$31.49

Supplemental Benefit Rate per Hour: \$36.18

Millwright (Third Year)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$36.33

Supplemental Benefit Rate per Hour: \$40.66

Millwright (Fourth Year)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$46.02

Supplemental Benefit Rate per Hour: \$46.24

(Local #740)

PAVER AND ROADBUILDER

(Ratio of Apprentice to Journey person: 1 to 1, 1 to 3)

Paver and Roadbuilder - First Year (Minimum 1000 hours)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$26.61

Supplemental Benefit Rate per Hour: \$16.50

Paver and Roadbuilder - Second Year (Minimum 1000 hours)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$28.22

Supplemental Benefit Rate per Hour: \$16.50

(Local #1010)

PAINTER

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 3)

Painter - Brush & Roller - First Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$15.80
Supplemental Benefit Rate per Hour: \$11.88

Painter - Brush & Roller - Second Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$19.75
Supplemental Benefit Rate per Hour: \$15.73

Painter - Brush & Roller - Third Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$23.70
Supplemental Benefit Rate per Hour: \$18.64

Painter - Brush & Roller - Fourth Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$31.60
Supplemental Benefit Rate per Hour: \$24.02

(District Council of Painters)

PAINTER - STRUCTURAL STEEL

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 3)

Painters - Structural Steel (First Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 40% of Journeyman's rate

Painters - Structural Steel (Second Year)

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 60% of Journeyman's rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Painters - Structural Steel (Third Year)

Effective Period: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 80% of Journeyman's rate

(Local #806)

PLASTERER

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 3)

Plasterer - First Year: 1st Six Months

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 40% of Journeyman's rate

Supplemental Rate Per Hour: \$15.76

Plasterer - First Year: 2nd Six Months

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 45% of Journeyman's rate

Supplemental Rate Per Hour: \$16.24

Plasterer - Second Year: 1st Six Months

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 55% of Journeyman's rate

Supplemental Rate Per Hour: \$18.21

Plasterer - Second Year: 2nd Six Months

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 60% of Journeyman's rate

Supplemental Rate Per Hour: \$19.29

Plasterer - Third Year: 1st Six Months

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 70% of Journeyman's rate

Supplemental Rate Per Hour: \$21.46

Plasterer - Third Year: 2nd Six Months

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 75% of Journeyman's rate

Supplemental Rate Per Hour: \$22.54

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

(Local #530)

PLUMBER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Plumber - First Year: 1st Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$14.00
Supplemental Benefit Rate per Hour: \$0.71

Plumber - First Year: 2nd Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$14.00
Supplemental Benefit Rate per Hour: \$2.96

Plumber - Second Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$23.87
Supplemental Benefit Rate per Hour: \$11.46

Plumber - Third Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$25.97
Supplemental Benefit Rate per Hour: \$11.46

Plumber - Fourth Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$28.82
Supplemental Benefit Rate per Hour: \$11.46

Plumber - Fifth Year: 1st Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$30.22
Supplemental Benefit Rate per Hour: \$11.46

Plumber - Fifth Year: 2nd Six Months

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$42.29
Supplemental Benefit Rate per Hour: \$11.46

(Plumbers Local #1)

**POINTER - WATERPROOFER, CAULKER MECHANIC (EXTERIOR BUILDING
RENOVATION)**

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Pointer - Waterproofer, Caulker Mechanic - First Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$25.01
Supplemental Benefit Rate per Hour: \$4.75

Pointer - Waterproofer, Caulker Mechanic - Second Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$27.25
Supplemental Benefit Rate per Hour: \$9.70

Pointer - Waterproofer, Caulker Mechanic - Third Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$32.24
Supplemental Benefit Rate per Hour: \$12.45

Pointer - Waterproofer, Caulker Mechanic - Fourth Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$38.66
Supplemental Benefit Rate per Hour: \$12.45

(Bricklayer District Council)

ROOFER

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 2)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Rofer - First Year

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 35% of Journeyperson's Rate

Rofer - Second Year

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's Rate

Rofer - Third Year

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's Rate

Rofer - Fourth Year

Effective Period: 7/1/2014 - 6/30/2015
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: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 25% of Journeyperson's rate
Supplemental Rate Per Hour: \$6.15

Sheet Metal Worker (7-18 Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 35% of Journeyperson's rate
Supplemental Rate Per Hour: \$16.21

Sheet Metal Worker (19-30 Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Rate Per Hour: \$22.23

Sheet Metal Worker (31-36 Months)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 55% of Journeyman's rate
Supplemental Rate Per Hour: \$26.16

Sheet Metal Worker (37-42 Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 60% of Journeyman's rate
Supplemental Rate Per Hour: \$28.13

Sheet Metal Worker (43-48 Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 70% of Journeyman's rate
Supplemental Rate Per Hour: \$32.09

Sheet Metal Worker (49-54 Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 75% of Journeyman's rate
Supplemental Rate Per Hour: \$34.07

Sheet Metal Worker (55-60 Months)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Rate Per Hour: \$36.03

(Local #28)

SIGN ERECTOR

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Sign Erector - First Year: 1st Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 35% of Journeyman's rate
Supplemental Rate Per Hour: \$5.96

Sign Erector - First Year: 2nd Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 40% of Journeyman's rate
Supplemental Rate Per Hour: \$6.75

Sign Erector - Second Year: 1st Six Months

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 45% of Journey person's rate
Supplemental Rate Per Hour: \$7.55

Sign Erector - Second Year: 2nd Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journey person's rate
Supplemental Rate Per Hour: \$8.34

Sign Erector - Third Year: 1st Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 55% of Journey person's rate
Supplemental Rate Per Hour: \$9.13

Sign Erector - Third Year: 2nd Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 60% of Journey person's rate
Supplemental Rate Per Hour: \$9.92

Sign Erector - Fourth Year: 1st Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 65% of Journey person's rate
Supplemental Rate Per Hour: \$10.72

Sign Erector - Fourth Year: 2nd Six Months

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 70% of Journey person's rate
Supplemental Rate Per Hour: \$11.51

Sign Erector - Fifth Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 75% of Journey person's rate
Supplemental Rate Per Hour: \$12.30

Sign Erector - Sixth Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journey person's rate
Supplemental Rate Per Hour: \$12.30

(Local #137)

STEAMFITTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Steamfitter - First Year

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate and Supplemental Per Hour: 40% of Journeyperson's rate

Steamfitter - Second Year

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate and Supplemental Rate Per Hour: 50% of Journeyperson's rate.

Steamfitter - Third Year

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate and Supplemental Rate per Hour: 65% of Journeyperson's rate.

Steamfitter - Fourth Year

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate and Supplemental Rate Per Hour: 80% of Journeyperson's rate.

Steamfitter - Fifth Year

Effective Period: 7/1/2014 - 6/30/2015

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: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Second 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 60% of Journeyperson's rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Third 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

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: 7/1/2014 - 6/30/2015

Wage Rate Per Hour: 80% of Journeyperson's rate

Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Fifth 750 Hours

Effective Period: 7/1/2014 - 6/30/2015

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: 7/1/2014 - 6/30/2015

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: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Drywall Taper - Second Year

Effective Period: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Drywall Taper - Third Year

Effective Period: 7/1/2014 - 6/30/2015

Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

(Local #1974)

TILE LAYER - SETTER
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Tile Layer - Setter - First 750 Hours

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 50% of Journeyman's rate

Tile Layer - Setter - Second 750 Hours

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 55% of Journeyman's rate

Tile Layer - Setter - Third 750 Hours

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 65% of Journeyman's rate

Tile Layer - Setter - Fourth 750 Hours

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 75% of Journeyman's rate

Tile Layer - Setter - Fifth 750 Hours

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 85% of Journeyman's rate

Tile Layer - Setter - Sixth 750 Hours

Effective Period: 7/1/2014 - 6/30/2015
Wage and Supplemental Rate Per Hour: 95% of Journeyman's rate

(Local #7)

TIMBERPERSON
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 6)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Timberperson - First Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.89

Timberperson - Second Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.89

Timberperson - Third Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.89

Timberperson - Fourth Year

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.89

(Local #1536)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

LABOR LAW §230 AND
NYC ADMINISTRATIVE CODE §6-130 BUILDING SERVICE EMPLOYEES

PREVAILING WAGE FOR BUILDING SERVICE EMPLOYEES ON NYC CONTRACTS PURSUANT
TO LABOR LAW §230 ET SEQ.

Building service employees on public contracts must receive not less than the prevailing rate of wage and supplements for the classification of work performed. In accordance with Labor Law §230 et seq. the Comptroller of the City of New York has promulgated this schedule of prevailing wages and supplemental benefits for building service employees engaged on New York City public building service contracts in excess of \$1,500.00. Prevailing rates are required to be annexed to and form part of the contract pursuant to §231 (4).

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 234 (1). 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 building services contracts. Contractors are advised to review the Comptroller's Prevailing Wage Schedule before bidding on building services contracts. Contractors with questions concerning trade classifications, prevailing rates or prevailing practices with respect to building services 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 building services 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 building services 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.

PREVAILING WAGE FOR BUILDING SERVICE EMPLOYEES IN NEW YORK CITY LEASED OR
FINANCIALLY ASSISTED FACILITIES PURSUANT TO NYC ADMINISTRATIVE CODE § 6-130

Covered landlords & covered financial assistance recipients shall ensure that all building service employees performing building service work at the premises to which a lease or financial assistance pertains are paid no less than the prevailing wage listed in the Labor Law §230 Prevailing Wage Schedule.

Covered Landlords include:

Businesses (other than not-for-profit organizations) leasing to New York City agencies

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

commercial office space or commercial office facilities of 10,000 square feet or more where the City leases or rents no less than 51% of the total square footage of the building to which the lease applies (no less than 80% in Staten Island or in an area not defined as an exclusion area pursuant to section 421-a of the real property tax law on the date of enactment of the local law).

Covered Financial Assistance Recipients include:

Businesses (other than not-for-profit organizations) with annual gross revenues of five million dollars or more who have received financial assistance from the City of New York (as defined in New York City Administrative Code §6-130) with a total value of one million dollars or more.

Exemptions: Business Improvement Districts and employers with manufacturing operations at the premises to which the financial assistance pertains.

The information is intended to assist you in meeting your prevailing wage obligation. You should consult New York City Administrative Code §6-130 to determine whether you are covered by this prevailing wage law. New York City Administrative Code § 6-130 requires the City to maintain an updated list of covered landlords and financial assistance recipients who are subject to the prevailing wage requirement.

Labor Law § 231 (6) and NYC Administrative Law §6-130 requires contractors to post on the site of the work a current copy of this schedule of wages and supplements.

This schedule is applicable to work performed during the effective period, unless otherwise noted. Changes to this schedule are published on our web site www.comptroller.nyc.gov. Contractors must pay the wages and supplements in effect when the building service employee performs the work. Preliminary schedules for future one-year periods appear in the City Record on or about June 1 each succeeding year. Final schedules appear on or about July 1 in the City Record and on our web site www.comptroller.nyc.gov.

Contractors are solely responsible for maintaining original payroll records delineating, among other things, the hours worked by each employee within a given classification.

Some of the rates in this schedule are based on collective bargaining agreements. The Comptroller's Office has attempted to include all overtime, shift and night differential, Holiday, Saturday, Sunday or other premium time work. However, this schedule does not set forth every prevailing practice with respect to such rates with which employers must comply. All such practices are nevertheless part of the employer's prevailing wage obligation and contained in the collective bargaining agreements of the prevailing wage unions. These collective bargaining agreements are available for inspection by appointment. Requests for appointments may be made by calling (212) 669-4443, Monday through Friday between the hours of 9 a.m. and 5 p.m.

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE



THE CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
BUREAU OF LABOR LAW
1 CENTRE STREET
NEW YORK, NY 10007

SCOTT M. STRINGER
COMPTROLLER

If you are a Covered Building Service Employee and you have been paid less than the Prevailing Wage and Benefits, please contact us at 212-669-4443 or download our complaint form from our website at WWW.COMPTROLLER.NYC.GOV (click on the Bureau of Labor Law).

Si es un empleado de servicios a edificios elegible y recibió menos del sueldo prevalente y beneficios, por favor contáctenos en 212-669-4443 o descarga un formulario de reclamo del sitio del Internet WWW.COMPTROLLER.NYC.GOV (opreme "Oficina de Derecho Laboral").

Wasył Kinach, P.E.
Director of Classifications
Bureau of Labor Law

TABLE OF CONTENTS

<u>CLASSIFICATION</u>	<u>PAGE</u>
BOILER SERVICEPERSON/TANK CLEANER MECHANIC (LOW PRESSURE).....	6
BUILDING CLEANER AND MAINTAINER (OFFICE).....	6
BUILDING CLEANER AND MAINTAINER (RESIDENTIAL).....	11
BUILDING HVAC SERVICES OPERATOR.....	12
CLEANER (PARKING GARAGE).....	13
FUEL OIL.....	13
GARDENER.....	15
LOCKSMITH.....	16
MEDICAL WASTE REMOVAL.....	16
MOVER - OFFICE FURNITURE AND EQUIPMENT.....	17
REFUSE REMOVER.....	18
SECURITY GUARD (ARMED).....	18
SECURITY GUARD (UNARMED).....	20
WINDOW CLEANER.....	22

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

BOILER SERVICEPERSON/TANK CLEANER MECHANIC (LOW PRESSURE)

Boiler Service Person/Tank Cleaner Mechanic (Low Pressure)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$11.00

Supplemental Benefit Rate per Hour: \$7.15

Overtime Description

Work in excess of 8 hours performed on a Sunday or Holiday shall be paid two and one half times the regular rate.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.

Double time the regular rate for Sunday.

Double time the regular rate for work on the following holiday(s).

Paid Holidays

- New Year's Day
- Martin Luther King Jr. Day
- President's Day
- Good Friday
- Memorial Day
- Independence Day
- Labor Day
- Columbus Day
- Thanksgiving Day
- Day after Thanksgiving
- Christmas Day
- Employee's Birthday

Vacation

- 1 year service.....five (5) days
- 3 years service or more.....ten (10) days
- 8 years service or more.....fifteen (15) days
- 13 years service or more.....twenty (20) days

SICK LEAVE:

- 1-2 years employment.....4 days
- 2-3 years employment.....5 days
- 3-4 years employment.....6 days
- 4-5 years employment.....8 days
- 6 years or more employment.....10 days

(Local #32 B/J)

BUILDING CLEANER AND MAINTAINER (OFFICE)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Office Building Class "A" Handyperson (Over 280,000 square feet gross area)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$25.65

Supplemental Benefit Rate per Hour: \$9.91

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$26.20

Supplemental Benefit Rate per Hour: \$10.46

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Office Building Class "A" Foreperson, Starter (Over 280,000 square feet gross area)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$25.54

Supplemental Benefit Rate per Hour: \$9.91

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$26.09

Supplemental Benefit Rate per Hour: \$10.46

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Office Building Class "A" Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director (Over 280,000 square feet gross area)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$23.42

Supplemental Benefit Rate per Hour: \$9.91

Supplemental Note: for new employee 0-3 months of employment - \$0.00; for new employee 4-12 months of employment - \$7.22; for new employee 13-24 months of employment - \$9.58

NEW HIRE: Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director may be paid 75% of the wage rate above for the first 21 months of employment, 85% of the wage rate above for the 22nd through 42nd months of employment, and upon the completion of 42 months of employment employee shall be paid the full wage rate. Note: New Hires hired before January 1, 2012 will continue to receive 80% of the wage rate above for the first 30 months, and upon the completion of 30 months of employment employee shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$23.92

Supplemental Benefit Rate per Hour: \$10.46

Supplemental Note: for new employee 0-3 months of employment - \$0.00; for new employee 4-12 months of employment - \$7.67; for new employee 13-24 months of employment - \$10.13

NEW HIRE: Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director may be paid 75% of the wage rate above for the first 21 months of employment, 85% of the wage rate above for the 22nd through 42nd months of employment, and upon the completion of 42 months of employment employee shall be paid the full wage rate.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Note: New Hires hired before January 1, 2012 will continue to receive 80% of the wage rate above for the first 30 months, and upon the completion of 30 months of employment employee shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Office Building Class "B" Handyman (Over 120,000 and less than 280,000 square feet gross area)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$25.62

Supplemental Benefit Rate per Hour: \$9.91

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$26.17

Supplemental Benefit Rate per Hour: \$10.46

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Office Building Class "B" Foreperson, Starter (Over 120,000 and less than 280,000 square feet gross area)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$25.50

Supplemental Benefit Rate per Hour: \$9.91

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$26.05

Supplemental Benefit Rate per Hour: \$10.46

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Office Building Class "B" Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director (Over 120,000 and less than 280,000 square feet gross area)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$23.39

Supplemental Benefit Rate per Hour: \$9.91

Supplemental Note: for new employee 0-3 months of employment - \$0.00; for new employee 4-12 months of employment - \$7.22; for new employee 13-24 months of employment - \$9.58

NEW HIRE: Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director may be paid 75% of the wage rate above for the first 21 months of employment, 85% of the wage rate above for the 22nd through 42nd months of employment, and upon the completion of 42 months of employment employee shall be paid the full wage rate. Note: New Hires hired before January 1, 2012 will continue to receive 80% of the wage rate above for the first 30 months, and upon the completion of 30 months of employment employee shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$23.89

Supplemental Benefit Rate per Hour: \$10.46

Supplemental Note: for new employee 0-3 months of employment - \$0.00; for new employee 4-12 months of employment - \$7.67; for new employee 13-24 months of employment - \$10.13

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

NEW HIRE: Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director may be paid 75% of the wage rate above for the first 21 months of employment, 85% of the wage rate above for the 22nd through 42nd months of employment, and upon the completion of 42 months of employment employee shall be paid the full wage rate. Note: New Hires hired before January 1, 2012 will continue to receive 80% of the wage rate above for the first 30 months, and upon the completion of 30 months of employment employee shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Office Building Class "C" Handyman (Less than 120,000 square feet gross area)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$25.57

Supplemental Benefit Rate per Hour: \$9.91

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$26.12

Supplemental Benefit Rate per Hour: \$10.46

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Office Building Class "C" Foreperson, Starter (Less than 120,000 square feet gross area)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$25.46

Supplemental Benefit Rate per Hour: \$9.91

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$26.01

Supplemental Benefit Rate per Hour: \$10.46

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Office Building Class "C" Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director (Less than 120,000 square feet gross area)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$23.35

Supplemental Benefit Rate per Hour: \$9.91

Supplemental Note: for new employee 0-3 months of employment - \$0.00; for new employee 4-12 months of employment - \$7.22; for new employee 13-24 months of employment - \$9.58

NEW HIRE: Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director may be paid 75% of the wage rate above for the first 21 months of employment, 85% of the wage rate above for the 22nd through 42nd months of employment, and upon the completion of 42 months of employment employee shall be paid the full wage rate. Note: New Hires hired before January 1, 2012 will continue to receive 80% of the wage rate above for the first 30 months, and upon the completion of 30 months of employment employee shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Effective Period: 1/1/2015 - 6/30/2015

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$230 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$23.85

Supplemental Benefit Rate per Hour: \$10.46

Supplemental Note: for new employee 0-3 months of employment - \$0.00; for new employee 4-12 months of employment - \$7.67; for new employee 13-24 months of employment - \$10.13

NEW HIRE: Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director may be paid 75% of the wage rate above for the first 21 months of employment, 85% of the wage rate above for the 22nd through 42nd months of employment, and upon the completion of 42 months of employment employee shall be paid the full wage rate. Note: New Hires hired before January 1, 2012 will continue to receive 80% of the wage rate above for the first 30 months, and upon the completion of 30 months of employment employee shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Months of employment shall be defined as an Employee's length of service with the Employer or at the Facility, whichever is greater.

Overtime Description

Supplemental Benefits shall be paid for each hour paid, up to forty (40) paid hours per week.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for work on a holiday plus the day's pay.

Time and one half the regular hourly rate after 40 hours in any work week.

Paid Holidays

New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Vacation

Less than 6 months of work.....no vacation
6 months of work.....three (3) days
1 year of work.....ten (10) days
5 years of work.....fifteen (15) days
15 years of work.....twenty (20) days
21 years of work.....twenty-one (21) days
22 years of work.....twenty-two (22) days
23 years of work.....twenty-three (23) days
24 years of work.....twenty-four (24) days
25 years or more of work.....twenty-five (25) days
Plus two Personal Days per year.

Sick Leave:

10 sick days per year.

Unused sick leave paid in the succeeding January, one full day pay for each unused sick day.

(Local #32 B/J)

BUILDING CLEANER AND MAINTAINER (RESIDENTIAL)

Residential Building Handyperson

Effective Period: 7/1/2014 - 4/20/2015

Wage Rate per Hour: \$24.26

Supplemental Benefit Rate per Hour: \$9.83

Supplemental Note: for new employee 0-3 months of employment - \$0.00. Effective 1/1/2015 - \$10.38

Effective Period: 4/21/2015 - 6/30/2015

Wage Rate per Hour: \$24.83

Supplemental Benefit Rate per Hour: \$10.38

Supplemental Note: for new employee 0-3 months of employment - \$0.00

Residential Building Cleaner/Porter, Doorperson, Elevator Operator

Effective Period: 7/1/2014 - 4/20/2015

Wage Rate per Hour: \$21.98

Supplemental Benefit Rate per Hour: \$9.83

Supplemental Note: for new employee 0-3 months of employment - \$0.00; for new employee 4-12 months of employment - \$7.22; for new employee 13-24 months of employment - \$9.58

Effective 1/1/2015 - \$10.38, for new employee 0-3 months of employment - \$0.00; for new employee 4-12 months of employment - \$7.67; for new employee 13-24 months of employment - \$10.13

NEW HIRE - Cleaner/Porter, Doorperson, Elevator Operator: may be paid a starting rate of 80% of the hourly rate published above. Upon completion of 30 months of employment, the new hire shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Effective Period: 4/21/2015 - 6/30/2015

Wage Rate per Hour: \$22.51

Supplemental Benefit Rate per Hour: \$10.38

Supplemental Note: for new employee 0-3 months of employment - \$0.00; for new employee 4-12 months of employment - \$7.67; for new employee 13-24 months of employment - \$10.13

NEW HIRE - Cleaner/Porter, Doorperson, Elevator Operator: 0-21 months may be paid 75% of the hourly wage rate published above, 22-42 months may be paid 85% of the hourly wage rate published above. Upon completion of 42 months of employment, the new hire shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Overtime Description

Supplemental Benefits shall be paid for each hour paid, up to forty (40) paid hours per week.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for work on a holiday plus the day's pay.

Time and one half the regular hourly rate after 40 hours in any work week.

Paid Holidays

New Year's Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Christmas Day

Vacation

6 months.....three (3) days
1 year.....ten (10) days
5 years.....fifteen (15) days
15 years.....twenty (20) days
21 years.....twenty-one (21) days
22 years.....twenty-two (22) days
23 years.....twenty-three (23) days
24 years.....twenty-four (24) days
25 years.....twenty-five (25) days
Plus two Personal Days per year.

SICK LEAVE

After 1 year of service.....ten (10) days per year

(Local #32 B/J)

BUILDING HVAC SERVICES OPERATOR

Engineer (Refrigeration)

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$36.73
Supplemental Benefit Rate per Hour: \$16.35

Fireperson

Fireperson (Helper): Assist the Engineer

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$28.60
Supplemental Benefit Rate per Hour: \$15.97

Please note that the NYC Comptroller's Office does not publish rates for the Stationary Engineer title.

Overtime Description

All hours worked on a holiday shall be paid at two and one half times the regular wage rate in lieu of the paid day off.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Paid Holidays

New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day
Plus six (6) floating Holidays

Vacation

6 months three (3) days
1 year ten (10) days
5 years fifteen (15) days
15 years twenty (20) days
21 years twenty-one (21) days
22 years twenty-two (22) days
23 years twenty-three (23) days
24 years twenty-four (24) days
25 years twenty-five (25) days

(Local #94)

CLEANER (PARKING GARAGE)

Garage Cleaner

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$10.76
Supplemental Benefit Rate per Hour: \$1.63

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular hourly rate after 40 hours in any work week.

(Based on data from NYS Department of Labor Occupational Employment Statistics and US Department of Labor Bureau of Labor Statistics)

FUEL OIL

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (5th Year and above)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 12/15/2014
Wage Rate per Hour: \$31.36
Supplemental Benefit Rate per Hour: \$20.77

Effective Period: 12/16/2014 - 6/30/2015
Wage Rate per Hour: \$31.86
Supplemental Benefit Rate per Hour: \$21.27

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (4th Year)

Effective Period: 7/1/2014 - 12/15/2014
Wage Rate per Hour: \$28.75
Supplemental Benefit Rate per Hour: \$20.77

Effective Period: 12/16/2014 - 6/30/2015
Wage Rate per Hour: \$29.25
Supplemental Benefit Rate per Hour: \$21.27

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (3rd Year)

Effective Period: 7/1/2014 - 12/15/2014
Wage Rate per Hour: \$26.75
Supplemental Benefit Rate per Hour: \$20.77

Effective Period: 12/16/2014 - 6/30/2015
Wage Rate per Hour: \$27.25
Supplemental Benefit Rate per Hour: \$21.27

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (2nd Year)

Effective Period: 7/1/2014 - 12/15/2014
Wage Rate per Hour: \$24.75
Supplemental Benefit Rate per Hour: \$20.77

Effective Period: 12/16/2014 - 6/30/2015
Wage Rate per Hour: \$25.25
Supplemental Benefit Rate per Hour: \$21.27

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (1st Year)

Effective Period: 7/1/2014 - 12/15/2014
Wage Rate per Hour: \$22.75
Supplemental Benefit Rate per Hour: \$20.77

Effective Period: 12/16/2014 - 6/30/2015
Wage Rate per Hour: \$23.25
Supplemental Benefit Rate per Hour: \$21.27

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

- Martin Luther King Jr. Day
- Lincoln's Birthday
- Washington's Birthday
- Memorial Day
- Independence Day
- Labor Day
- Columbus Day
- Election Day
- Veteran's Day

Triple time the regular rate for work on the following holiday(s).

- New Year's Day
- Thanksgiving Day
- Christmas Day

Paid Holidays

- New Year's Day
- Martin Luther King Jr. Day
- Lincoln's Birthday
- Washington's Birthday
- Memorial Day
- Independence Day
- Labor Day
- Columbus Day
- Election Day
- Veteran's Day
- Thanksgiving Day
- Christmas Day

Vacation

Less than 75 days worked.....no vacation.
75 days worked, but less than 110 days worked in a calendar year.....five (5) days the following year.
110 days or more worked in a calendar year.....ten (10) days the following year.

SICK LEAVE:

1 day sick leave earned for each 40 days worked in the preceding calendar year for a maximum of five (5) days per calendar year.

(Local #553)

GARDENER

Gardener

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$17.57
Supplemental Benefit Rate per Hour: \$1.63

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular hourly rate after 40 hours in any work week.

(Based on data from NYS Department of Labor Occupational Employment Statistics and US Department of Labor Bureau of Labor Statistics)

LOCKSMITH

Locksmith

Effective Period: 7/1/2014 - 6/30/2015
Wage Rate per Hour: \$22.28
Supplemental Benefit Rate per Hour: \$6.13

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular hourly rate after 40 hours in any work week.

(Based on data from NYS Department of Labor Occupational Employment Statistics and US Department of Labor Bureau of Labor Statistics)

MEDICAL WASTE REMOVAL

Driver

Effective Period: 7/1/2014 - 3/31/2015
Wage Rate per Hour: \$18.76
Supplemental Benefit Rate per Hour: \$9.47

Effective Period: 4/1/2015 - 6/30/2015
Wage Rate per Hour: \$19.59
Supplemental Benefit Rate per Hour: \$10.34

Helper

Effective Period: 7/1/2014 - 3/31/2015
Wage Rate per Hour: \$15.01
Supplemental Benefit Rate per Hour: \$9.47

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Effective Period: 4/1/2015 - 6/30/2015
Wage Rate per Hour: \$15.84
Supplemental Benefit Rate per Hour: \$10.34

Tractor Trailer Driver

Effective Period: 7/1/2014 - 3/31/2015
Wage Rate per Hour: \$21.26
Supplemental Benefit Rate per Hour: \$9.47

Effective Period: 4/1/2015 - 6/30/2015
Wage Rate per Hour: \$22.09
Supplemental Benefit Rate per Hour: \$10.34

Overtime Description

Time and one half the regular hourly rate after an 8 hour day or after 40 hours in any work week. The seventh day of work in a workweek is paid at double time the regular hourly rate. Time and one half the regular hourly rate for work on a holiday plus days pay for below paid holidays.

Paid Holidays

President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Vacation

1 year of service but less than five years.....ten (10) days
5 years of service but less than ten years.....fifteen (15) days
10 years of service.....sixteen (16) days
11 years.....seventeen (17) days
12 years.....eighteen (18) days
13 years.....nineteen (19) days
14 years.....twenty (20) days
20 years.....twenty-one (21) days
21 years.....twenty-two (22) days
22 years.....twenty-three (23) days
23 years.....twenty-four (24) days
24 years.....twenty-five (25) days
Plus 5 Personal Days

(Local #813)

MOVER - OFFICE FURNITURE AND EQUIPMENT

Heavy and Tractor Trailer Truck Driver

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Tractor-trailer combination or a truck with a capacity of at least 26,000 pounds Gross Vehicle Weight (GVW)

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$22.48

Supplemental Benefit Rate per Hour: \$5.13

Light Truck Driver

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$18.89

Supplemental Benefit Rate per Hour: \$5.13

Laborer and Freight, Stock, and Material Movers, Hand

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$17.59

Supplemental Benefit Rate per Hour: \$5.13

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular hourly rate after 40 hours in any work week.

(Based on data from NYS Department of Labor Occupational Employment Statistics and US Department of Labor Bureau of Labor Statistics)

REFUSE REMOVER

Refuse Remover

Effective Period: 7/1/2014 - 6/30/2015

Wage Rate per Hour: \$29.54

Supplemental Benefit Rate per Hour: \$5.13

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular hourly rate after 40 hours in any work week.

(Based on data from NYS Department of Labor Occupational Employment Statistics and US Department of Labor Bureau of Labor Statistics)

SECURITY GUARD (ARMED)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Security Guard (Armed)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$28.25

Supplemental Benefit Rate per Hour: \$5.02

Supplemental Note: for new employee 0-30 days of employment - \$4.44; for new employee 31-120 days of employment - \$4.61; for new employee 121 days - 2 years of employment - \$4.63

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$28.50

Supplemental Benefit Rate per Hour: \$5.34

Supplemental Note: for new employee 0-30 days of employment - \$4.62; for new employee 31-120 days of employment - \$4.79; for new employee 121 days - 2 years of employment - \$4.90

Months of employment shall be defined as an Employee's length of service with the Employer or at the Facility, whichever is greater.

Overtime Description

A guard who works a holiday is paid the regular rate plus receives the paid holiday.
Supplemental Benefits shall be paid for each hour paid, up to forty (40) paid hours per week.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular hourly rate after 40 hours in any work week.

Paid Holidays

- New Year's Day
- President's Day
- Memorial Day
- Independence Day
- Labor Day
- Thanksgiving Day
- Christmas Day
- Personal Day

Vacation

Months on payroll	Vacation with Pay
6	3 days
12	5 days
24	10 days
60	15 days
180	20 days
300	25 days

Sick Leave

Employees accrue paid sick leave at the rate of one (1) sick day for every six (6) months worked, up to a maximum of six (6) days a year.

(Local #32B/J)

SECURITY GUARD (UNARMED)

Security Guard (Unarmed) 0 - 6 months

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$13.10

Supplemental Benefit Rate per Hour: \$4.63

Supplemental Note: for new employee 0-30 days of employment - \$4.44; for new employee 31-120 days of employment - \$4.61

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$13.35

Supplemental Benefit Rate per Hour: \$4.90

Supplemental Note: for new employee 0-30 days of employment - \$4.62; for new employee 31-120 days of employment - \$4.79

Security Guard (Unarmed) 7 - 12 months

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$13.60

Supplemental Benefit Rate per Hour: \$4.63

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$13.85

Supplemental Benefit Rate per Hour: \$4.90

Security Guard (Unarmed) 13 - 18 months

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$14.10

Supplemental Benefit Rate per Hour: \$4.63

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$14.35

Supplemental Benefit Rate per Hour: \$4.90

Security Guard (Unarmed) 19 - 24 months

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$14.60

Supplemental Benefit Rate per Hour: \$4.63

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$14.85

Supplemental Benefit Rate per Hour: \$4.90

Security Guard (Unarmed) 25 - 30 months

Effective Period: 7/1/2014 - 12/31/2014

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$15.10
Supplemental Benefit Rate per Hour: \$5.02

Effective Period: 1/1/2015 - 6/30/2015
Wage Rate per Hour: \$15.35
Supplemental Benefit Rate per Hour: \$5.34

Security Guard (Unarmed) 31 months or more

Effective Period: 7/1/2014 - 12/31/2014
Wage Rate per Hour: \$15.60
Supplemental Benefit Rate per Hour: \$5.02

Effective Period: 1/1/2015 - 6/30/2015
Wage Rate per Hour: \$16.00
Supplemental Benefit Rate per Hour: \$5.34

Months of employment shall be defined as an Employee's length of service with the Employer or at the Facility, whichever is greater.

Overtime Description

A guard who works a holiday is paid the regular rate plus receives the paid holiday.
Supplemental Benefits shall be paid for each hour paid, up to forty (40) paid hours per week.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular hourly rate after 40 hours in any work week.

Paid Holidays

- New Year's Day
- President's Day
- Memorial Day
- Independence Day
- Labor Day
- Thanksgiving Day
- Christmas Day
- Personal Day

Vacation

Months on payroll	Vacation with Pay
6	3 days
12	5 days
24	10 days
60	15 days
180	20 days
300	25 days

Sick Leave

Employees accrue paid sick leave at the rate of one (1) sick day for every six (6) months worked, up to a maximum of six (6) days a year.

Local #32B/J)

WINDOW CLEANER

Window Cleaner

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$26.90

Supplemental Benefit Rate per Hour: \$9.91

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$27.40

Supplemental Benefit Rate per Hour: \$10.46

Power Operated Scaffolds, Manual Scaffolds, and Boatswain Chairs

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$29.27

Supplemental Benefit Rate per Hour: \$9.91

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$29.90

Supplemental Benefit Rate per Hour: \$10.46

Window Cleaner Apprentice (0 - 3 months)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$19.92

Supplemental Benefit Rate per Hour: None

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$20.29

Supplemental Benefit Rate per Hour: None

Window Cleaner Apprentice (4 - 7 months)

Effective Period: 7/1/2014 - 12/31/2014

Wage Rate per Hour: \$21.54

Supplemental Benefit Rate per Hour: \$9.91

Effective Period: 1/1/2015 - 6/30/2015

Wage Rate per Hour: \$21.94

Supplemental Benefit Rate per Hour: \$10.46

Window Cleaner Apprentice (8 - 11 months)

Effective Period: 7/1/2014 - 12/31/2014

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$22.82
Supplemental Benefit Rate per Hour: \$9.91

Effective Period: 1/1/2015 - 6/30/2015
Wage Rate per Hour: \$23.24
Supplemental Benefit Rate per Hour: \$10.46

Window Cleaner Apprentice (12 - 15 months)

Effective Period: 7/1/2014 - 12/31/2014
Wage Rate per Hour: \$24.12
Supplemental Benefit Rate per Hour: \$9.91

Effective Period: 1/1/2015 - 6/30/2015
Wage Rate per Hour: \$24.57
Supplemental Benefit Rate per Hour: \$10.46

Window Cleaner Apprentice (16 - 17 months)

Effective Period: 7/1/2014 - 12/31/2014
Wage Rate per Hour: \$25.44
Supplemental Benefit Rate per Hour: \$9.91

Effective Period: 1/1/2015 - 6/30/2015
Wage Rate per Hour: \$25.91
Supplemental Benefit Rate per Hour: \$10.46

Months of employment shall be defined as an Employee's length of service with the Employer or at the Facility, whichever is greater.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Personal Day

Vacation

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

After 7 months but less than 1 year of service.....	five (5) days
1 year but less than 5 years of service.....	ten (10) days
5 years of service but less than 15 years of service.....	fifteen (15) days
15 years of service but less than 21 years of service.....	twenty (20) days
21 years.....	twenty-one (21) days
22 years.....	twenty-two (22) days
23 years.....	twenty-three (23) days
24 years.....	twenty-four (24) days
25 years or more of service.....	twenty-five (25) days
Plus 1 day per year for medical visit	

SICK LEAVE:

10 days after one year worked. Unused sick days to be paid in cash.

(Local #32 B/J)



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Issue Date - January 15, 2015

**DDC STANDARD GENERAL CONDITIONS
FOR MULTIPLE CONTRACT PROJECTS**



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Issue Date - January 15, 2015

NO TEXT



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Issue Date - January 15, 2015

**DIVISION 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS**

TABLE OF CONTENTS

SECTION NO.	SECTION TITLE
01 10 00	SUMMARY
01 31 00	PROJECT MANAGEMENT AND COORDINATION
01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION
01 32 33	PHOTOGRAPHIC DOCUMENTATION
01 33 00	SUBMITTAL PROCEDURES
01 35 03	GENERAL MECHANICAL REQUIREMENTS
01 35 06	GENERAL ELECTRICAL REQUIREMENTS
01 35 26	SAFETY REQUIREMENTS PROCEDURES
01 35 91	HISTORIC TREATMENT PROCEDURES
01 40 00	QUALITY REQUIREMENTS
01 42 00	REFERENCES
01 50 00	TEMPORARY FACILITIES, SERVICES AND CONTROLS
01 54 11	TEMPORARY ELEVATORS AND HOISTS
01 54 23	TEMPORARY SCAFFOLDING AND PLATFORMS
01 73 00	EXECUTION
01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 77 00	CLOSEOUT PROCEDURES
01 78 39	CONTRACT RECORD DOCUMENTS
01 79 00	DEMONSTRATION AND OWNERS PRE-ACCEPTANCE ORIENTATION
01 81 13	SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS
01 81 13.13	VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES, SEALANTS, PAINTS AND COATINGS FOR LEED BUILDINGS
01 81 19	INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS
01 91 13	GENERAL COMMISSIONING REQUIREMENTS



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Issue Date - January 15, 2015

NO TEXT



**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.
- C. **MULTIPLE CONTRACTS:** The Project involves multiple separate Contracts: (1) Contract for General Construction Work ("GC Contract"), (2) Contract for Plumbing Work ("Plumbing Contract"), (3) Heating/Ventilating/Air-Conditioning/Fire Protection Work ("HVAC and Fire Protection Contract"), and (4) Electrical Work ("Electrical Contract"). The Contracts pertaining to the Project are set forth in the Addendum. These Division 01 Standard General Conditions are applicable to all Contracts for the Project and shall constitute an integral part of each separate Contract to the same extent as though repeated in full therein.

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
- B. This section includes a summary of each Contract, including responsibilities for coordination and temporary facilities and controls.
- C. Specific requirements of each Contract are also indicated in individual Specification Sections and on Drawings.
- D. Throughout these General Conditions, various responsibilities and obligations are assigned to each of the following four Contractors for:
 - 1) General Construction Work ("GC Contractor")
 - 2) Plumbing Work ("Plumbing Contractor")
 - 3) Heating/ Ventilating/ Air-Conditioning/ Fire Protection Work ("HVAC and Fire Protection Contractor"), and
 - 4) Electrical Work ("Electrical Contractor")

In the event the Project does not involve all four Contracts, the responsibilities and obligations of each omitted Contract shall be assigned to one of the Contracts included in the Project. The Addendum specifies which Contractor shall perform the responsibilities and obligations of each omitted Contract, as set forth in the General Conditions.



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 this project.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.4 B

- B. LEED: 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."

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.4 C

- C. COMMISSIONING: 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. Each 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 this project.
- E. COMPLETION OF WORK – Work to be done under each separate Contract comprises 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 each separate Contract but not shown on the Contract Drawings in their present form, or vice versa, is required, and shall be performed by each 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 each 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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, each Contractor shall be deemed to have estimated the most expensive way of doing the work unless each 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.
- J. **COOPERATION BETWEEN CONTRACTORS** – Inasmuch as the completion of the Project within the prescribed limit of time is dependent largely upon the close and active cooperation of all those engaged herein, it is therefore expressly understood and agreed that the Contractor shall lay out and install all work at such time or times and in such manner as not to delay or interfere with the carrying forward of the work of other Contractors. In the event of any dispute regarding possible or alleged interference between the various Contractors which may retard the progress of the work, the Contractor shall file a dispute in accordance with the Article of the Contract entitled "Dispute Resolution".

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 GC 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. **PRINTS**: Each Contractor, other than GC Contractor referred to in Paragraph B, will receive three (3) complete sets of paper prints of all Drawings listed in Paragraph A and specifications.
- D. **ADDITIONAL COPIES** of Drawings and Specifications, when requested, will be furnished to each Contractor if available.
- E. **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.
- F. **COMPENSATION** - Where Supplementary Drawings entail extra work, compensation therefore to the affected Contractor shall be subject to the terms of the Contract. The Supplementary Drawings shall be binding upon such Contractor with the same force as the Contract Drawings.
- G. **SUPPLEMENTARY DRAWING PRINTS** - Three (3) copies of prints of these Supplementary Drawings will be furnished to the affected Contractor(s).
- H. **COPIES TO SUBCONTRACTORS** - Each Contractor shall furnish to 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 SEPARATION OF WORK BETWEEN TRADES:

- A. **SCHEDULE E** – Requirements for various items of work are included in the Specifications for the separate contracts for the Project and in the General Conditions. Schedule E delineates the responsibilities of each separate contractor for various items of work, as well as the extent to which certain items involve coordination between trades. Schedule E is included in the Addendum. The delineation set forth in Schedule E shall be taken as specific instruction to each Contractor that is responsible for the listed items of work. Schedule E is not intended to limit the Contractor's responsibility for supervision and coordination as set forth in Paragraph B below. In the event of any conflict between the Specifications, the General Conditions and Schedule E, Schedule E shall take precedence; provided, however, in the event of an omission from Schedule E (i.e., Schedule E omits either a reference to or information concerning an item of work which is set forth in the Specifications or the General Conditions), such omission from Schedule E shall have no effect and the Contractor's obligation to perform the work, as set forth in the Specifications or the General Conditions, shall remain in full force and effect.
- B. **SUPERVISION AND COORDINATION** – Each Contractor is required to supply all necessary supervision and coordination information to other Contractors who are to supply work to accommodate their installation.

1.7 COORDINATION:

- A. **COORDINATION AND COOPERATION** - Each Contractor shall consult and study the requirements of the Contract Drawings and Specifications of all Contracts furnished to the Contractor, 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:** - Each 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 each Contractor proceeds with any work. Figures shall be used in preference to scale dimensions and large-scale drawings in preference to small-scale drawings.

1.8 SHOP DRAWINGS AND RECORD DRAWINGS:

- A. Refer to Division I Section 01 33 00 – SUBMITTAL PROCEDURES and Section 01 78 39 – PROJECT RECORD DRAWINGS for requirements applicable to shop drawings and record drawings.

1.9 INTEGRATED DRAWINGS:

- A. Refer to Division I Section 01 33 00 – SUBMITTAL PROCEDURES for requirements of each Contractor.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

1.10 TEMPORARY FACILITIES, SERVICES AND CONTROLS:

- A. Refer to Division I Section 01 50 00 – TEMPORARY FACILITIES SERVICES AND CONTROLS and SCHEDULE E which is set forth in the Addendum for the responsibilities of each separate Contractor.

1.11 DUST CONTROL:

- A. The GC 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.

1.12 SUBSTITUTIONS:

- A. Each Contractor shall cooperate with other Contractors involved to coordinate approved substitutions with remainder of the Work.

1.13 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. Each Contractor shall submit to the Commissioner a written request, in quadruplicate, for payment for materials purchased or to be purchased which need 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 each 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)



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

\$ 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)

Each Contractor may requisition for one-half (1/2) of the Mobilization Payment upon satisfactory completion of the following as applicable:

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:** Each 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.

1.14 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 affected 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.

1.15 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

B. INTERRUPTION OF EXISTING FACILITIES:

1. Each 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.
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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

SUMMARY
01 10 00 -10



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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. Each 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: Each 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. Each 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. Each 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: Each 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: Each Contractor shall coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
- E. Salvaged Items, Material and/or Equipment: The Specifications may identify certain items, materials or equipment which must be salvaged by each Contractor and handled or disposed of as directed. Each



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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: Each Contractor shall prepare applicable Coordination Drawings in compliance with the requirements for Integrated 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, each 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 each 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 each Contractor will then dictate a brief statement for the record.
 - 2. Coordination: In addition to construction progress meetings called by the Resident Engineer, the GC Contractor shall hold regularly scheduled meetings for the purpose of coordinating; expediting and scheduling the work of all Contracts in accordance with the master coordinated Job Progress Chart. All Contractors and their subcontractors, material suppliers or vendors whose presence is necessary, are required to attend. These meetings may, at the discretion of the GC 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 GC 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; each Contractor and their 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

2. Attendees:
 - a. Design Consultant and applicable sub-consultants
 - b. Client Agency Representative
 - c. Representatives from each 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 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 each Contractor. RFIs submitted by entities other than the 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: Each Contractor shall prepare, maintain, and submit a tabular log of RFIs organized by the RFI number monthly to the Resident Engineer.
 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:

- A. Copies of all correspondence to DDC shall be sent directly to the Resident Engineer at the job site.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

1.9 CONTRACTOR'S DAILY REPORTS:

- A. Each 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

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. Each Contractor shall prepare a preliminary 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 GC 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, each Contractor shall sign and date a reproducible form of the Composite Schedule. The Composite Schedule must be finalized and signed by each 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 Sub-Section 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. Each 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. Each 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 Contractors 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, each Contractor shall sign and date a reproducible form of the Schedule. Such schedule must be prepared and submitted by each 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: Each 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, each Contractor must review this Schedule with the Resident Engineer and the Design Consultant. Within 10 days after the kick-off meeting, each 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 each 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 each 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 each 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 each Contractor. Upon acceptance, the Resident Engineer will date and sign the schedule as approved and transmit it to the Design Consultant, Contractors and others within DDC as he/she deems appropriate.



2.6 REPORTS:

- A. Daily Construction Reports: Each 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 each Contractor's Superintendent and shall bear the Contractor's Superintendent's 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: Each 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

CONSTRUCTION PROGRESS DOCUMENTATION
01 32 00 - 6



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

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].

1.12 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 GC 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. Each 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 GC Contractor shall include the provisions set forth below in its agreement with the Photographer who will provide the construction photographs described in this section. The GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 1inch 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:



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 the photographer, as specified and required by individual sections of the Contract documents or at the direction of the Commissioner, shall take



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

images of existing elements scheduled to be removed for replacement, repair or replication in quantities as directed, including post-construction photographs of completed work as directed by the Commissioner.

1. Take Presentation Quality Photographs of designated landmark structures as directed by the Commissioner for submission to the New York City Landmarks Preservation Commission. Provide a minimum of four color photographic prints of each view as directed.

3.5 DVD RECORDING:

- A. When DVD Recording of Demonstration and Orientation sessions is required the GC Contractor shall provide the services of a Videographer as indicated in Section 01 79 00, DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION, and Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS.

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



NEW YORK CITY DEPARTMENT OF
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Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

PHOTOGRAPHIC DOCUMENTATION
01 32 33 - 6



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

**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 INTEGRATED DRAWINGS:

- A. The GC Contractor shall provide to the HVAC Contractor reflected ceiling starting points or plans, showing beam soffits elevations, ceiling heights, roof openings, etc.
- B. The HVAC Contractor shall prepare a 3/8 inch scale drawing or drawings showing ductwork, heating and sprinkler piping. This drawing shall include location of grilles, registers, etc. and access doors in hung ceilings. Location shall be fixed by elevations and dimensions from column center lines and/or walls.
- C. The HVAC Contractor shall prepare and issue a 3/8 inch scale original reproducible drawing or drawings of the above to the GC Contractor and a print of same to the Resident Engineer.
- D. The GC Contractor shall lay out on the original reproducible drawing, the reflected ceiling plan, beam soffit elevations, ceiling heights, roof opening, etc. and issue the original reproducible drawing to the Plumbing Contractor, and a print of same to the Resident Engineer.



- E. The Plumbing Contractor shall lay out on the original reproducible drawing its piping, valves, cleanouts, etc., indicating locations and elevations and shall indicate the necessary access doors, and issue the original reproducible drawing to the Electrical Contractor and print of same to the Resident Engineer.
- F. The Electrical Contractor shall indicate on the original reproducible drawing its fixtures, large conduit runs, clearances, pull boxes, junction boxes, sound system speakers, etc., and issue the original reproducible drawing to the Resident Engineer.
- G. The Resident Engineer will call as many meetings with each Contractor as are necessary to resolve any conflicts that become apparent. The Resident Engineer will call on the services of the Design Consultant where necessary.
- H. Upon resolution of the conflicts, the HVAC Contractor shall provide a reproducible drawing of the coordinated drawing or drawings, which will become the Master Integrated Drawing. The Master Integrated Drawing shall be signed by each Contractor to indicate its acceptance of the arrangement of the work.
- I. A reproducible copy of the Master Integrated Drawing or Drawings will be provided by the HVAC Contractor to each Contractor, the Resident Engineer and to the Design Consultant for information.
- J. Each Contractor shall prepare its Shop Drawings in accordance with the Master Integrated Drawings. No work will be permitted without approved Shop Drawings. It is therefore essential that this procedure be instituted as quickly as possible.
- K. Each Contractor shall be held strictly accountable for cooperation in preparing the Integrated Drawing or Drawings.

1.6 SUBMITTAL PROCEDURES:

- A. Refer to Section 01 35 03 GENERAL MECHANICAL REQUIREMENTS and Section 01 35 06 GENERAL ELECTRICAL REQUIREMENTS for additional submittal requirements involving electrical and mechanical work or equipment of any nature called for 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 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. Each Contractor shall make available to its subcontractors the necessary Contract Documents and shall instruct such subcontractors 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).



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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. Each 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 responsible for preparation of the shop drawings 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 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:** Each 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:** Each 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 Contractors or 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 Contractor and subcontractors so affected. [These accepted Shop Drawings shall be distributed to the affected Contractor and 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:
 - 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: Each 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 appropriate.Should the Product Data be "Rejected" or noted "Revise and Resubmit" by the Design Consultant, the Design Consultant will return one (1) set of such Product Data to the Contractor with the necessary corrections and changes to be made indicated and one (1) set to DDC.
 7. Revisions: Each 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 1.6 herein.
- C. Number of Copies: Submit FOUR (4) copies of LEED submittals, in accordance with procedure described in Sub-Section 1.6 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.

1.8 ULTRA LOW SULFUR DIESEL FUEL AND BEST AVAILABLE TECHNOLOGY REPORTING:

- A. In accordance with Section 01 10 00 Summary, Sub-Section 1.13E, each 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

1.10 AS-BUILT DOCUMENTS:

- A. Submit all as-built documents in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 33 00



**SECTION 01 35 03
GENERAL MECHANICAL REQUIREMENTS**

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 35 03

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract]

1.2 SUMMARY:

- A. The General Mechanical Requirements contained herein shall be followed by all Contractors furnishing mechanical equipment under their respective contracts. 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 HVAC Contractor shall follow these Contract Drawings in laying out the work and verify the spaces in which it will be installed. The HVAC 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.



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 HVAC 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 HVAC 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 HVAC 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 HVAC 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 HVAC 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 HVAC Contractor shall be designed by an Engineer licensed in New York State retained by the GC Contractor. Supporting structures shall be built by the GC 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 HVAC 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 HVAC 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 HVAC 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 HVAC 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 HVAC Contractor shall make all adjustments and tests required by the Commissioner to prove that such equipment is in proper and satisfactory operating condition. The HVAC 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 HVAC 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.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 35 03



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

GENERAL MECHANICAL REQUIREMENTS
01 35 03 - 4



SECTION 01 35 06
GENERAL ELECTRICAL REQUIREMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract]

1.2 SUMMARY:

- A. This Section sets forth the General Requirements applicable to electrical work for the Project. Such requirements are intended to be read in conjunction with the Specifications and Contract Drawings for the Project. In the event of any conflict between the requirements set forth in this Section and the requirements of the Project Specifications and/or the Contract Drawings, whichever requirement is the most 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 panelboard or other specified source to a starter (if required) then to a disconnect (if required), then to the final point of usage such as a motor, unit or device.
- 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 for other than the Contract for Electrical Work.

- A. **ELECTRIC SERVICE:** The electric service supply is subject to commercial and operating variation of the utility company. Proper provision shall be made to have all apparatus operate normally under these conditions.
- B. **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 Electrical Contractor shall notify the Commissioner when the Electrical 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 Electrical 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 Electrical 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 Electrical 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 Electrical Contractor shall obtain certificates of inspection, approval, acceptance and compliance from all agencies and/ or



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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. Any 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.
2. After delivery and before and after installation, such Contractor shall protect all equipment against theft, injury or damage from all causes. Such Contractor shall carefully store all equipment received for work, which is not immediately installed. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through a special dielectric test as directed by the Commissioner, at the expense of such Contractor or replaced by such 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 Electrical 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 Electrical 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 Electrical 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 Contracts.

(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 each Contractor shall provide whatever labor and materials are found necessary, within the scope of its Contract, for the successful operation of the installation. Specific details of individual installations are to be finally decided upon when the Contractor submits Working or Shop Drawings for approval to 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 Plumbing Contractor and shall extend one (1) inch above finished floor.
- D. **COORDINATION:** Each Contractor shall keep in close touch with the construction progress and obtain the necessary information for the accurate placement of its work in ample time before project construction operations obstruct its work. Each Contractor is to consult all other Contract Drawings, as well as approved equipment Shop Drawings on file in the Resident Engineer's Field Office. This will aid in avoiding interferences, omissions and errors in the electrical installation.
- E. **RESTORATION:** If drilling or cutting is done on finished surfaces of equipment or the structure, any marring of the surface shall be repaired or replaced by the Contractor who caused the damage. Each Contractor shall be held responsible for corrective restoration due to its cutting or drilling, and for any damage to the project or its contents caused by the Contractor or the Contractor's workers. Any Contractor who pierces waterproofing because of the installation of their work shall, at their own expense, restore the waterproofing to the satisfaction of the Commissioner.
- F. **ELECTRICAL WORK AT SITE:** Any Contractor who is required to furnish equipment consisting of a number of related electrical devices or appliances, mounted in a single enclosure, or on a common base.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

shall furnish this unit complete with internal wiring, connections, terminal boxes with copper connectors and/or lugs and ample electrical leads, ready for connection and operation. The cost of any wiring, re-wiring or other work required to be done on this unit in the field, shall be borne by the Contractor who furnished the unit, without additional cost to the City.

- G. **COOPERATION AMONG CONTRACTORS:** Whenever an electrically operated unit or system involves the combined work of several Contractors for its installation and successful operation, each Contractor shall exercise the utmost diligence in cooperating with others to produce a complete, harmonious installation.
- H. **WORK BY CONTRACTORS FURNISHING ELECTRICAL EQUIPMENT:** Any Contractor who furnishes an electrically operated or motorized unit of equipment shall install same and, as part of its Contract, perform the following work in connection therewith:
1. **FOUNDATIONS:** Unless otherwise specified or indicated, the Contractor furnishing electrically operated equipment shall also furnish and install approved foundations for same. Special foundations, if required, will be described in the detailed Specification and/or in the Drawings.
 - a. **MATERIAL -** All foundations, unless required otherwise, shall rest on a structural slab and shall be of poured concrete, of a mixture specified for reinforced concrete. Foundations shall present a neat, smooth appearance without voids, sharp corners or edges.
 - b. **DIMENSIONS:** Foundation dimensions, height above floor, methods of setting, aligning and anchoring of equipment shall be as recommended by the manufacturer of equipment and approved by the Commissioner. The minimum height of foundations above finished floor shall be four (4) inches and foundations shall extend at least six (6) inches at all sides beyond the base plates of equipment.
 2. At least one (1) inch of grout shall be applied under the equipment base plate after placement and alignment of the equipment.
 3. **ITEMS:** Anchor plates, bolts, sleeves, nuts and washers and other necessary items for proper installation of equipment shall be provided. The Contractor shall also furnish and set required templates to locate accurately the positions of the hold down bolts.
 4. **VIBRATION ISOLATION:** If specifically required in the detailed Specifications for a particular unit, vibration isolators shall be provided for rotating equipment.
 5. **SUPPORTS:** If any motorized equipment is required to be mounted overhead or off a wall, the Contractor supplying the unit shall furnish and install a suitable platform, bracket or shelf, whichever is appropriate or specified, and mount the equipment thereon. This support shall be constructed of Galvanized steel members, plates, etc., and the whole securely fastened to the structure or to anchors previously embedded in the wall or slab. In case of excessive vibration transmitted to structure, isolating pads or other devices shall be installed. The Contractor shall apply one (1) coat of approved Galvanized primer paint to the support and one (1) additional coat of approved paint in the field.
 6. **ASSOCIATED EQUIPMENT:** The Contractor who furnishes a motorized or electrically operated unit of equipment shall also furnish all associated motor starters, disconnect means, relays, control devices, lamps, or other devices, necessary for the successful functioning of the unit.
 7. **POINT OF DELIVERY:** Any item specified to be installed by the Contractor for Electrical Work and delivered to the site that cannot be hand carried (due to bulk, weight or timeliness) to the location of its installation is to be delivered and set in place, leveled and secured by the Contractor furnishing the equipment. Such delivery shall be to the location where it is to be installed by the Contractor for Electrical Work.
 8. **CONTROL AND INTERLOCK WIRING:**



- a. General Construction Work and Plumbing Work.
 - (1) All control wiring associated with doors and door hardware is to be furnished and installed, unless otherwise indicated, by the Contractor furnishing the doors. Power for the door operation and for its controls shall be furnished and installed by the Contractor for Electrical Work.
 - (2) All other control wiring associated with equipment furnished by either the Contractor for General Construction Work or the Contractor for Plumbing Work is to be furnished and installed by the Contractor for Electrical Work.
 - b. Contractor for Heating, Ventilating and Air Conditioning Work
 - (1) The furnishing and installing of all control devices and all control and interlock wiring for equipment furnished under the Heating, Ventilating and Air Conditioning Contract shall be by that Contractor, including any power required for any control device.
 - (2) The Contractor for Heating, Ventilating and Air Conditioning Work shall deliver to the Contractor for Electrical Work all starters and disconnect switches specified to be furnished under the Heating, Ventilating and Air Conditioning Contract. The Contractor for Electrical Work is to install the starters and disconnect switches, and furnish and install all power wiring and make connections between the starter, disconnect switch and motor or equipment being served. The motor or equipment is to be mounted by the Contractor furnishing the motor.
9. **INSTALLATION OF BURNER:** The Contractor who furnishes and installs the gas/oil-fired boiler/furnace shall also include as part of its Contract, the work of furnishing, installing and connecting all equipment, controls with necessary conduits and wiring, to a service point provided by the Contractor for Electrical Work. Unless detailed otherwise in the Specifications, the Contractor for Electrical Work shall furnish power from the power source to a junction box furnished and installed by the Contractor for the Electrical Work and located near the boiler/furnace control panel. The Contractor for Electrical Work shall also furnish and install an empty conduit and a junction box to be located at a remote location (outside of the boiler/furnace room) for an emergency shut-off switch. The shut-off switch and all other conduit and wire shall be furnished and installed by the Contractor furnishing the boiler/furnace.

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 any Contract requiring the installation of electrical conduits, boxes or fittings. Rigid steel conduit shall be used through out, 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

3. Conduits shall be reamed smooth after cutting. No running threads will be permitted. Universal type couplings shall be used where required. Conduit joints shall be screwed up to butt. Empty conduits after installation shall have all open ends temporarily plugged to prevent the entrance of water or other foreign matter.
4. Conduits being installed in concrete or masonry shall be securely held in place by the Contractor installing them during pouring and construction operations. A group of conduits terminating together shall be held in place by a template.
5. UNDERGROUND STEEL CONDUITS: Unless otherwise specified, all underground steel conduits in contact with earth shall be encased by the Contractor who installs them, in a covering of not less than two (2) inches of an approved concrete mixture. Concrete mix shall be one (1) part cement to four and one-half (4 ½) parts of fine and coarse aggregate.
6. EXCAVATION RESTORATION PERMITS: The Contractor installing underground conduits, duct banks or manholes shall perform as part of its contract the work of cutting pavement, excavation shoring, keeping trenches or holes pumped dry, backfilling, restoration of surfaces to original condition and removal of excess earth and rubbish from premises. During the work, the Contractor shall provide adequate crossovers, protective barriers, lamps, flags, etc., to safeguard traffic and the public. When the work is in a public highway or street, the Contractor shall secure and pay for all necessary permits and inspection fees and pay the cost of repaving.
7. EXPOSED CONDUIT SUPPORTS: Exposed conduit shall be supported by 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 responsible for furnishing and installing the conduit 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 a hydraulic or power pipe bender. The radius of the inner edge of any bend shall not be less than six (6) times the internal diameter of the conduit where rubber covered conductors are to be installed, and not less than 10 times the internal diameter of the conduit where lead covered conductors are to be used. Long gradual sweeps will be required, rather than sharp bends, when changes of direction are necessary.



14. EMPTY CONDUITS

- a. TESTS: All conduits and ducts required to be installed and left empty shall be tested for clear bore and correct installation by the Contractor who installed them using a bail 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 1-¼ inch width, attached by means of a nylon cord. All conduit terminations in panel, splice or pull boxes as well as those out of the floor or ceiling 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 who installed them as directed.
- e. DRAG LINES: A drag line shall be left in all empty conduit.

B. BOXES:

1. The Electrical 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 Electrical 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 Electrical 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 Electrical 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 Electrical 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 Contractor furnishing a device containing lugs is to coordinate with the Electrical Work Contract Documents to insure that the device terminations are adequate for the wire or cable (whose size may be larger than expected due to voltage drop considerations) connected to the device. This requirement applies to both the Electrical Contractor whose branch circuit protector must have lugs of the proper size, as well as to the Contractor who furnishes the device who may have to increase the size of that particular device.

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, Panelboards and Service Entrance.

A. CIRCUIT BREAKERS:

1. **CIRCUIT BREAKERS:** shall be operable in any position and shall be of the quick-make, quick-break type on manual operation. The handle shall be trip free, preventing contacts from being held in closed position against abnormal overloads or short circuits. Positive visual indication of automatic tripped position of breaker shall be provided, in addition to the "On" and "Off" indication. All circuit breakers shall be of the bolted type.
2. **TRIP RATING:** Circuit breakers shall be provided with the required number of trip elements, calibrated at 40 degrees C., ambient temperature, in accordance with wire sizes or motor currents as shown on Contract Drawings or indicated in the Specifications.
3. **POLE 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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, Panelboards and Cabinets.

- A. PANELBOARDS-GENERAL TYPE: The panelboards shall be of the automatic circuit breaker type with individual breakers for each circuit, removable without disturbing the other units. Circuit breakers shall be in accordance with the requirements outlined under "Circuit Protective Devices."
- B. NUMBER AND RATING OF CIRCUIT BREAKERS: The Contract Drawings show a layout of each panel, giving the number, frame, size and trip setting of circuit breakers and number of branch circuits and spare breakers. Each branch circuit shall be distinctly numbered.
- C. BUS-BAR CONSTRUCTION AND SUPPORT: Panel Boards shall be of the 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 panelboard shall be equipped with main lugs only and capacity as required on Contract Drawings. Where main protection is required, automatic circuit breakers shall be used. A neutral bus of at least the same capacity as a live bus bar shall be provided for the connection of all neutral conductors. Each terminal shall be identified. All current carrying parts, exclusive of circuit breakers, shall be of copper with a minimum number of joints. The bus bar structure shall be a self supporting unit, firmly fastened to a 1/2 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 Electrical 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 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, panelboards shall be enclosed and gasketed NEMA 3R type. Panelboards 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. All of the aforementioned painting is to be done by the Contractor who furnishes the boxes and trim. Where panel trims or boxes are installed on walls which are to be painted, the previously mentioned third or finishing coat of paint shall be included in the work of the Contractor who has the Contract for general interior painting.

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 any of the Contracts.

- A. **MOTOR DESIGN:** All motors shall be designed to comply with the New York State Energy Conservation and Construction Code currently in effect 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. Each Contractor who furnishes four (4) or more such motors shall also furnish, as part of its Contract, a pressure grease gun of rugged design, of approximately 10 ounce capacity, complete with necessary adapters. The Contractor shall also provide 10 pounds of approved gun grease.
 2. For any particular unit where sleeve bearings are deemed desirable, permission for their use may be granted by the Commissioner. Motors one (1) horsepower and larger that are equipped with sleeve type bearings shall in addition to having protected accessible fittings for oiling be provided with visible means for determining normal oil level. Lubrication shall be positive, automatic and continuous.
- 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 Contracts under which motor control equipment is 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 who furnishes a motor shall also furnish therewith complete disconnecting, starting and control equipment as required by the detailed Specifications, the various code authorities and for the successful operation of the driven equipment. These items include circuit breaker, magnetic starter with overload protection and low voltage release or protection, push button stations, pilot lights and alarms, float, pressure, temperature and limit switches, load transfer switches, devices for manual operation and speed controllers, etc. The Contractor shall furnish as many of these items as are required for the successful operation of the driven unit.
 - 1. Where a motor is to be located out of sight of the controller, the Contractor who furnishes the motor shall furnish an approved disconnecting means to be mounted near motor.

C. TYPES OF STARTERS:

- 1. SQUIRREL CAGE: A.C. motors of the squirrel cage type, rated from one (1) to 30 horsepower, shall have magnetic across the line starters; motors rated above 30 horsepower shall be furnished with reduced voltage (autotransformer type) starter or part winding start with time delay to reduce inrush current. Size of starters shall be based on 200V. operation.
- 2. SLIP RING: A.C. Motors of the slip-ring type shall be furnished with primary across the line starters interlocked with secondary starting and regulating equipment. The interlocking feature shall prevent starting of the motor when the secondary controller is off the initial starting point.
- 3. MAGNETIC: For fractional horsepower motors, magnetic type starters are not required unless the particular method of controlling the driven equipment makes them necessary. Where individual single phase fractional horsepower motors or the sum of fractional horsepower motors controlled by an automatic device are 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 Sub-Section 3.5 CIRCUIT



PROTECTIVE DEVICES of the General Conditions. This disconnecting means shall be contained in the same housing with the starter and shall be operable from outside. Means shall be provided for locking the handle of the circuit breaker in the "OFF" position if it is desired to take the equipment out of service and prevent unauthorized starting.

- E. CONTROL CABINET: DRY LOCATIONS - All starters shall be furnished with general purpose, NEMA Type 1, sheet metal enclosures with hinged covers and baked enamel finish.
- F. CONTROL CABINET – WATERTIGHT: In wet locations, cast iron watertight enclosures with threaded hubs, galvanized and gasketed hinged covers shall be provided.
- G.
 - 1. PANELS: Motor control devices and appliances shall be mounted on approved insulating slabs with all wiring and connections made on the back of the slabs.
 - 2. WIRING AND TERMINALS: Wiring connections for currents of 100 Amperes or less may be made with copper wire or cable with special flameproof insulating coverings. Such wires shall be installed in a neat workmanlike manner, flat against the slab, and held in place by clips. Connections shall be made with pressure connectors for No. 8 AWG and larger wires, and with grommets for small stranded wires. Except for incoming and outgoing main leads, all connections shall terminate on approved connector blocks, which may be installed on the face of the slab. For small, across the line starters, the above requirements may be modified if satisfactory connections are provided.
 - 3. COPPER BUS: For currents exceeding 100 Amperes, copper bus shall be used in place of wires. The bus shall be constructed of copper rods, tubing or flat strap, bent and shaped properly and securely attached to the slab in a neat and workmanlike manner. The cross section of copper shall provide sufficient areas to keep current density at not more than 1,000 Amperes per square inch.
- H. COOPERATION: The Contractors who furnish electrically operated equipment shall give to the Electrical Contractor full information relative to sizes and locations of apparatus furnished by them which require electrical connections.

Equipment being installed by the Electrical Contractor shall be delivered to the Electrical Contractor by other Contractors in proper time and sequence so that the Electrical Contractor shall be able to meet its Project Schedule.

- I. SPARE PARTS:
 - 1. FURNISH: Each Contractor shall furnish the following spare parts pertaining to equipment furnished by each Contractor.
 - One (1) set of contact fingers and springs and thermal elements for each three (3) (or fraction) of each size of magnetic contactor starter.
 - One (1) holding coil for each three (3) (or fraction) of each size of magnetic contactor starter.
 - 2. WRAPPER MARKING: All parts shall be delivered to the Resident Engineer neatly wrapped and boxed and plainly tagged and marked for identification and reordering.

3.9 SCHEDULE OF ELECTRICAL EQUIPMENT:

Schedule D, which is set forth in the Addendum, lists requirements for electrical motor equipment that may be included in one or more of the Specifications for the separate contracts for the Project. SCHEDULE D delineates the responsibilities of each separate contractor for electrical motor control equipment. In the event of any conflict between the Specifications and SCHEDULE D, SCHEDULE D shall take precedence; provided, however, in the event of an omission from SCHEDULE D (i.e., SCHEDULE D omits either a reference to or information concerning electrical motor equipment which is set forth in the Specifications), such omission from SCHEDULE D shall have no effect and the



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

Contractor's obligation with respect to the electrical motor control equipment, as set forth in the Specifications, shall remain in full force and effect.

END OF SECTION 01 35 06



SECTION 01 35 26
SAFETY REQUIREMENTS PROCEDURES

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract]
- B. Each 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 each 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 GC Contractor is responsible to conduct weekly documented jobsite safety meetings, given to all jobsite personnel, including all Contractors and their 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. Each 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:

- A. Special facilities, devices, equipment and similar items used by each 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. Each 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 such 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 such 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 a Contractor is notified by the Commissioner of noncompliance with the safety provisions of the Contract, that 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. Each 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 subcontractor(s).
- 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

SAFETY REQUIREMENTS PROCEDURES
01 35 26 - 4



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

**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 historic treatment of Designated Landmark Structures and structures of Landmark/Historical significance, as identified in the Addendum. Specific requirements are indicated in other sections of the project 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 Landmarks 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. **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.
- L. **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: The Contractor responsible for Historic Treatment Work shall 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.

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 Designated Landmark 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.
 - a. 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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:

- A. Photographs for Designated Landmark Structures: Show existing conditions prior to any historic treatments, including one overall photograph and two close-up photographs of all areas of work affected. Show one overall photograph and two close-up photographs of all areas of work after the successful execution of all historical treatments.

3.4 NEW YORK CITY LANDMARKS PRESERVATION COMMISSION FINAL APPROVALS SIGNOFF:

- A. For all projects involving a Landmark Structure or Site, the GC 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

HISTORIC TREATMENT PROCEDURES
01 35 91 - 6



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This Section includes the following:
1. Definitions
 2. Conflicting Requirements
 3. Quality Assurance
 4. Quality Control
 5. Approval of Materials
 6. Special Inspections (Controlled Inspection)
 7. Inspections by Other City Agencies
 8. Certificates of Approval
 9. Acceptance Tests
 10. 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 each 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. Each 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 Sub-Section 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 each 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 appropriate 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 expenses of the testing personnel assigned by the City shall not be the Contractor's obligation. The Contractor shall reimburse the City for expenditures incurred in 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 48 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 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 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 and 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, each Contractor will be required to arrange for all applicable 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: Each Contractor shall be responsible for and shall obtain all final approvals for the work installed under its Contract in the form of such certificates that are required by all governmental agencies having jurisdiction over the work of the Contract.
- B. Transmittal: All such certificates shall be forwarded to the Commissioner through the Resident Engineer.

1.12 ACCEPTANCE TESTS:

- A. Government Agencies: All equipment and appliances furnished and installed under the Contract shall conform with the requirements of the Specifications, and shall in no event be less than that necessary to comply with the minimum requirements of the law and all of the governmental agencies having jurisdiction.
- B. Notice of 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/or Work of other Contractors, 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

END OF SECTION 01 40 00

QUALITY REQUIREMENTS
01 40 00 - 8



**SECTION 01 42 00
REFERENCES**

PART I – GENERAL

1.1 RELATED DOCUMENTS:

The following documents apply to all required work for the Project: (1) the 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.



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 – comprised of 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

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)



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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)



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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)
DASMA	Door and Access Systems Manufacturer's Association International



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

DHI	Door and Hardware Institute
DOC	U.S. Department of Commerce – National Institute of Standards and Technology
EIA	Electronic Industries Alliance
DOJ	U.S. department of Justice
EIMA	EIFS Industry Members Association
DOL	U.S. Department of Labor
EJCDC	Engineers Joint Contract Documents Committee
DOTn	U.S. Department of Transportation
EN	European Committee of Standards
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
EVO	Efficiency Valuation Organization
FEMA	Federal Emergency Management Agency
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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
HUD	U.S. Department of Housing and Urban Development
IAPMO	International Association of Plumbing and Mechanical Officials
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICC	International Code Council, Inc.
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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)



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

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)



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

END OF SECTION 01 42 00

REFERENCES
01 42 00 - 12



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

SECTION 01 50 00
TEMPORARY FACILITIES, SERVICES AND CONTROLS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This section includes the following:
1. Temporary Water System
 2. Temporary Sanitary Facilities
 3. Temporary Electric Power, Temporary Lighting System, And Site Security Lighting:
 4. Temporary Heat
 5. Dewatering Facilities And Drains
 6. Temporary Field Office for Contractor
 7. Resident Engineer's Office
 8. Material Sheds
 9. Temporary Enclosures
 10. Temporary Partitions
 11. Temporary Fire Protection
 12. Work Fence Enclosure
 13. Rodent and Insect Control
 14. Plant Pest Control Requirements
 15. Project Identification Signage
 16. Security Guards/Fire Guards on Site
 17. Project Sign and Rendering
 18. Safety

1.3 RELATED SECTIONS: include without limitation the following:

- A. Section 01 10 00 SUMMARY
- B. Section 01 42 00 REFERENCES
- C. Section 01 54 11 TEMPORARY ELEVATORS AND HOISTS
- D. Section 01 54 23 TEMPORARY SCAFFOLDS AND SWING STAGING
- E. Section 01 77 00 CLOSE OUT PROCEDURES

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- B. Permanent Enclosure: As determined by the Commissioner, permanent or temporary roofing that is complete, insulated, and weather tight; exterior walls which are insulated and weather tight; and all openings that are closed with permanent construction or substantial temporary closures.



- 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 responsible for the installation of each permanent facility, services, and controls shall be responsible for the operation, maintenance, and protection of each permanent facility and service while in use during construction before Final Acceptance by the City, regardless of previously assigned responsibilities.
- B. Install, operate, maintain and protect temporary facilities 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 responsible for the installation of each permanent facility, services, and controls 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 responsible for the installation of each permanent facility, services, and controls 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 responsible for the installation of each permanent facility, services, and controls 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,



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 Plumbing Contractor shall furnish a Temporary Water System as set forth below.
 - 1. Immediately after the Commissioner has issued an order to start work, the GC Contractor shall file an application with the Dept. of Environmental Protection for the schedule of charges for water use during construction. The GC Contractor will be responsible for payment of water charges.



2. Immediately after the Commissioner has issued an order to start work, the Plumbing 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 all Contractors and his/ her subcontractors. A copy of the above mentioned permit shall be filed with the Commissioner. The Plumbing 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 Plumbing 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 Plumbing Contractor shall take the necessary precautions to prevent the temporary water system from freezing. The Plumbing 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 Plumbing 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 GC 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 service system will be permitted for temporary water service during construction, as long as system is cleaned and maintained in a condition acceptable to the Commissioner. At Substantial Completion, the Plumbing Contractor shall restore the existing water system to conditions existing before initial use.
 2. The Plumbing Contractor shall be responsible for all repairs to the existing water service system permitted to be used for temporary water service during construction. The GC Contractor shall be responsible to maintain the facility in a clean condition on a daily basis, acceptable to the Commissioner.
 3. The GC 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 Plumbing 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 Plumbing 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).
- E. OVERTIME USE: Whenever any Contractor(s) work before or after the regular work hours hereinafter specified under Subparagraph 3.2 F, or on a Saturday, Sunday or Holiday of any Contract, such Contractor(s) shall pay the Plumbing Contractor for the activation of the temporary water system and toilet facility services during such overtime periods. When more than one (1) Contractor is involved in overtime work, the costs thereof shall be prorated as determined by the Resident Engineer. When overtime is required by any or all Contractors on the work, the



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

provisions for payment for regular time use of the temporary water supply system as specified in Subparagraph 3.2 F shall apply.

- F. **ACTIVATION** - The Plumbing Contractor shall bear the cost of keeping the temporary water supply system activated from a period of time 15 minutes before the established starting time of that trade which starts work earliest in the morning, to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week which is established as a regular working day for aforementioned trades and holds until completion and final acceptance of the work of the Plumbing Contractor or until the services are terminated by instructions from the Commissioner.

3.3 TEMPORARY SANITARY FACILITIES:

- A. The GC Contractor shall provide for 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 GC 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 GC 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 GC Contractor shall maintain the temporary toilet facilities in a clean and sanitary manner and make all necessary repairs.
3. **NUISANCES** - The Contractors shall not cause any sanitary nuisance to be committed by its employees in or about the work, and shall enforce all sanitary regulations of the City and State Health Authorities.

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, and is applicable to, and binding on, all Contracts insofar as they are affected.
- B. **TEMPORARY ELECTRIC POWER:**
The Electrical Contractor shall provide and maintain Temporary Electric Power service and distribution system of sufficient size, capacity and power characteristics required for construction



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

operations for all Contracts, including but not limited to power for Temporary Lighting System, Site Security Lighting, construction equipment, hoists and 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 Electrical Contractor shall make all necessary arrangements with the Public Utility Company and pay all charges for the Temporary Electric Power system. The Electrical 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 Electrical Contractor shall make payment directly to the Public Utility Company.
 - b. APPLICATIONS FOR METER: The Electrical 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 Electrical 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 Electrical 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.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 B (2)

2. CONNECTION TO EXISTING ELECTRICAL POWER SERVICE:
 - a. When approved by the Commissioner, electrical power service for the Temporary Lighting System and for the operation of small tools and equipment less than 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 Electrical 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 for the electrical energy consumed.
 - c. The Electrical 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 Electrical 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Electrical 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 Electrical 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 Electrical 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 Electrical 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 Electrical Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 D

D. TEMPORARY LIGHTING SYSTEM:

1. The Electrical 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 Electrical 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 Electrical 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 various Contracts.
5. **RELOCATION:** Each Contractor requiring the relocation or extension of the original Temporary Lighting System that is not required due to the normal advancement of the work, as determined by the Resident Engineer, shall bear all costs thereof.
6. **PIGTAILS:** shall be furnished with left-hand sockets with locked type guards and 40 feet of rubber covered cable. The Electrical Contractor shall furnish and distribute a minimum of three (3) complete pigtails to each Contractor. See the detailed Electrical Specifications for possible additional pigtail required.



7. LAMPS: The Electrical Contractor shall furnish and install one (1) complete set of lamps, including those for the trailers. Broken and burned out lamps in the general lighting system shall be replaced by the Electrical Contractor while those in the trailers shall be replaced by each Contractor using such equipment. All lamps shall be compact fluorescent.
8. CIRCUIT PROTECTION: The Electrical Contractor shall furnish and install GFI protection for the Temporary Lighting and Site Security Lighting Systems.
9. ENERGIZING: The Electrical Contractor shall keep the Temporary Lighting System energized from a period of time, 15 minutes before the established starting time of that trade, which starts work earliest in the morning to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week which is established as a regular working day for any trade involved in the construction of this facility and holds until Substantial Completion and Final Acceptance of the work of the Electrical Contractor or until the services are terminated by instructions from the Commissioner.
10. MAINTENANCE OF TEMPORARY LIGHTING SYSTEM:
 - a. The Electrical Contractor shall maintain the Temporary Lighting System in good working order during the scheduled hours established.
 - b. The Electrical 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.
11. ADJUSTMENT IN CONTRACT PRICE FOR TEMPORARY LIGHTING MAINTENANCE: In the event that the temporary lighting maintenance extends beyond the Contract time through no fault of the Electrical Contractor, as determined by the Commissioner, the additional maintenance cost will be in accordance with the requirements of the following paragraphs:
 - a. Payment for maintaining Temporary facilities when required will be made at the average hourly wage for electricians plus 69% of this rate, for each hour of work done upon order of the Resident Engineer. Payments will be included in partial estimates upon submission of detailed vouchers stating date, hour and time expended for each item of work.
 - b. The addition of 69% of the average hourly wage rate specified above shall be deemed as the total allowance for all profit and overhead and for any and all other costs and expenses of any nature whatsoever, including but not limited to allowance for insurance, workman's compensation, unemployment insurance and other supplementary benefits.
12. REMOVAL OF TEMPORARY LIGHTING SYSTEM: The temporary lighting system shall be removed by the Electrical Contractor when authorized by the Commissioner.
13. 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 each 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 Electrical 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. All Contractors must cooperate, coordinate and exert every effort to accomplish an early complete installation of the site security lighting system. After



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

the system is installed and in operation, if a part of the system interferes with the work of any Contractor, that 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 Electrical Contractor.
5. The site security lighting shall be kept illuminated at all times during the hours of darkness. The Electrical Contractor, 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 Electrical 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 Electrical Contractor and shall be removed and disposed of by the Electrical Contractor upon completion of that phase of the project.

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 3.5C 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

2. Responsibility: The Contractor responsible 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 3.5B, each Contractor shall be responsible for the provision of its own Temporary Heat.
 - 2) Post Enclosure - Once the Commissioner determines that the building, or any portion thereof, has been enclosed, as set forth in Sub-Section 3.5B, the HVAC 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 HVAC 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 HVAC 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 HVAC Contractor provided for herein is subject to the exception set forth in Sub-Section 3.5A.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 HVAC Contractor shall be responsible for the provision of Temporary Heat, except as otherwise provided in Sub-Section 3.5H.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 HVAC Contractor shall be responsible for the provision of Temporary Heat and such Contractor 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 GC Contractor shall notify all other Contractors and the Resident Engineer at least 30 days prior to the anticipated date that the building(s) will be enclosed.
 2. Commissioner Determination: The Commissioner shall determine whether the building, or any portion thereof, has been enclosed. As indicated in Sub-Section 3.5A.2 above, once the building has been enclosed, the HVAC 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 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 GC 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 HVAC 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 HVAC 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 HVAC 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 (ccd)s. 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:



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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.
 - 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 HVAC 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 GC Contractor shall coordinate with the HVAC Contractor in the work of providing Temporary Heat, and shall so coordinate its operations as to insure sufficient and timely performance of the work under all Contracts. The GC 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 GC 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 by the HVAC Contractor, the GC 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 GC 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 HVAC 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 HVAC 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 HVAC 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 HVAC 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 HVAC Contractor including the placing of ancillary system equipment, shall be coordinated with the operations of all Contractors so as to insure sufficient and timely performance of the work of all Contractors. Once the permanent heating system is operating properly, the HVAC Contractor shall remove all portions of the system for Temporary Heat which are not part of the permanent heating system.

3. Temporary Heat Allowance for Special Conditions or and/or Unforeseen Circumstances.
 - a. The City may establish an allowance in the HVAC 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 HVAC 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 HVAC 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 that after enclosure of the building, the Commissioner determines that (i) Contractors other than the HVAC Contractor have not sufficiently advanced the work of their contracts that is necessary and required to permit the HVAC Contractor to use the permanent or other heating equipment for the provision of Temporary Heat, and (ii) the HVAC Contractor does not bear any responsibility for such other Contractors' failure to advance the work, the City shall pay the HVAC Contractor for all differential costs for labor, material, and equipment necessary and required for the provision of a substitute system(s) for the provision of Temporary Heat or portions thereof in lieu of the permanent or other systems intended for Temporary Heat. Payment shall be made in accordance with Article 26 of the Contract, except that the cost of fuel shall be as set forth in Paragraph (c) below.
 3. In the event the Commissioner determines that there is a need for maintenance of the permanent heating system by the HVAC Contractor after written acceptance by the Commissioner of the work of all Contractors, and that the need for such maintenance is not the fault of the HVAC Contractor, the HVAC 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 HVAC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 HVAC 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 HVAC Contractor must present original invoices for the same. DDC reserves the right to furnish the required fuel.
- d. Deduction - In the event that any amount of the allowance set forth herein is expended for payment to the HVAC Contractor under the circumstances set forth in Paragraph b.(2) above, the Commissioner shall deduct and retain such amount out of moneys that are due and owing hereunder to the other Contractor(s) responsible for the failure to advance the work, as determined by the Commissioner. In the event the amount expended from the allowance exceeds the total sum due and owing to such other Contractor(s), such excess shall be paid to the City by such other Contractor(s) immediately upon demand.

I. RELATED ELECTRICAL WORK:

1. The Electrical 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 Electrical Contractor shall provide such items promptly when required and shall in all respects coordinate its work with the GC Contractor and the HVAC Contractor in order to facilitate the provision of Temporary Heat by the HVAC Contractor.
 - a. The Electrical 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 Electrical 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 by the HVAC Contractor. Such power shall be provided by the Electrical Contractor for the duration the HVAC Contractor is required to provide Temporary Heat, as set forth in Paragraph D above.
2. In providing the items set forth in Paragraph 1 above, the Electrical 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 Plumbing 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 its Contract. The Plumbing Contractor shall include all expenses in connection with such items of work in its Total Contract Price. The Plumbing Contractor shall provide such items of work promptly when required and shall in all respects coordinate its work with the GC Contractor and the HVAC Contractor in order to facilitate the provision of Temporary Heat by the HVAC Contractor.
2. In the event portions of the permanent plumbing equipment furnished by the Plumbing Contractor as part of the work of his Contract are used for the provision of Temporary Heat by the HVAC Contractor, either during construction or prior to acceptance by the City of the complete plumbing system, the Plumbing 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 its 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

3. For Projects requiring the installation of new and/or modified gas service, as well as associated meter installations, the Plumbing 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. The GC 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. Each Contractor shall establish a temporary field office for its own use at the site during the period of construction, at which readily accessible copies of all Contract Documents shall be kept.
- B. The field office shall be located where it will not interfere with the progress of any part of the work or with visibility of traffic control devices.
- C. CONTRACTOR'S REPRESENTATIVE: In charge of each office there shall be a responsible and competent representative of the Contractor, duly authorized to receive orders and directions and to put them into effect.
- D. Arrangements shall be made by each 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 - Each 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.
- 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 GC Contractor shall provide and install a lockset for the door to secure the equipment in the room. The GC Contractor shall provide two (2) keys to the Resident Engineer. After completion of the project the GC Contractor shall replace the original lockset on the door and ensure its proper operation.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

2. In addition to equipment specified in Sub-Section 3.8 (D) the GC 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 GC 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 GC Contractor..

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 B

B. DDC FIELD OFFICE TRAILER:

1. **GENERAL:** The GC Contractor shall, for the time frame specified herein, provide and maintain at it's 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 GC Contractor shall provide at its own cost and expense a mobile office trailer for use as the DDC Field Office. The Plumbing and Electrical Contractors shall install and connect all utility services to the trailer within thirty (30) days from Notice to Proceed. The trailer shall have equipment with the minimum requirements hereinafter specified. Any permit and fees required for the installation and use of said trailer shall be borne by the GC 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 GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 3.8D 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 GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 Electrical 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 Plumbing 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.

The Plumbing Contractor shall frost-proof all water pipes to prevent freezing.

 - 1) REPAIRS, MAINTENANCE: The Plumbing 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 Plumbing Contractor and shall be plugged at the mains. All piping shall become the property of the Plumbing Contractor and shall be removed from the site, all as directed. All repair work due to these removals shall be the responsibility of the GC Contractor.
 - b. ELECTRICAL WORK:
 - 1) The Electrical 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.
 - 3) The Electrical Contractor shall make all arrangements and pay all costs to provide electric service.
 - 4) The Electrical 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 in Sub-Section 3.8.B.1 herein, the temporary feeder, safety switch, etc., shall be removed and disposed of as directed.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 6) All repair work due to these removals shall be the responsibility of the GC Contractor.

c. MAINTENANCE

- 1) The GC 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 GC 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 GC 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 Plumbing and Electrical 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 GC Contractor.

d. TELEPHONE SERVICE: The GC 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 GC Contractor shall make the necessary arrangements and obtain all permits and pay all fees required for this work.

- C. RENTED SPACE: The GC 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 GC Contractor 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 herein, required for the DDC Field Office trailer shall also apply to rented spaces.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 D

D. ADDITIONAL EQUIPMENT FOR THE DDC FIELD OFFICE:

1. The GC 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.
2. The GC 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 GC Contractor shall provide one complete computer workstation, in quantities specified in Sub-Section 3.8.B.3, 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 GC 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 DDC 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** 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 w/ 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 DDC Field Office shall be delivered, installed, and setup in the DDC Field Office by the GC 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 GC 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 GC Contractor, and shall be replenished by the GC Contractor as required by the Resident Engineer.
- 8) It is the GC 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 GC 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 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 GC 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 GC Contractor.

3.9 MATERIAL SHEDS:

- A. Material sheds used by each 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. The GC Contractor shall 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. The GC Contractor shall 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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. The GC Contractor shall 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.
- 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 GC 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 GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 GC 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 GC 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 GC 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:
 - 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 Contractors 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 Contractors' activities, which will provide food and shelter to the resident rodent population shall be corrected by the GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 GC Contractor shall be responsible for collecting and disposing of all trapped and poisoned rodents found in live traps and tamper proof bait stations. The GC Contractor shall also be responsible for posting and maintaining signs announcing the baiting of each particular location.
The GC 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 GC 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 & INSTRUCTION:

- 1 The GC 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 GC 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 GC 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 GC 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 GC 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 GC 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 GC Contractor is referred to: (1) Part 139 of Title 1 NYCRR, Agriculture



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 GC Contractor or its subcontractor 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 GC Contractor.
 3. Prior to commencement of tree work, the GC Contractor shall submit to the Commissioner a copy of a valid Asian Longhorned Beetle compliance agreement entered into with NYSDAM and the GC Contractor or its subcontractor performing tree work. If any host material is transported from the quarantine area the GC 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 GC Contractor shall contact the NYC Department of Parks & Recreation's Director of Landscape Management at (718) 699-6724, to determine the limits of any additional quarantine areas that may be in effect at the time when tree work is to be performed. The quarantine area may be expanded by Federal and State authorities at any time and the GC 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 GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 GC 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 GC 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 Sub-Section, 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 GC Contractor's bid for the Project.

3.16 PROJECT IDENTIFICATION SIGNAGE:

- A. The GC 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 GC 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 GC 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 GC 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 GC 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 GC 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 GC Contractor shall commence production and installation of the sign.
- 4 Removal: At the completion of all work under the Contract, the GC 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 GC 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 GC 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 GC 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 GC 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 GC Contractor shall provide competent Security Guards on the site until final acceptance of the project or earlier if so notified in writing by the Commissioner. The Security Service shall commence with the start of work. There shall be no less than one (1) Security Guard on duty every day, including Saturdays, Sunday and Holidays, 24 hours a day, except between the hours of 8:00 A.M. and 4:00 P.M. on any day which is a regular working day for a majority of the trades. This exception during the working day shall not apply after the finishing painting of the plaster work is commenced; thereafter, not less than one (1) Security Guard shall be on duty continuously, 24 hours a day, until final completion of the project or earlier if so notified in writing by the Commissioner.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 GC Contractor upon the written demand of the Commissioner.
 4. Each Security Guard furnished by the GC Contractor shall be instructed by the GC Contractor to include in their duties the entire construction site including the Field Office, temporary structures, and equipment, materials, etc.
 5. Should any Contractor consider the security requirements outlined above inadequate, that 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 who provides the additional protection.
 6. Nothing contained in this Sub-Section shall diminish in any way the responsibility of each Contractor for its own work, materials, tools, equipment, nor for any of the other risks and obligations outlined hereinbefore in this Sub-Section.
- B. **COSTS** - The GC Contractor shall employ Security Guards/Fire Guards at all times, except as otherwise modified by the detailed Specifications and as approved by the Commissioner, for the purpose of safeguarding and protecting the site. All costs for Security Guards/Fire Guards shall be borne by the GC Contractor.
- C. **RESPONSIBILITY** - All Contractors will be responsible for safeguarding and protecting their own work, materials, tools and equipment.

3.19 SAFETY:

- A. Each 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 GC Contractor at no additional cost to the City.

END OF SECTION 01 50 00



SECTION 01 54 11
TEMPORARY ELEVATORS AND HOISTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

- A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

- A. This section includes the following:
1. Temporary Use, Operation and Maintenance of Elevators during Construction
 - a. For New buildings up to 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, SERVICES 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 GC 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 all Contractors and representatives of the DDC and other Governmental Agencies having jurisdiction of work at the project. The GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- B. **RESPONSIBILITY:** The GC 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. **COSTS:** The GC 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. The Electrical Contractor shall pay the costs of all electrical current used for operating the temporary elevators.
- D. **ACTIVATION TIME:** The GC Contractor shall keep the temporary elevator activated from a period of time of 15 minutes before the established starting time of that trade which starts work earliest in the morning to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week, which is established as a regular working day for the aforementioned trades.
- E. **COMMENCEMENT OF SERVICE:** The GC 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.
- F. **ELECTRICAL INSTALLATION:** The Electrical 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 shaftway and for the car control and signal traveling cables. The Electrical Contractor shall make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.
- G. **REMOVAL:** When elevators for permanent use have been installed and are in condition for service, and when directed by the Commissioner, the GC 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.

- H. **INSPECTION:** Before temporary elevator equipment is removed, a joint inspection of the equipment shall be made by the GC 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 GC 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.
- I. **REPLACEMENT:** The GC Contractor shall furnish and install new 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 GC Contractor except for the replacement of hoisting ropes.
- J. **LIMITATIONS OF 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 all Contractors and the 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 various Contractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation, but only after such times as all plastering has been completed from the second floor up. The particular Contractor using the elevator for the hoisting of its material shall be responsible for any damage to the elevator during the entire period of such use. The GC Contractor shall give notification in writing to the Resident Engineer of any alleged damage to the elevator installation within 24 hours after the elevator has been employed for the hoisting of materials by the particular Contractor(s). As indicated above the GC Contractor shall be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.
- K. **PAYMENT FOR USE:** The GC Contractor shall be paid for its operation and maintenance of the temporary elevator or permanent elevator used for temporary service at the daily rate indicated under the Item of its Contract. All other costs in connection with the elevator installation and equipment, excepting electrical work done by the Electrical Contractor under its Contract, shall be included in the Total Bid price submitted by the GC Contractor.
- L. **LIQUIDATED DAMAGES:** The GC 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 GC 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 GC 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 all Contractors and representatives of the DDC and other Governmental Agencies having jurisdiction over work at the project. The GC 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 GC 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 GC Contractor shall be responsible for all costs in connection with the temporary elevator, 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 elevator, (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 elevator, 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 include all costs in connection with the temporary elevators, including without limitation, the costs specified herein. The Electrical Contractor shall pay the costs of all electrical current used for operating the temporary elevators.
- D. **ACTIVATION TIME:** The GC Contractor shall keep the temporary elevator activated from a period of time of 15 minutes before the established starting time of that trade which starts work earliest in the morning to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week, which is established as a regular working day for the aforementioned trades.
- E. **LOW RISE ELEVATOR:** The GC 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.
- F. **ELECTRICAL INSTALLATION:** The Electrical 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 Electrical Contractor shall make all these required connections as soon as the Equipment is declared ready for such connections by the Resident Engineer.

- G. **HIGH RISE ELEVATOR:** The GC 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 shaftway entrances to the elevator, solid substantial frames and either sliding or swing doors with substantial hardware and door locks, also any necessary approved wire mesh barricades for adjacent shaftways.
 4. There shall have been furnished and installed, solid substantial enclosures at front, back, sides and top of car platform enclosure, with an emergency exit at top of car, excepting that the portion of the front at the elevator entrance shall have been provided with a substantial temporary door or gate.
- H. **ELECTRICAL INSTALLATION:** The Electrical 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 Electrical Contractor shall make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.
- I. When the high rise elevator is completed and ready for temporary operation, the low rise temporary elevator shall be shut down.
- J. **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 GC 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.
- K. **INSPECTION:** Before temporary elevator equipment is removed, a joint inspection of the equipment shall be made by the GC 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 GC 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.
- L. **REPLACEMENT:** The GC Contractor shall furnish and install new equipment or parts for any equipment or parts of the temporary elevator installations that were damaged, destroyed, or that indicate excessive wear or corrosion, excepting the replacement of hoisting ropes. All 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 GC Contractor except for the replacement of hoisting ropes.

- M. **LIMITATIONS OF 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 all Contractors and the 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 various Contractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation, but only after such times as all plastering has been completed from the second floor up. The particular Contractor using the elevator for the hoisting of its material shall be responsible for any damage to the elevator during the entire period of such use. The GC Contractor shall give notification in writing to the Resident Engineer of any alleged damage to the elevator installation within 24 hours after the elevator has been employed for the hoisting of materials by the other Contractors. As indicated above the GC Contractor shall be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.
- N. **PAYMENT FOR USE:** The GC Contractor shall be paid for its operation and maintenance of each temporary elevator or permanent elevator used for temporary service at the daily rate indicated under the item of its Contract. All other costs in connection with elevator installation and equipment, excepting Electrical Work done by the Electrical Contractor under its Contract, shall be included in the Total Bid Price submitted by the Electrical Contractor for Electrical Work.
- O. **LIQUIDATED DAMAGES:** The GC 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 GC 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 GC Contractor may use, at the Commissioner's discretion, one (1) selected elevator in the project for temporary operation by the GC Contractor for the transportation of employees of all Contractors and representatives of DDC and other Governmental Agencies having jurisdiction over 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 GC 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. **ACTIVATION TIME:** The GC Contractor shall keep the temporary elevator activated from a period of time of 15 minutes before the established starting time of that trade which starts work earliest in the morning to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week, which is established as a regular working day for the aforementioned trades.
- D. **REPLACEMENT:** The GC Contractor shall furnish and install new equipment or parts for any equipment or parts of the elevator for temporary operation that were 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 GC Contractor except for the replacement of hoisting ropes. If it is determined and ordered by the Commissioner that new hoist ropes are requested, such ropes shall be installed and payment therefore will be made in accordance with Article 26 of the Contract.

- E. **LIMITATIONS OF 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 all Contractors and the representative 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 various Contractors to hoist materials which, in the Resident Engineer's opinion, will not overload or damage the elevator installation. The particular Contractor using the elevator for the hoisting of its material shall be responsible for any damage to the elevator during the entire period of such use. The GC Contractor shall give notification in writing to the Resident Engineer of any alleged employed for the hoisting of materials by the particular Contractor(s). As indicated above the GC Contractor shall be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.
- F. **COSTS:** The GC Contractor shall pay all costs for the operation and maintenance of the elevator for temporary operation. All other costs in connection with the elevator and equipment excepting electrical work done by the Electrical Contractor under its Contract, shall be included in the Total Bid price submitted by the GC Contractor.
- G. **LIQUIDATED DAMAGES:** The GC 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 GC Contractor.

3.4 **TEMPORARY HOISTS AND HOISTWAYS (FOR MATERIAL AND PERSONNEL):**

- A. **RESPONSIBILITY:** The GC Contractor shall provide adequate numbers of material hoists for the most expeditious performance of all parts of its work. All other Contractors are required to provide their own facilities for the hoisting of materials under their respective Contracts. However, these Contractors may make arrangements, whenever possible, with the GC Contractor for the use of its hoist upon such terms and conditions as it may prescribe.
- B. **LOCATIONS:** No hoists shall be constructed at such locations as will interfere with, or affect the construction of, floor arches, or the work of other Contractors. The hoists may be located at the exterior sides of the structure or in the courtyard and extend upward adjacent to the line of window openings. The hoists shall be located a sufficient distance from the exterior walls and be so protected as to prevent any of the permanent work from being damaged, stained or marred.
- C. **ELEVATOR SHAFT:** Wherever possible, one or more of the permanent elevator shafts may be used as temporary 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 of any Contractor.
- 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

END OF SECTION 01 54 11

TEMPORARY ELEVATORS AND HOISTS
01 54 11 - 8



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. Each 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 GC 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 GC 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.



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 GC Contractor shall be responsible for erection, maintenance and dismantling of the scaffold / shed in conformance with the New York City Building Code and OSHA requirements, contract documents and engineering specifications. The GC Contractor shall also be guided by generally accepted standards of scaffold industry practice as promulgated by the Scaffold Industry Association.
- C. The GC 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 inform the Jobsite Safety Coordinator of known hazards, non-conformances or violations.

1.5 JOBSITE DOCUMENTATION AND SUBMITTALS:

The GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 GC 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 GC 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 GC 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, 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 GC 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - 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 CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - 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. Preparation
 7. Deferred Construction
 8. Installation
 9. Permits
 10. Transportation
 11. Sleeves and Hangers
 12. Sleeve and Hanger Drawings
 13. Cutting and Patching
 14. Location of Partitions
 15. Furniture and Equipment
 16. Removal of Rubbish and Surplus Material
 17. Cleaning
 18. Security And Protection of Work Site
 19. Maintenance of Site and Adjoining Property
 20. Maintenance of Project Site
 21. Safety Precautions for Control Circuits
 22. 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: Each 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: Each 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. Each Contractor shall coordinate Deliveries: in order to avoid delaying or impeding the progress of the work of any related Contractor.
- E. Handling: Each 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 Sub-Section 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 other Contractor, the relevant 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: Each 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. Each 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, who, in the absence of the applicable 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: Each 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 relevant Contractor(s) in connection with the performance of the work.
- B. Responsibility: Each Contractor shall establish all other lines and elevations required for its work and shall be solely responsible for the accuracy thereof.
- C. Safeguard All Points: Each Contractor shall safeguard all points, stakes, grade marks and bench marks made or established by each 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 GC 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 GC Contractor shall establish the permanent lines of exterior walls. The GC 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 GC 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.
- 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 GC Contractor, nor shall the Surveyor have any interest in the Contract. The Surveyor shall not be employed by the GC 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 GC Contractor shall submit to the Department of Design and Construction for submission to the Department of Buildings a final Survey by the licensed Surveyor showing the location of the new Structure, before completion of the Structure. This Survey shall show the location of the first tier of beams or of the first floor; the finish grades of the open spaces on the plot; the established curb level and the location of all other Structures on the plan, together with the location and boundaries of the lot or plot upon which the Structure is constructed, curb cuts, all yard dimensions, etc.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4

3.4

BORINGS:

- A. The work of this Sub-Section shall be the responsibility of the GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 GC Contractor shall comply with all federal, state and local asbestos regulations affecting the work for this Contract.
- B. Contractor Responsibility: The GC Contractor shall comply with all federal, state and local environmental regulations, including without limitation USEPA and OSHA regulations which require the GC 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 GC Contractor shall comply with all federal, state and local environmental waste disposal regulation which may be required during the work. The GC Contractor is required to hire licensed abatement and disposal companies for the requisite work.

3.7 PREPARATION:

- A. Field Measurements: Each Contractor shall verify all dimensions and conditions on the job so that all work will properly join the existing work.
- B. Each 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 Specification and Contract 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, each Contractor shall defer construction work limited to adequate areas as approved by the Commissioner.
- B. Each Contractor shall confer with the affected 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 other sub-contractors 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:

Each 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. Each 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 each 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 applicable 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, each 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 each 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:** Contractors required to furnish and install conduits, outlets, piping sleeves, boxes, inserts and all other materials and equipment that is to be built into the work performed by the GC Contractor, shall promptly furnish and set such sleeves or other materials in conformity with the requirements of the project.
- B. **Cooperation of Contractors:** All Contractors and their 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 affected Contractor may arrange to have boxes or other forms set at the locations where the piping or other material is to pass through or into the slabs, walls or other work. Upon the subsequent installation of the sleeves or other material, the GC 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 or Contractors responsible therefore.
- D. **Inserts:** The GC 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 Plumbing, HVAC and Electrical Contractors shall submit to the Resident Engineer 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. Each 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. Each Contractor shall not predicate their layout work on unapproved sketches.

3.14 CUTTING AND PATCHING:

- A. Responsibility: Each Contractor shall do all cutting, patching and restoration required by its work, unless otherwise particularly specified in the Specifications of its Contract.
- B. Restore Work: Each Contractor shall restore any work they damage that is the work of another Contractor.
- C. Competent Workers: All restoration work shall be done to the satisfaction of the Commissioner by competent workers skilled in the trade required by such restoration. If, in the judgment of the Commissioner, workers engaged in restoration work are incompetent, they shall be replaced immediately by competent workers.
- D. 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: Each Contractor must remove from the premises all demolished materials of every nature or description resulting from cutting, patching and restoration work, in accordance with the requirements hereinafter stipulated under 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 GC 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

3.16 FURNITURE AND EQUIPMENT:

- A. Responsibility: Each 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: Each Contractor shall clean Project site and work area daily and sweep up and deposit, at a location designated on each floor by the GC Contractor, 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 by the GC Contractor.
 - 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: Each Contractor shall be responsible for the removal of all rubbish, etc., from the site. Each 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. Each Contractor shall employ and keep engaged for this purpose an adequate number of laborers.
- E. Surplus Materials: Each 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 each 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. Each Contractor shall thoroughly clean all equipment and materials furnished and installed and shall deliver such materials and equipment undamaged in a clean and new appearing condition 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. Each Contractor shall provide protection of its 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 GC Contractor shall take over and maintain the Project site, after order to start work.
- B. The GC 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 GC 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 GC 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 GC 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 GC Contractor shall take over and maintain all project areas, after order to start work.
- B. Until the date of Final Acceptance, the GC 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 GC Contractor's own expense, except as otherwise specified, protect same and maintain them in at least as good condition as that in which the GC 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 for General Construction Work shall keep the space for the Resident Engineer in a clean condition.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

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 Electrical Code.

3.23 OBSTRUCTIONS IN DRAINAGE LINES:

- A. The GC 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 GC Contractor

END OF SECTION 01 73 00



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

EXECUTION
01 73 00 - 12



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 salvage and accrue tax benefits (which would accrue to each 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. Standard forms for a Waste Management Plan and a C&D Waste Management Log are 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 GC Contractor shall be responsible for the development and implementation of a Waste Management Plan for the Project. Each Contractor 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 GC 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 GC Contractor shall submit a Final Waste Management Plan.
- D. PROGRESS REPORTS. The GC 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 material type recycled, reused, salvaged or land filled, 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 the applicable credit, signed by each 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 and 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 GC 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 GC Contractor shall implement the Waste Management Plan, coordinate the Plan with each Contractor and all affected subcontractors, 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. Each 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. Each Contractor shall oversee and document the results of the Plan. Monies received for salvaged materials shall remain with the applicable 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 GC Contractor shall distribute copies of the Waste Management Plan to each Contractor, Subcontractors, Resident Engineer, Construction Manager, and Commissioner.
- E. Instructions. The GC 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.
 - 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 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Construction and Demolition Waste – Management Log

Project Name: _____ For Month: _____
 Contractor: _____
 Prepared by: _____

Project I.D.: _____

Haul Date	Ticket #	Hauling Company	*Material Category ²	Material Quantity (tons or cubic yards) ¹			*Material Recipient
				*Total Weight	Excluded Material ³	*Diverted Material ⁴	
Monthly Totals				*Total		*Diverted	*Landfilled
% Diverted this Month*							

Cumulative Totals				
% Diverted to Date				

- Notes:
- Volume (cubic yards) may be used instead of weight if used for ALL amounts and ALL materials.
 - 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.
 - Excluded material includes soil or land clearing debris.
 - 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Construction and Demolition Waste – Management Log

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. Each 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 each Contractor.

1.5 SUBSTANTIAL COMPLETION:

- A. Preliminary Procedures: Before requesting inspection to determine the date of Substantial Completion, each 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: Each 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 applicable 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 and Final Payment, each 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 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 applicable Contractor(s).
 3. Submit pest-control final inspection report and survey as required in Section 01 50 00, TEMPORARY FACILITIES, SERVICES, 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: Each 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 applicable Contractor(s) 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 applicable Contractor(s) 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, each Contractor as applicable 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. Each 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 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: Unless otherwise noted, the GC Contractor shall 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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. The HVAC Contractor shall be responsible to clean ducts, blowers, and coils if units were operated without filters during construction.
 - r. The Electrical Contractor shall be responsible to 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 each Contractor shall complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Each contractor, as applicable 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

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



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 applicable 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

CLOSEOUT PROCEDURES
01 77 00- 8



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 each 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 each Contractor to modify the Contract Drawings to indicate all changes and corrections, if any, occurring in the work as actually installed. Each 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: Each 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.

Each 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 each 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. Each Contractor shall receive periodic updates of this scorecard,



and is required to submit the final version of the Scorecard at Substantial Completion with other project Record Documents.

1.3 RELATED SECTIONS: include without limitation the following:

- A. Section 01 10 00 SUMMARY
- B. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
- C. Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION
- D. Section 01 33 00 SUBMITTAL PROCEDURES
- E. Section 01 77 00 PROJECT CLOSEOUT PROCEDURES

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.
- 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, each 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.
 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 _____
 Made by: _____ Date _____
 Checked by: _____ Date _____

Commissioner's Representatives
 (Resident Engineer) DDC
 (Plumbing Inspector) DDC
 (Heating & Ventilating Inspector) DDC
 (Electrical Inspector) DDC

- 5. Record Drawing Title Sheet: Each Contractor shall prepare a title sheet, the same size as the Contract Record Drawings, which shall contain the following:



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

- 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. Record of changes (a caption description of work affected, and the date and number of Change Order or other authorization)
 - f. List of Record Drawings
- 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. Each contractor, as applicable shall submit three (3) copies each of preliminary manuals to the Resident Engineer for review and approval. Each 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. Each 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: The GC Contractor shall 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

PART II – PRODUCTS

2.1 CONTRACT RECORD DRAWINGS:

- A. Record Prints: Each 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: Each 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." Each 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.
 - 11 Changes made by Change Order
 - 12 Changes made following Commissioner's written orders.
 - 13 Details not on the original Contract Drawings.
 - 14 Field records for variable and concealed conditions.
 - 15 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 Consultant. When directed by the Resident Engineer transfer progress mark-ups to a full set 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 GC 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, each Contractor shall review marked-up Record Prints with the Resident Engineer and the Design Consultant. 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, each 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 the DDC. Dispose of other samples as specified for disposal of surplus and waste material.

2.5 OPERATING AND MAINTENANCE MANUALS:

- A. Each 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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:
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. Dates of the work covered by the contents of the Project Manual.
 6. 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- N. Instructions for care and maintenance: Include manufacturers' recommendations for cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- 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. Commissioned and Non-Commissioned Projects: Each Contractor shall submit final version of applicable Demonstration and Orientation DVD recordings in compliance with Section 01 79 00, DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION, and Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS.

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, each 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

GUARANTY

DDC PROJECT # _____

PROJECT DESCRIPTION _____

CONTRACT # _____

SPECIFICATION SECTION # AND TITLE _____

GUARANTY TO BE IN EFFECT FROM _____
TO _____

The Contractor hereby guarantees that the work specified under the above section of the aforesaid Contract will be free from defects of material and/or workmanship, for the period indicated above.

The Contractor also guarantees that it will promptly repair, restore, rebuild or replace whichever may be deemed necessary by the City, any or all defective material or workmanship of the aforementioned section, that may appear within the guaranty period and any finished work to which damage may occur because of such defects, to the satisfaction of the City and without any cost or expense to the City.

The Contractor hereby agrees to pay to the City the cost of the repairs or replacements should the City make the same because of the failure of the Contractor to do so.

Contractor

By

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

Notary Public



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 78 39



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

CONTRACT RECORD DOCUMENTS
01 78 39- 10



SECTION 01 79 00
DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SUB-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.
- B. Each 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 each 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 Orientation indicated in other sections of the Project Specifications

1.4 DEFINITIONS:

- A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.



- 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 instruction module to the Commissioner for approval no less than thirty (30) days prior to the date the proposed instruction is to take place. Include learning objective and outline for each instruction module.
1. At completion of instruction, submit three (3) complete instruction 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 instruction 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 instruction.
- F. Demonstration and Orientation Recordings:
1. Non-Commissioned Projects:
- a. Each 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 instruction 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 Design Consultant
 - 5) Name of Construction Manager as applicable
 - 6) Date recorded.
 - 7) Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - 8) 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 each applicable Contractor in accordance with Sub-Section 1.5F and Sub-



Section 3.2B herein. Each 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 instructing or educating maintenance personnel in an orientation program similar in content and extent to that indicated for this Project, and whose work has resulted in instruction or education with a record of successful learning performance.
- 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/instruction.
- C. **Videographer Qualifications:** A professional Videographer who has experience with instruction 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 instruction 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 instruction 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: Each Contractor performing Demonstration and Orientation shall engage a qualified facilitator to prepare instruction program and instruction modules, to coordinate instructors, and to coordinate between Contractor and the Resident Engineer for the number of participants, instruction times, and location.
- B. Each 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 instruction with the Resident Engineer with at least fourteen (14) days' advance notice.
- D. Evaluation: At conclusion of each orientation instruction 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. Each Contractor performing Demonstration and Orientation shall engage a qualified commercial Videographer to record demonstration and orientation instruction sessions. Record each orientation instruction module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 2. At beginning of each orientation instruction module, record each chart containing learning objective and lesson outline.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 instruction. Display continuous running time.
6. Narration: Describe scenes on the recording by audio narration by microphone while recording or by dubbing audio narration off-site after. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
7. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from opposite the corresponding narration segment.

B. Commissioned Projects:

Refer to the Addendum to determine if 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 DVD recording per CxA comments.

END OF SECTION 01 79 00



**SECTION 01 81 13
SUSTAINABLE DESIGN REQUIREMENTS FOR LEED BUILDINGS**

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SUB-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. Each 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 each Contractor or its 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 except mechanical and electrical components 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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. Each 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): 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 each Contractor or sub-contractor's scope of work. Cost reporting shall include itemized material costs (excluding each 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 each 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. **FLOORSCORE 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:
 - a. Carbon dioxide monitoring systems, if any, installed to measure outside air delivery.
 - b. Air filters: for detailed requirements refer to Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS.
21. **REFRIGERATION:** For all refrigeration equipment, provide manufacturer's cut sheets indicating the following:
 - a. Equipment type.



- b. Equipment life. Default values specified by the 2007 ASHRAE Applications Handbook will be used unless otherwise demonstrated by the manufacturer's guarantee and an equivalent long-term service contract.
- c. Refrigerant type.
- d. Refrigerant charge in pounds of refrigerant per ton of gross cooling capacity.
- e. Tested refrigerant leakage rate, in percent per year. A default rate of 2% will be used unless otherwise demonstrated by test data.
- f. Tested end-of-life refrigerant loss, in percent. A default rate of 10% will be used unless otherwise demonstrated by test data.

1.7 LEED BUILDING SUBMITTAL REQUIREMENTS:

- A. The LEED BUILDING submittal information shall be assembled into one package per each Contractor's 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 rejecting the submittals of 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 (ESC Plan):
 - 1. 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.
 - 2. The Plan shall be submitted in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
 - 3. Detailed requirements: ESC Plan
 - i. Include the Stormwater Pollution Prevention Plan, if required.
 - ii. Identify the party responsible for Plan monitoring and documentation. The party must be regularly on site.
 - iii. Describe all site work that will be implemented on the project.
 - iv. 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.
 - v. Describe the inspection and maintenance of the ESC measures. Provide a construction schedule indicating weekly site review.
 - vi. Describe reporting and documentation measures.
 - 4. 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 GC Contractor shall implement the ESC Plan, coordinate the Plan with all affected trades, and designate one individual as the Erosion and Sedimentation Control



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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. Each Contractor shall be responsible for the provision, maintenance, and repair of all ESC measures.
 - c. Demonstration. Each 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. Each 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: Each 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 GC Contractor shall be responsible for distributing the EBMCF and any other forms or templates required for each Contractor and his/ her subcontractors to record LEED documentation. Each 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
- E. Closeout meeting

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 13



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM

Contractor Name: _____ Project Name: _____
 Contractor Contact: _____ Project I.D.: _____
 Telephone Number: _____ Project Location: _____

Product/Manufacturer	Recycled Content		Regional ⁴		Rapidly Renewable ⁷ VOC content ⁸		Flooring ⁹	Wood			
	Material Cost ¹	Pre-Consumer (% by wt) ²	Post-Consumer (% by wt) ³	Total % (1/2 Pre + Post)	Location & Distance to Manufacture ⁵	Extracted & Manuf. (% by wt)			*VOC content listed	*VOC content allowed	*Green Label or FloorScore

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.
⁴ Regional: 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.
⁸ 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.
⁹ 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/unreated 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.
¹⁰ Added Urea Formaldehyde: Applies to composite wood and aggrifer products only (plywood, particleboard, MDF, OSB, wheatboard, strawboard). Resins or binders with added urea formaldehyde are prohibited.
¹¹ FSC 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



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- B. **CARCINOGEN:** A chemical listed as a known, probable, reasonably anticipated, or possible human carcinogen by the International Agency for Research on Cancer (IARC) (Groups 1, 2A, and 2B), the National Toxicology Program (NTP) (Groups 1 and 2), the U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) (weight-of-evidence classifications A, B1, B2, and C, carcinogenic, likely to be carcinogenic, and suggestive evidence of carcinogenicity or carcinogen potential), or the Occupational Safety and Health Administration (OSHA).
- 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. Each 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 each 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

1.7 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:

a. Architectural Applications:

i. Indoor carpet adhesive	50
ii. Carpet pad adhesive	50
iii. Wood flooring adhesive	100
iv. Rubber floor adhesive	60
v. Subfloor adhesive	50
vi. Ceramic tile adhesive	65
vii. VCT and asphalt tile adhesive	50
viii. Drywall and panel adhesive	50
ix. Cove base adhesive	50
x. Multipurpose construction adhesive	70
xi. Structural glazing adhesive	100

b. Specialty Applications:

a. PVC welding	510
b. CPVC welding	490



c.	ABS welding	325
d.	Plastic cement welding	250
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
c. Substrate Specific Applications:		
a.	Metal to metal	30
b.	Plastic foams	50
c.	Porous material (except wood)	50
d.	Wood	30
e.	Fiberglass	80
d. 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:
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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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. Each Contractor shall 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 Design 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



**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 established that this Project shall minimize the detrimental impacts on Indoor Air Quality (IAQ) resulting from construction activities. Factors that contaminate indoor air, such as dust entering HVAC systems and ductwork, improper storage of materials on-site, poor housekeeping, shall be minimized.

1.3 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.
- 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 GC Contractor shall prepare and implement a Construction IAQ Management Plan in coordination with each Contractor 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", Second Edition, 2007 (or latest).
 - 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 through the duration of the construction process, and documented in accordance with the Submittal Requirements of Sub-Section 1.08 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. Each Contractor shall 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 GC Contractor shall distribute copies of the Construction IAQ Management Plan in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
 - b. Instruction: The GC Contractor shall provide on-site instruction of appropriate site management to each Contractor.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

- 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 1.7 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 each 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 GC Contractor shall be responsible for preparing and implementing the Construction IAQ Management Plan and shall coordinate and incorporate the work of each Contractor in the IAQ Management Plan.
- B. Responsibility of other Contractors: Each Contractor for this project shall be responsible to cooperate with the GC 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. Each 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 OWNER'S PRE-ACCEPTANCE ORIENTATION
 - 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 Design Consultant that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- 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 Design Consultant that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- 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 each Contractor: 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 each Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by the City:
 - 1. Commissioning Authority/Agent (CxA): The designated person, company, or entity under separate contract with the City that plans, schedules, and coordinates the commissioning team to implement the commissioning process.
 - 2. Representatives of the facility user and operation and maintenance personnel.
 - 3. Design Consultant and other concerned entities.



1.6 CITY'S RESPONSIBILITIES:

- A. Provide the OPR documentation to the Commissioning Agent (CxA) for use in developing the commissioning plan; systems manual; operation and maintenance orientation plan; and testing plans and checklists.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the BoD documents, prepared by the Design Consultant and approved by the Commissioner, to the Commissioning Agent (CxA) for use in developing the commissioning plan, systems manual, and operation and maintenance orientation plan.

1.7 CONTRACTOR'S RESPONSIBILITIES:

- A. The Contractor(s) responsible for each specific service shall provide utility services required for the commissioning process.
- B. As a member of the Commissioning Team, each Contractor and their subcontractors shall assign representatives with expertise and authority to act on behalf of each Contractor 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 recorded by each contractor providing demonstration and orientation instruction sessions) 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 each 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 orientation 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:

Each 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 Design Consultant 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 Design Consultant, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that 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 each 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. Each Contractor, as applicable 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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 each Contractor(s) or their 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 each 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. Each 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 each Contractor(s) as applicable.
- 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 orientation sessions.
- C. System Operations Manual
1. The CxA shall prepare and deliver these documents with inputs from other agencies. Each Contractor(s) 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. Each 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.



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Division 01 – DDC STANDARD GENERAL CONDITIONS
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

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.

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
MULTIPLE CONTRACT PROJECTS
Issue Date - January 15, 2015

NO TEXT

GENERAL COMMISSIONING REQUIREMENTS
01 91 13 - 8



**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

Contractor

Dated _____, 20____

Approved as to Form
Certified as to Legal Authority

Acting Corporation Counsel

Dated _____, 20____

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____, 20____



FMS ID: PV467-CRG



**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
- CONTRACT NO. 2 PLUMBING WORK
- CONTRACT NO. 3 HVAC + FIRE PROTECTION WORK
- CONTRACT NO. 4 ELECTRICAL WORK

Manhattan Class Company Theater Fit Out

LOCATION: 515 West 52nd Street
BOROUGH: Manhattan 10019
CITY OF NEW YORK

Sajun Electric Inc

Contractor

Dated February 29, , 20 16

Approved as to Form
Certified as to Legal Authority

Acting Corporation Counsel

Dated March 3 , 20 15

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____ , 20 _____

JP
3-3-15





PROJECT ID:

PV467-CRG

**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
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VOLUME 3 OF 3

**ADDENDUM TO THE GENERAL
CONDITIONS**

SPECIFICATIONS

FOR FURNISHING ALL LABOR AND MATERIALS
NECESSARY AND REQUIRED FOR:

**Manhattan Class Company Theater
Fit Out**

LOCATION:
BOROUGH:
CITY OF NEW YORK

515 West 52nd Street
Manhattan 10019

CONTRACT NO. 1
CONTRACT NO. 2
CONTRACT NO. 3
CONTRACT NO. 4

GENERAL CONSTRUCTION WORK
PLUMBING WORK
HVAC + FIRE PROTECTION WORK
ELECTRICAL WORK

Department of Cultural Affairs

Andrew Berman Architects

Date: December 30, 2014



■ 5-108



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

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

ADDENDUM TO THE GENERAL CONDITIONS
FOR MULTIPLE CONTRACT PROJECTS

The General Conditions are hereby amended in accordance
with the terms and conditions set forth in this Addendum.

I. PROJECT DESCRIPTION

FMS #: **PV467-CRG**

PROJECT NAME: **Manhattan Class Company Theater**

PROJECT DESCRIPTION: This Project consists of a new two-stage theater fit out in an existing core and shell building. The project will include a complete fit out including: modifications to the existing reinforced concrete structure, new reinforced concrete and structural steel systems, all new plumbing piping, fixtures and fittings, new climate conditioning systems utilizing the building service, and new theatrical and architectural fit-outs, to serve the office, education and theatrical programs for the Manhattan Class Company. All work will be performed to meet the stringent acoustical criteria established by the theater program. Work will be performed to meet and achieve LEED Silver criteria.

PROJECT LOCATION: **515 West 52nd Street**
BOROUGH: **Manhattan**
CITY OF NEW YORK
ZIP CODE: **11101**
COMMUNITY BOARD #: **104**

LANDMARK STATUS:

DESIGNATED LANDMARK STRUCTURE OR SITE: *No*

If this is a Designated Landmark Structure or Site, Section 01 3591, Historic Treatment Procedures applies to this project.

LANDMARK QUALITY STRUCTURE: *No*

If this is a Landmark Quality Structure, Section 01 3591, Historic Treatment Procedures applies to this project.

II. LEED GREEN BUILDING REQUIREMENTS

This project must achieve a **Silver** LEED Green Building Rating. A certain number of credits are required for this rating and are detailed in the Project Specifications. Sections 018113 Sustainable Design Requirements for LEED Buildings, 018113.13 VOC Limits for Adhesives, Sealants, Paints and Coatings for LEED Buildings, 018119 Indoor Air Quality Requirements for LEED Buildings, and 019113 General Commissioning Requirements of the DDC Standard General Conditions shall apply to this project.

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 separate Contracts pertaining to this Project are set forth below:

- Contract No. 1 - Contract for General Construction Work
- Contract No. 2 - Contract for Plumbing Work
- Contract No. 3 - Contract for Heating, Ventilating, and Air Conditioning and Fire Safety Work
- Contract No. 4 - Contract for Electrical 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>	Applies	Does not Apply	Applies as Amended
01 1000	1.4 (B)	Scope and Intent / LEED	X		
	1.4(C)	Scope and Intent / Commissioning	X		
01 3233		Photographic Documentation	X		
01 3300	1.7 (A-D)	LEED Submittals	X		
01 3503		General Mechanical Requirements	X		
01 3506	3.2 (A-B)	Electrical Conduit System Including Boxes (Pull, Junction and Outlet)	X		
	3.3 (A-E)	Electrical Wiring Devices	X		
	3.4 (A-I)	Electrical Conductors and Terminations	X		
	3.5 (A-B)	Circuit Protective Devices	X		
	3.6 (A-J)	Distribution Centers	X		
	3.7 (A-I)	Motors	X		
	3.8 (A-I)	Motor Control Equipment	X		
	01 3591		Historic Treatment Procedures		X
01 5000	3.2 (A)	Temporary Water Facilities / Temporary Water		X	
	3.2 (B)	Temporary Water Facilities / Temporary Water – Work in Existing Facilities	X		
	3.3 (B)	Temporary Sanitary Facilities / Self-Contained Toilet Units	X		
	3.3 (C)	Temporary Sanitary Facilities / Existing Toilets		X	
	3.4 (B) 1	Temporary Power, Lighting, and Site Lighting / Connection to Utility Lines		X	
	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		

<u>Section</u>	<u>Sub-Section</u>	<u>Sub-Section</u>	Applies	Does not Apply	Applies as Amended
01 5411	3.1 (A-L)	Temporary Use, Operation and Maintenance of Elevators During Construction for New Buildings Up To and Including 15 Stories		X	
	3.2 (A-O)	Temporary Use, Operation and Maintenance of Elevators During Construction for New Buildings Over 15 Stories		X	
	3.3 (A-G)	Temporary Use, Operation and Maintenance of Elevators During Construction for Existing Buildings	X		
01 7300	3.3 (A-I)	Surveys	X		
	3.4 (A-B)	Borings		X	
	3.12 (A-D)	Sleeves and Hangers	X		
	3.13 (A)	Sleeve and Penetration Drawings	X		
	3.15 (A)	Location of Partitions	X		
01 7419	1.5 (C)	Waste Management Performance Requirements / LEED Certification	X		
01 7900		Demonstration and Owner's Pre-Acceptance Orientation	X		
01 8113		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		

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.

Work must be performed between 7.30am and 4.30 pm, Monday through Friday, excluding holidays unless explicitly authorized in writing by the City of New York. Additional information is available upon request through the City of New York.

VIII. SPECIAL EXPERIENCE REQUIREMENTS FOR THE PROJECT

- (1) **GENERAL:** The following are set forth below: Special Experience Requirements applicable to the contractor or subcontractor that will perform specific areas of work.
- (2) **REVISION OF SPECIFICATIONS AND DRAWINGS:** In the event the Specifications and/or the Contract Drawings contain any Special Experience Requirement that is not set forth below, such Special Experience Requirement is deemed deleted, except as otherwise expressly provided in Section VIII of this Addendum.
- (3) **SPECIAL EXPERIENCE REQUIREMENTS FOR SPECIFIC AREAS OF WORK:** The special experience requirements set forth below apply to the contractor or subcontractor that will perform specific areas of work. Compliance with such experience requirements will be evaluated after an award of contract. Within two (2) weeks of such award, the contractor will be required to submit the qualifications of the contractor or subcontractor that will perform these specific areas of work. If the contractor intends to perform these specific areas of work with its own forces, it must demonstrate compliance with the special experience requirements. If the contractor intends to subcontract these specific areas of work, the proposed subcontractor(s) must demonstrate compliance with the special experience requirements. Once approved, no substitution will be permitted, unless the qualifications of the proposed replacement have been approved in writing in advance by the City.

Special Experience Requirement #1: The contractor or subcontractor performing the work of this section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.

General Construction

- Section 033300: Cast-in-Place Concrete
- Section 033500: Special Concrete Finishes
- Section 112429: Fall Protection
- Section 116133: Theatrical Rigging
- Section 116163: Theatrical Lighting Dimming and Control
- Section 116183: Theatrical Audio Video Systems
- Section 126100: Fixed Theatre Seating
- Section 144200: Wheelchair Lifts

- (4) **SPECIAL EXPERIENCE REQUIREMENTS FOR MANUFACTURERS:** The special experience requirements set forth below apply to the manufacturer that will supply or fabricate specific material or equipment. Compliance with such experience requirements will be evaluated after an award of contract. Within two (2) weeks of award, the contractor will be required to submit the qualifications of the proposed manufacturer(s). Once approved, no substitution will be permitted, unless the qualifications of the proposed replacement have been approved in writing in advance by the City
 - (a) Special Experience Requirement #2: The manufacturer providing the material or equipment specified in this section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years. 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 112429: Fall Protection
- Section 116133: Theatrical Rigging
- Section 116163: Theatrical Lighting Dimming and Control
- Section 116183: Theatrical Audio Video Systems
- Section 126100: Fixed Theatre Seating

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	CONTRACT #2	CONTRACT #3	CONTRACT #4
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	550	550	550	550
Article 15 Contract	Liquidated Damages	For each consecutive calendar day over completion time	\$900\$	\$180	\$900	\$900
Article 17 Contract	Sub-Contracts	Not to exceed Percent of Contract Price	60%	25%	60%	25%
Article 21 Contract	Retainage	Percent of Voucher	If 100% bonds are required			5%
			If 100% bonds are not required, and Contract Price is less than \$1,000,000			10%
			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%	1%	1%	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	M/WBE 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
<p>■ Commercial General Liability Art. 22.1.1</p>	<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>
<p>■ Workers' Compensation Art. 22.1.2</p> <p>■ Disability Benefits Insurance Art. 22.1.2</p> <p>■ Employers' Liability Art. 22.1.2</p> <p><input type="checkbox"/> Jones Act Art. 22.1.3</p> <p><input type="checkbox"/> U.S. Longshoremen's and Harbor Workers Compensation Act Art. 22.1.3</p>	<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 <p align="center">Art. 22.1.4</p>	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 <p align="center">Art. 22.1.5</p>	\$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
□ Contractor's Pollution Liability <p align="center">Art. 22.1.6</p>	\$ _____ per occurrence \$ _____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
□ Marine Protection and Indemnity <p align="center">Art. 22.1.7(a)</p>	\$ _____ 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.

<p>[OTHER] Art. 22.1.8</p> <p><input type="checkbox"/> Asbestos Liability _____</p>	<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>
<p>[OTHER] Art. 22.1.8</p> <p><input type="checkbox"/> Boiler Insurance _____</p>	<p>\$200,000</p>
<p>[OTHER] Art. 22.1.8</p> <p>■ Professional Liability</p> <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. Broker's Certification

[Pursuant to Article 22.3.3 of the **Contract**, every Certificate of Insurance must be accompanied by either the following certification by the broker setting forth the following text and required information and signatures or certified copies of all policies referenced in the Certificate of Insurance.]

CERTIFICATION BY BROKER

The undersigned insurance broker represents to the City of New York that the attached Certificate of Insurance is accurate in all material respects, and that the described insurance is effective as of the date of this Certification.

[Name of broker (typewritten)]

[Address of broker (typewritten)]

[Email address of broker (typewritten)]

[Phone number/Fax number of broker (typewritten)]

[Signature of authorized official or broker]

[Name and title of authorized official (typewritten)]

State of)
) ss:
County of

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

NOTARY PUBLIC FOR THE STATE OF _____

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART IV. Address of Commissioner

Wherever reference is made in Article 7 or Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents 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
064023	Architectural Woodwork	10 years
078100	Sprayed Fire-Resistive Materials	1 year
079200	Joint Sealer	10 years
081416	Wood Doors	Life of Installation
084313	Aluminum Entrances and Storefronts	3 years
	Aluminum Entrances and Storefronts -- Finish	15 years
088000	Glass and Glazing -- Coated Glass	5 years
	Glass and Glazing --Insulated Glass	10 years
	Glass and Glazing --Laminated Glass	5 years
083473	Sound Control Door Assemblies	1 year
096400	Wood Flooring --	1 year
096401	Wood Block Flooring	1 year
096800	Carpeting --Face Yarn	5 years
112429	Fall Protection	2 year
116163	Theatrical Lighting & Dimming Control	1 year
126100	Fixed Theater Seating	3 years

144200	Basic Unit and Electrical System	1 year
	Drive Train Components	2 years
210000	Fire Protection Work	1 year
220000	Water Heaters	3 years
230000	Refrigeration Compressors	4 years
230000	Tank Linings	10 years
230513	Motors and Starters	3 years
230523	Pipes, Valves, & Fittings Vibration Control	1 year
230548	Equipment Bases &	1 year
230700	Insulation	1 year
230923	Controls Systems	2 years
232000	Pumps	1 year
233000	Ductwork & Air Outlets	1 year
237000	Air Handling & Treatment	1 year
260000	General Provision For Electrical	1 year
260500	Switch Bypass Devices	5 years
260943	Architectural Dimming	2 years
263200	Emergency Power System	5 years or 1500 hrs
265000	Fluorescent Ballast	5 years
265000	Emergency Fluorescent Ballast	5 years
265000	Emergency Ballast for HID Lamps	5 years
265100	Architectural Lighting	5 years
	LED Luminaires and Drivers	3 years
270528	Copper Cabling System	20 years
	Fiber Optic Cabling System	20 years
	Passive Telecommunications equipment	5 years

(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.

Contract #1

A-001.00 GENERAL NOTES
A-002.00 BUILDING AND ZONING NOTES
A-003.00 SITE PLAN
PA-001.00 OCCUPANCY & FLOOR EGRESS ANALYSIS
PA-002.00 OCCUPANCY ANALYSIS
PA-003.00 EGRESS ANALYSIS THEATER 1&2
DM-111.00 DEMOLITION PLAN GROUND LEVEL
DM-112.00 DEMOLITION PLAN CONTROL ROOM LEVEL
DM-113.00 DEMOLITION PLAN MEZZANINE LEVEL
A-110.00 PROPOSED PLAN CELLER LEVEL
A-111.00 PROPOSED PLAN GROUND LEVEL
A-112.00 PROPOSED PLAN CONTROL ROOM LEVEL
A-113.00 PROPOSED PLAN MEZZANINE LEVEL MEZZANINE CONTROL ROOM
A-131.00 REFLECTED CEILING PLAN GROUND LEVEL
A-132.00 REFLECTED CEILING PLAN MEZZANINE LEVEL MEZZANINE CONTROL ROOM
A-220.00 EXTERIOR SOUTH ELEVATION
A-221.00 EXTERIOR NORTH ELEVATION
A-250.00 THEATER 1 GROUND PLAN SLL ELEVATION
A-251.00 THEATER 1 MEZZANINE LEVEL PLAN
A-253.00 THEATER 1 ELEVATIONS NORTH & SOUTH
A-254.00 THEATER 1 ELEVATIONS EAST & WEST
A-255.00 THEATER 1 WALL SECTIONS
A-256.00 THEATER 1 DETAILS
A-257.00 THEATER 1 DETAILS
A-258.00 THEATER 1 DETAILS
A-259.00 THEATER 1 DETAILS
A-260.00 THEATER 1 RAILINGS, PLANS ELEVATIONS AND DETAILS
A-262.00 THEATER 2 ELEVATIONS
A-265.00 THEATER 2 DETAILS
A-266.00 THEATER 2 DETAILS
A-300.00 STAIR 1 ENLARGED PLANS
A-301.00 STAIR 1 SECTION 1
A-302.00 STAIR 1 ELEVATIONS
A-304.00 STAIR 1 DETAIL
A-310.00 STAIR 3 ENLARGED PLANS, SECTIONS AND DETAILS
A-320.00 PLATFORM LIFT, PLANS, ELEVATION AND SECTION
A-330.00 THEATER STAIR AT BALCONY PLAN AND ELEVATION
A-400.00 DOOR SCHEDULE
A-401.00 DOOR ELEVATIONS
A-410.00 WINDOWS & STOREFRONT SCHEDULE & ELEVATIONS
A-411.00 WINDOWS & STOREFRONTS ELEVATIONS
A-430.00 DOOR DETAILS
A-431.00 DOOR DETAILS
A-432.00 DOOR DETAILS
A-433.00 DOOR DETAILS
A-434.00 ENTRY VESTIBULE DETAILS
A-440.00 EXTERIOR STORE FRONT DETAILS
A-450.00 ADMINISTRATION OFFICE WALL DETAILS
A-500.00 121 WC PLAN, ELEVATIONS, DETAILS & ACCESSORIES

A-501.00 122 WC PLAN & ELEVATIONS
 A-502.00 112 WC, 113 ADA WC, 154 & 155 ADA WC PLAN & ELEVATION
 A-503.00 219, 220 WC PLAN & ELEVATIONS
 A-510.00 DRESSING ROOM ELEVATIONS
 A-511.00 GREEN ROOM & WARDROBE/ WORKSHOP ELEVATIONS
 A-520.00 REHEARSAL STUDIOS 1& 2 ELEVATIONS
 A-530.00 BACK OF THE HOUSE ELEVATIONS
 A-540.00 119 VESTIBULE 123 BACKSTAGE 118 WORKROOM ELEVATIONS
 A-550.00 MEZZANINE LOBBY/ADMINISTRATION ELEVATION
 A-560.00 ELEVATOR LOBBY ELEVATION
 A-570.00 LOBBY & TICKETING ELEVATIONS
 A-701.00 MILLWORK BAR
 A-702.00 MILLWORK TICKETING AREA
 A-703.00 MILLWORK
 A-704.00 MILLWORK
 A-705.00 MILLWORK
 A-706.00 MILLWORK
 A-800.00 WALL TYPES
 A-801.00 WALL TYPES
 A-802.00 CEILING AND FLOOR TYPES
 A-803.00 FLOOR AND BASE TYPES
 A-810.00 INTERIOR DETAIL GROUND FLOOR LEVEL
 A-811.00 INTERIOR DETAIL GROUND FLOOR LEVEL
 A-812.00 INTERIOR DETAIL BACK OF THE HOUSE & CONTROL ROOM LEVEL
 A-813.00 INTERIOR DETAIL 1 MEZZANINE LEVEL
 A-814.00 EXTERIOR DETAIL
 A-900.00 FINISH SCHEDULE
 A-920.00 INTERIOR SIGNAGE
 A-930.00 EMERGENCY GENERATOR PLAN, SECTION, ELEVATION
 A-931.00 EMERGENCY GENERATOR PLAN, SECTION, ELEVATION
 A-932.00 EMERGENCY GENERATOR DETAILS

 S-001.00 NOTES
 S-110.00 GROUND FLOOR & CONTROL BOOTH PLAN
 S-111.00 NEW CONTROL LEVEL
 S-112.00 MEZZANINE LEVEL
 S-113.00 SECOND FLOOR
 S-114.00 GENERATOR PLAN
 S-201.00 SECTIONS
 S-202.00 SECTIONS & DETAILS
 S-203.00 SECTIONS & DETAILS II
 S-204.00 TYPICAL DETAILS
 S-205.00 TYPICAL DETAILS II
 S-206.00 DETAILS
 S-207.00 TYPICAL METAL DECK & STEEL DETAILS
 S-301.00 THEATER 1 WALLS
 S-302.00 THEATER 2 WALLS
 S-303.00 ARCHITECTURAL WALLS

 T-000.00 THEATRICAL SYSTEMS DRAWING INDEX
 TA-001.00 THEATRICAL AUDIO VIDEO SYMBOL KEY, WIRING DETAILS & NOTES 1
 TA-101.00 THEATRICAL AUDIO VIDEO SYMBOL KEY, WIRING DETAILS & NOTES 2
 TA-101.00 THEATRICAL AUDIO VIDEO GROUND LEVEL DEVICE PLAN
 TA-102.00 THEATRICAL AUDIO VIDEO CONTROL ROOM LEVEL DEVICE PLAN
 TA-103.00 THEATRICAL AUDIO VIDEO MEZZANINE LEVEL DEVICE PLAN
 TA-104.00 THEATRICAL AUDIO VIDEO UPPER MEZZANINE LEVEL DEVICE PLAN
 TA-201.00 THEATRICAL AUDIO VIDEO CONTROL & EQUIPMENT ROOM DETAIL PLANS
 TA-202.00 THEATRICAL AUDIO VIDEO BALCONY MIX POSITION DETAILS
 TA-301.00 THEATRICAL AUDIO VIDEO THEATER 1 LOUDSPEAKER CENTERLINE SECTION

TA-401.00 THEATRICAL AUDIO VIDEO CONNECTION PANEL DETAILS 1
 TA-402.00 THEATRICAL AUDIO VIDEO CONNECTION PANEL DETAILS 2
 TA-403.00 THEATRICAL AUDIO VIDEO CONNECTION PANEL DETAILS 3
 TA-404.00 THEATRICAL AUDIO VIDEO CONNECTION PANEL DETAILS 4
 TA-405.00 THEATRICAL AUDIO VIDEO PATCH PANEL DETAILS 1
 TA-406.00 THEATRICAL AUDIO VIDEO DISPLAY PANEL AND LOUDSPEAKER MOUNTING DETAILS
 TA-407.00 THEATRICAL AUDIO VIDEO PANEL MOUNTING DETAILS THEATER1
 TA-408.00 THEATRICAL AUDIO VIDEO STAGE MANAGER STATION DETAILS
 TA-409.00 THEATRICAL AUDIO VIDEO THEATER 2 CATWALK DEVICE MOUNTING DETAILS
 TA-410.00 THEATRICAL AUDIO VIDEO THEATER 1 CENTRAL CLUSTER DETAILS
 TA-411.00 THEATRICAL AUDIO VIDEO THEATER 1 ORCHESTRA SPEAKER LAYOUT AND DETAILS
 TA-412.00 THEATRICAL AUDIO VIDEO THEATER 1 SURROUND LOUDSPEAKER LAYOUT AND DETAILS
 TA-413.00 THEATRICAL AUDIO VIDEO DETAILS
 TA-501.00 THEATRICAL AUDIO VIDEO WIRING RISER DIAGRAM
 TA-502.00 THEATRICAL AUDIO VIDEO THEATER 1 AUDIO BLOCK DIAGRAM
 TA-503.00 THEATRICAL AUDIO VIDEO THEATER 2 AUDIO BLOCK DIAGRAM
 TA-504.00 THEATERS 1 AND 2 WORD CLOCK/RF & REHEARSAL STUDIO BLOCK DIAGRAM
 TA-505.00 THEATRICAL AUDIO VIDEO VIDEO BLOCK DIAGRAM
 TA-506.00 THEATRICAL AUDIO VIDEO DATA BLOCK DIAGRAM
 TA-507.00 THEATRICAL AUDIO VIDEO PAGING SYSTEM BLOCK DIAGRAM
 TA-508.00 THEATRICAL AUDIO VIDEO INTERCOM SYSTEM BLOCK DIAGRAM
 TA-601.00 THEATRICAL AUDIO VIDEO CONNECTION PANEL SCHEDULE THEATER 1
 TA-602.00 THEATRICAL AUDIO VIDEO CONNECTION PANEL SCHEDULE THEATER 2 & LOBBY
 TA-603.00 THEATRICAL AUDIO VIDEO SYMBOL & DEVICE SCHEDULE
 TA-604.00 THEATRICAL AUDIO VIDEO WIRE SCHEDULE
 TF-113.00 THEATRICAL FALL PROTECTION THEATER A PLAN AT CATWALK
 TF-124.00 THEATRICAL FALL PROTECTION THEATER 2 PLAN AT CATWALKS
 TF-311.00 THEATRICAL FALL PROTECTION THEATER 1 CENTERLINE SECTION
 TF-321.00 THEATRICAL FALL PROTECTION THEATER 2 CENTERLINE SECTION
 TF-401.00 THEATRICAL FALL PROTECTION DETAILS
 TL-000.00 THEATRICAL LIGHTING KEY AND NOTES
 TL-111.00 THEATRICAL LIGHTING GROUND LEVEL THEATER 1 DEVICE PLAN
 TL-112.00 THEATRICAL LIGHTING GROUND LEVEL RCP THEATER 1 DEVICE PLAN
 TL-113.00 THEATRICAL LIGHTING MEZZANINE LEVEL THEATER 1 DEVICE PLAN
 TL-114.00 THEATRICAL LIGHTING UPPER MEZZANINE THEATER 1 DEVICE PLAN
 TL-121.00 THEATRICAL LIGHTING GROUND LEVEL THEATER 2 DEVICE PLAN
 TL-123.00 THEATRICAL LIGHTING CONTROL ROOM LEVEL THEATER 2 DEVICE PLAN
 TL-124.00 THEATRICAL LIGHTING CATWALK LEVEL THEATER 2 DEVICE PLAN
 TL-131.00 THEATRICAL LIGHTING GROUND LEVEL REHEARSAL ROOM 1 DEVICE PLAN
 TL-201.00 THEATRICAL LIGHTING ENLARGED PLANS THEATER 1
 TL-202.00 THEATRICAL LIGHTING ENLARGED PLANS THEATER 2
 TL-301.00 THEATRICAL LIGHTING CENTER LINE SECTION THEATER1
 TL-321.00 THEATRICAL LIGHTING CENTER LINE SECTION THEATER 2
 TL-322.00 THEATRICAL LIGHTING TRANSVERS SECTIONS THEATER 2
 TL-401.00 THEATRICAL LIGHTING DETAILS
 TL-402.00 THEATRICAL LIGHTING DETAILS
 TL-403.00 THEATRICAL LIGHTING DETAILS
 TL-404.00 THEATRICAL LIGHTING DETAILS
 TL-405.00 THEATRICAL LIGHTING DETAILS
 TL-406.00 THEATRICAL LIGHTING DETAILS
 TL-407.00 THEATRICAL LIGHTING DETAILS
 TL-408.00 THEATRICAL LIGHTING DETAILS
 TL-409.00 THEATRICAL LIGHTING DETAILS
 TL-410.00 THEATRICAL LIGHTING CONTROL RCK DETAIL
 TL-411.00 THEATRICAL LIGHTING MOUNTING DETAILS THEATER 1
 TL-412.00 THEATRICAL LIGHTING MOUNTING DETAILS THEATER 1
 TL-413.00 THEATRICAL LIGHTING MOUNTING DETAILS THEATER 2
 TL-414.00 THEATRICAL LIGHTING TRANSVERSE SECTION THEATER 2
 TL-415.00 THEATRICAL LIGHTING MOUNTING DETAILS THEATER 2

TL-416.00 THEATRICAL LIGHTING THEATER 1 GRID POWER AND DATA DISTRIBUTION
 TL-501.00 THEATRICAL LIGHTING CONTROL RISER THEATER 1
 TL-502.00 THEATRICAL LIGHTING CONTROL RISER THEATER 2
 TL-601.00 THEATRICAL LIGHTING CONTROL SCHEDULES
 TL-602.00 THEATRICAL LIGHTING DISTRIBUTION SCHEDULE THEATER 1
 TL-603.00 THEATRICAL LIGHTING DISTRIBUTION SCHEDULE THEATER 2
 TL-604.00 THEATRICAL LIGHTING DISTRIBUTION SWITCHED POWER SCHEDULES
 TR-111.00 THEATRICAL RIGGING THEATER 1 PLAN AT STAGE LEVEL
 TR-112.00 THEATRICAL RIGGING THEATER 1 PLAN AT BALCONY LEVEL
 TR-113.00 THEATRICAL RIGGING THEATER 1 PLAN AT FLYING GRID
 TR-114.00 THEATRICAL RIGGING THEATER 1 RCP AT RIGGING STEEL
 TR-121.00 THEATRICAL RIGGING THEATER 2 CATWALK LEVEL DEVICE PLAN
 TR-311.00 THEATRICAL RIGGING THEATER 1 CENTERLINE SECTION
 TR-312.00 THEATRICAL RIGGING THEATER 1 TRANSVERSE SECTION
 TR-313.00 THEATRICAL RIGGING THEATER 1 PORTAL DETAILS
 TR-401.00 THEATRICAL RIGGING THEATER 1 DETAILS 1
 TR-402.00 THEATRICAL RIGGING THEATER 1 DETAILS
 TR-403.00 THEATRICAL RIGGING DETAILS
 TR-404.00 THEATRICAL RIGGING THEATER 1 MIX POSITION DETAILS
 TR-405.00 THEATRICAL RIGGING THEATER 1 MIX POSITION DETAILS
 TR-501.00 THEATRICAL RIGGING THEATER 1 RISER DIAGRAM AND AXIS LIST
 TS-111.00 THEATRICAL SEATING THEATER 1 ORCHESTRA PLAN
 TS-112.00 THEATRICAL SEATING THEATER 1 BALCONY PLAN
 TS-311.00 THEATRICAL SEATING THEATER 1 CENTERLINE SECTION

Contract #2

P-001.00 PLUMBING DETAILS, SYMBOLS LIST & NOTES
 P-002.00 PLUMBING DETAILS
 P-110.00 PLUMBING SUB-CELLAR FLOOR PLAN
 P-111.00 PLUMBING GROUND FLOOR PLAN
 P-113.00 PLUMBING MEZZANINE FLOOR PLAN
 P-200.00 PLUMBING SANITARY RISER DIAGRAM
 P-201.00 PLUMBING DOMESTIC RISER DIAGRAM
 P-911.00 PLUMBING DEMOLITION GROUND FLOOR PLAN
 P-913.00 PLUMBING DEMOLITION MEZZANINE FLOOR PLAN

Contract #3

M-001.00 MECHANICAL NOTES AND SYMBOL LIST
 M-111.00 MECHANICAL GROUND FLOOR PLAN
 M-112.00 MECHANICAL CONTROL ROOM PLAN
 M-113.00 MECHANICAL MEZZANINE FLOOR PLAN
 M-121.00 MECHANICAL PIPING GROUND FLOOR PLAN
 M-122.00 MECHANICAL PIPING CONTROL ROOM PLAN
 M-123.00 MECHANICAL PIPING MEZZANINE FLOOR PLAN
 M-201.00 MECHANICAL PARTS PLAN
 M-202.00 MECHANICAL PARTS PLAN
 M-203.00 MECHANICAL PARTS PLAN
 M-204.00 MECHANICAL PARTS PLAN
 M-205.00 MECHANICAL OUTSIDE AURE
 M-206.00 MECHANICAL PART PLAN
 M-301.00 MECHANICAL FLOW AND CONTROL DIAGRAMS
 M-302.00 MECHANICAL FLOW AND CONTROL DIAGRAMS
 M-303.00 MECHANICAL FLOW AND CONTROL DIAGRAMS
 M-304.00 MECHANICAL PIPING RISER DIAGRAM
 M-401.00 MECHANICAL DETAILS
 M-402.00 MECHANICAL DETAILS
 M-403.00 MECHANICAL DETAILS
 M-404.00 MECHANICAL DETAILS
 M-501.00 MECHANICAL SCHEDULES

M-502.00 MECHANICAL SCHEDULES
M-911.00 MECHANICAL DEMOLITION GROUND FLOOR PLAN
M-912.00 MECHANICAL DEMOLITION CONTROL ROOM PLAN
M-913.00 MECHANICAL DEMOLITION MEZZANINE FLOOR PLAN
M-914.00 MECHANICAL DEMOLITION SMOKE EXHAUST PART PLAN

SP/SD-001.00 SPRINKLER/STANDPIPE NOTES
SP/SD-002.00 SPRINKLER/STANDPIPE SITE PLAN AND DETAILS
SP/SD-003.00 SPRINKLER/STANDPIPE DETAILS
SP/SD-004.00 SPRINKLER STAGE WATER CURTAIN NOTES AND DETAILS
SP/SD-005.00 SPRINKLER/STANDPIPE THEATER 1 & 2 SECTIONS
SP/SD-006.00 SPRINKLER/STANDPIPE RISER DIAGRAM
SP/SD-111.00 SPRINKLER/STANDPIPE GROUND FLOOR PLAN
SP/SD-112.00 SPRINKLER/STANDPIPE CONTROL ROOM LEVEL PLAN
SP/SD-113.00 SPRINKLER/STANDPIPE MEZZANINE PLAN
SP/SD-114.00 SPRINKLER/STANDPIPE THEATER 1 UPPER PLAN
SP/SD-911.00 SPRINKLER/STANDPIPE GROUND FLOOR DEMOLITION PLAN
SP/SD-912.00 SPRINKLER/STANDPIPE CONTROL ROOM LEVEL DEMOLITION PLAN
SP/SD-913.00 SPRINKLER/STANDPIPE MEZZANINE DEMOLITION PLAN

Contract #4

E-001.00 ELECTRICAL SYMBOLS AND NOTES
E-002.00 ELECTRICAL SINGLE LINE DIAGRAM
E-110.00 ELECTRICAL CELLAR PLAN
E-111.00 ELECTRICAL GROUND FLOOR PLAN
E-112.00 ELECTRICAL CONTROL ROOM PLAN
E-113.00 ELECTRICAL MEZZANINE FLOOR PLAN
E-121.00 ELECTRICAL GROUND LEVEL THEATRICAL POWER
E-122.00 ELECTRICAL CONTROL LEVEL THEATRICAL POWER
E-123.00 ELECTRICAL MEZZANINE LEVEL THEATRICAL POWER
E-124.00 ELECTRICAL GRID LEVEL THEATRICAL POWER THEATER 1
E-125.00 ELECTRICAL GRID LEVEL THEATRICAL POWER THEATER 2
E-131.00 LIGHTING GROUND FLOOR PLAN
E-132.00 LIGHTING CONTROL ROOM PLAN
E-133.00 LIGHTING MEZZANINE FLOOR PLAN
E-201.00 ELECTRICAL DETAILS
E-202.00 ELECTRICAL DETAILS
E-203.00 ELECTRICAL PART PLAN
E-204.00 ELECTRICAL PART PLAN
E-205.00 ELECTRICAL PART PLAN
E-301.00 ELECTRICAL SCHEDULES
E-302.00 ELECTRICAL SCHEDULES
E-303.00 ELECTRICAL SCHEDULES
E-304.00 ELECTRICAL SCHEDULES
E-305.00 ELECTRICAL SCHEDULES
E-801.00 ELECTRICAL DATA RISER DIAGRAM
E-802.00 ELECTRICAL DATA DETAILS
E-911.00 ELECTRICAL DEMOLITION GROUND FLOOR PLAN
E-912.00 ELECTRICAL DEMOLITION CONTROL ROOM PLAN
E-913.00 ELECTRICAL DEMOLITION MEZZANINE LEVEL PLAN

FA-001.00 FIRE ALARM RISER DIAGRAM AND DETAILS
FA-002.00 FIRE ALARM SEQUENCES OF OPERATION SYMBOLS AND NOTES
FA-101.00 FIRE ALARM GROUND FLOOR PLAN
FA-102.00 FIRE ALARM CONTROL ROOM PLAN
FA-103.00 FIRE ALARM MEZZANINE PLAN
FA-201.00 FIRE ALARM PART PLANS

SCHEDULE D

Electrical Motor Control Equipment

(Reference: 01 3506, Article 3.9 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	BG Break Glass Station
TS Thermal Switch	F Firestat	HOA Hand-Off Auto.
MS Magnetic Starter	T Thermostat	PB Push Button Station
CMS Comb. Mag. Starter	AL Alternator	RO Remote "off"

Equip. Ident.	Location	# of Units	HP or KW	Volts and Phase	Control Type: See legend above	Remarks:
AHU-1	Mezz. MER	1	7.5 HP	208/3	CMS, HOA, T	With VFD controlled via BMS
AHU-2	Mezz. MER	1	7.5 HP	208/3	CMS, HOA, T	With VFD controlled via BMS
AHU-3	Mezz. MER	1	7.5 HP	208/3	CMS, HOA, T	With VFD controlled via BMS
AHU-4	Mezz. MER	1	10 HP	208/3	CMS, HOA, T	With VFD controlled via BMS
AHU-5A	Lobby MER	1	1.5 HP	208/3	CMS, HOA, T	With VFD controlled via BMS
AHU-5B	Lobby MER	1	1.5 HP	208/3	CMS, HOA, T	With VFD controlled via BMS
SEF-1	Roof	1	50 HP	208/3	CMS, HOA	With VFD controlled via BMS

SEF-2	Roof	1	50 HP	208/3	CMS, HOA	With VFD controlled via BMS
RLF-1	Mezz. MER	1	1.5 HP	208/3	CMS, HOA	With VFD controlled via BMS
EF-1	Mezz. MER	1	1/3 HP	208/3	CMS, HOA	With VFD controlled via BMS
EF-4	Roof	1	.25 HP	115/1	CMS, HOA	With VFD controlled via BMS
EF-5	Server Room	1	1.3 W	115/1	CMS, HOA	With VFD controlled via BMS
EF-6	Roof	1	1/3 HP	115/1	CMS, HOA	With VFD controlled via BMS
EF-R1	Mezz. MER	1	.25 HP	115/1	CMS, HOA	With VFD controlled via BMS
EF-R2	Mezz. MER	1	.25 HP	115/1	CMS, HOA	With VFD controlled via BMS
EF-R3	Mezz. MER	1	.25 HP	115/1	CMS, HOA	With VFD controlled via BMS
EF-R4A	Mezz. MER	1	.5 HP	115/1	CMS, HOA	With VFD controlled via BMS
EF-R4B	Mezz. MER	1	.25 HP	115/1	CMS, HOA	With VFD controlled via BMS
FCU-1	Dimmer Rm 2	2	.2 HP	208/1	CMS, T	Controlled via BMS
FCU-2	Dimmer Rm 1	2	.2 HP	208/1	CMS, T	Controlled via BMS
FCU-3	Closet 152 - A/V	2	.25 HP	208/1	CMS, T	Controlled via BMS
FCU-4	Theater 1 Control Rm	2	.25 HP	208/1	CMS, T	Controlled via BMS

FCU-5	Trash Room	1	.25 HP	208/1	CMS, T	Controlled via BMS
FCU-7	119 Hallway 5	1	1/6 HP	208/1	CMS, T	Controlled via BMS
FCU-8	Theater 2 Light & Sound Control Room	2	.2 HP	208/1	CMS, T	Controlled via BMS
CUH-1	Vestibule 100	1	.22 HP	115/1	CMS, T	Controlled via BMS
CP-1	153 Dimmer Rm 1	1	1/8 HP	115/1	CMS	
RP-1	Below Stair 1	1	1/6 HP	120/1	CMS, T	Controlled via BMS

SCHEDULE E

Separation of Trades

(Reference: 01 1000, Article 1.6 (A) of the DDC Standard General Conditions)

Requirements for various items of work are included in the Specifications for the separate Contracts for the Project and in the General Conditions. Schedule E set forth below delineates the responsibilities of each separate Contractor for various items of work, as well as the extent to which certain items involve coordination between trades. The delineation set forth in this Schedule E shall be taken as specific instruction to the Contractor that it is responsible for the listed items of work. Schedule E is not intended to limit the Contractor's responsibility for supervision and coordination. In the event of any conflict between the Specifications, the General Conditions and this Schedule E, Schedule E shall take precedence; provided, however, in the event of an omission from Schedule E (i.e., Schedule E omits either a reference to or information concerning an item of work which is set forth in the Specifications or the General Conditions), such omission from Schedule E shall have no effect and the Contractor's obligation to perform the work, as set forth in the Specifications or the General Conditions, shall remain in full force and effect.

Legend: "F" = Furnished "I" = Installed "P" = Provided (Furnished and Installed)
Contractor designation (#1, #2, #3 and #4) is as indicated in Section II of this Addendum.

ITEM	Contr # 1	Contr # 2	Contr # 3	Contr # 4	Notes
Temporary Heat			P		
Temporary Water		P			
Temporary Light and Power				P	
Temporary Toilets – Enclosures	P				
Temporary Toilets – Fixtures	P				
Rubbish removal from project site	P				
Hoisting and Rigging	P	P	P	P	

ITEM	Contr # 1	Contr # 2	Contr # 3	Contr # 4	Notes
Excavation and Backfill	NA	NA	NA	NA	
Utility Trenches – inside building	NA	NA	NA	NA	
Utility Trenches – outside building	P				Coordinate with Contract 4 for utility line run.
Keeping site, excavations, and building, free from water during construction	NA	NA	NA	NA	
Access doors in finished walls and ceilings, panels and ceilings, panels and supporting frames	F	F	F	F	Access Door specification to be referenced for pricing by each contract.
Field touch-up painting of damaged shop coats	P				
Prime coating hangers and supports	P				
Rust proofing field cut and assemble iron supporting frames and racks	P				
Finished painting of exposed equipment or piping or ductwork on walls and ceilings where adjacent surfaces are painted	P				
Concrete foundations, housekeeping pads or bases for floor mounted equipment not indicated on the contract drawings	P				
Concrete foundations pads and bases, as indicated on contract drawings, for floor mounted equipment	P				
Framed slots and openings in walls, decks, slabs and/or precast concrete planks	P				

ITEM	Contr # 1	Contr # 2	Contr # 3	Contr # 4	Notes
Sleeves and core drilling thru slabs, decks and walls whether waterproofed or not	P/I	F	F	F	Sleeves by individual contracts where required. Core drilling by Contract 1 coordinated through Contract 2/3/4.
Waterproof sealing of pipes passing thru sleeves and/or slots	P				
Waterproof sealing of sleeves thru membraned and waterproofed slabs, roofs, and decks	P				
Sleeves thru walls with no core drilling required	I	F	F	F	
Roof openings	P				
Louvers – exterior	P				
Louvers – interior					
Roof curbs and roof equipment supports	P				
Pitch pockets	P				
Roof cap flashing for all supports, penetrations and roof curbs	P				
Fireproof sealing of slab openings at duct or pipe shafts	P				
Fire extinguishers	P				
Prefabricated chimneys			P		
Domestic make-up water piping for heating and air conditioning systems		P			

ITEM	Contr # 1	Contr # 2	Contr # 3	Contr # 4	Notes
Pit frames and covers	NA				
Drywells	NA				
Gas service piping to heating boiler and equipment	NA				
Bathroom accessories	P				
Precast and/or molded receptors (mop basins, shower bases, etc.)		P			
Sprinkler water service from street main including meter, to capped OS&Y valve connection inside building	NA				
Motors for mechanical equipment			P		
Convactor enclosures			P		
Electric duct heaters (heaters installed in air ducts) and electric unit heaters			P		Power supply by Contract 4. Equipment and installation by Contract 3.
Fire and smoke dampers with motors			P		Power supply by Contract 4. Equipment and installation by Contract 3.
Control Wiring - General Construction			P		
Control Wiring - Plumbing		F		I	
Control Wiring - Sprinkler			F	I	
Control Wiring - HVAC for temperature control			F	I	
Door Monitoring Systems - Power Wiring	F			I	

ITEM	Contr # 1	Contr # 2	Contr # 3	Contr # 4	Notes
Door Monitoring Systems – Control Wiring	P				
Motor starters and motor controls for equipment requiring power wiring			P		
Power wiring for motorized equipment and motor controls			F	I	Installation by Contract 3. Wiring only by Contract 4.
Electric heating cables for pipe tracing	NA	NA	NA	NA	
Concrete encasement of conduits	NA	NA	NA	NA	
Electric manholes and handholes	NA	NA	NA	NA	
Opening frames for ceiling recessed lighting fixtures and other electrical items	I			F	

SCHEDULE F

Submittals Schedule

(Reference: Section 01 3200 Article 2.5 (B) 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: ANDREW BERMAN ARCHITECT DATE: _____
 TELEPHONE NUMBER: 212-226-5998
 DDC PROJECT MANAGER: LUCY WONG APPROVED: _____
 TELEPHONE NUMBER: 718-391-1162 (DDC RESIDENT ENGINEER/CPM)

REPORT DATE		FMS ID #/PROJECT ID #/ CONTRACT REGISTRATION #/ PROJECT NAME:			CONTRACT #: TRADE: SHOP DRAWING LOG SHEET #													
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL		SUB. DATE	REQ'D DEL.	SUBMISSIONS											
			COORD.	DATE			REC'D	ACTION	REC'D	ACTION	REC'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																
01 5423	Scaffold & Shed Installation Drawings		X															

01 7419	Waste Management Plan	X																		
01 7900	Instruction Program for Demonstration & Orientation	X																		
01 7900	Qualification Data	X																		
01 8113.13	MSDS		X																	
01 8119	IAQ Management Plan	X																		
01 8119	Product Cut Sheets					X														
01 8119	IAQ Management Plan Photographs	X																		
013329	LEED Submittals	X																		
017419	Construction Waste	X																		
018113	LEED Requirements	X																		
018116	Environmental Practices	X								X										
018119	Construction IAQ Management	X								X										
018419	VOC Limits for Adhesives, Sealants and Architectural Coatings	X																		
024116	Building Demolition	X								X										
033000	Cast In Place Concrete	X								X										
033500	Special Concrete Finishes	X								X										
035300	Concrete Floor Topping	X								X										

042200	Unit Masonry CMU	X																					
051200	Structural Steel	X	X	X	X																		
053000	Metal Decking	X	X	X	X																		
054000	Cold Formed Metal Framing	X	X	X	X																		
055000	Miscellaneous Metals	X	X	X	X																		
055100	Steel Pan Stairs	X	X	X	X																		
057010	Ornamental Glass Rail System	X	X	X	X																		
062000	Carpentry	X			X																		
064023	Architectural Woodwork	X	X	X	X																		
072100	Thermal Insulation	X																					
078100	Sprayed Fire-Resistive Materials	X	X	X	X																		
078413	Firestops and Smoke-seals	X	X	X	X																		
079200	Joint Sealers	X	X	X	X																		
081113	Steel Doors and Frames	X	X	X	X																		
081416	Wood Doors	X	X	X	X																		
083113	Access Doors	X			X																		
083473	Sound Control Door Assemblies	X																					
084313	Aluminum Entrances and Storefronts	X	X	X	X																		
087100	Door Hardware	X			X																		
088000	Glass and Glazing	X			X																		
092900	Gypsum Drywall	X	X	X	X																		
093013	Ceramic Tiling	X			X																		
096400	Wood Flooring	X			X																		

REPORT DATE		FMS ID #/PROJECT ID #/ CONTRACT REGISTRATION #/ PROJECT NAME:				CONTRACT #: TRADE: SHOP DRAWING LOG SHEET #											
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTALS	SUB DATE	REQ'D DEL.	FABRIC. TIME	SUBMISSIONS	SPEC. SECT. #	REC'D	RETD	ACTION	REC'D	RETD	ACTION	REC'D	RETD	ACTION
220000	Fire Stopping				X												
220000	Cross Connection Protection Devices				X												
220000	Drains	X	X		X												
220000	Cleanouts	X	X		X												
220000	Plumbing Fixtures				X												
220000	Water Heating Equip.				X												
220000	Water Detection System				X												
220000	Hose Bibbs	X	X		X												
220000	Drip Pans				X												
220000	Access Panels				X												
220000	Trap Primers				X												
220000	Plumbing Specialties				X												
220000	Plumbing As-Built Drawings		X														
220000	Plumbing O & M Manuals				X												

220000	Plumbing Guarantees																X				
220000	Plumbing Warrantees																	X			
220513	Motors & Starters	X																			
220523	Pipe Sleeves & Seals																	X			
220523	Pipe Material																	X			
220523	Pipe Hangers & Support																	X			
220523	Valves																	X			
220523	Pressure Reg. Valves																	X			
220548	Equip. Bases & Vibration Equip.	X																			
220700	Insulation																	X			
220800	Commissioning	X																			
222000	Pumping Equip.	X																			

REPORT DATE		FMS ID #/PROJECT ID #: CONTRACT REGISTRATION #: PROJECT NAME:				CONTRACT # _____ Contracts 3 HVAC and Fire Suppression TRADE: _____ SHOP DRAWING LOG SHEET # _____											
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMIT SHOP DWG	SUBMIT SAMPLE	REQ'D DEL. CUTS	FABRIC. TIME	SUBMISSIONS	SPEC. SECT. #	REC'D	RET'D	ACTION	REC'D	RET'D	ACTION	REC'D	RET'D	ACTION
210000	Pipes & Fittings				X												
210000	Wall Plates				X												
210000	Sleeves				X												
210000	Control Valves				X												
210000	Drain & Auxiliary Valves				X												
210000	Fire Hose Rack Assemblies with Cabinets				X												
210000	Supervisory Tamper Switch				X												
210000	Hanger & Earthquake Bracing				X												
210000	Valve tags, charts, pipe markers, equipment signage including hydraulic summary placards				X												
210000	Fire Stopping				X												
210000	Pressure Gauge				X												
210000	Sprinklers, Escutcheons, & Head Guards				X												
210000	Riser Control Valve Custom Cabinet				X												
210000	Sprinkler Shop Drawings	X															

210000	Sprinkler Hydraulic Calculations																			
210000	Sprinkler Heads									X										
210000	Sprinkler Close Out Doc.									X										
210000	Sprinkler O&M Manual									X										
210000	Sprinkler As-Built Drawings									X										
210000	Sprinkler Guarantees																			
210000	Sprinkler Warrantees																			
210800	Commissioning of Fire Supp.									X										
230050	Demo. & Removals																			
230523	Thermometers & Gauges																			
230548	Vibration Isolation Equip.																			
230548	Mounting Details, Static Deflection, Operating & Free Heights & Outside Spring Diameter									X										
230549	Noise Control																			
230700	Insulating Material & Jackets																			
230700	Insulating Cements, Mastics, & Adhesives																			
230700	Methods of Installation																			
230700	Pipe Shields																			
230700	Schedule of Insulation																			
230800	Commissioning of HVAC																			

230923	TAB Agent Data																	X										
230923	TAB Procedure																	X										
230923	TAB Sample Forms																	X										
230923	TAB Certified Reports																	X										
230923	Auto. Control Components																	X										
230923	Sequence of Operations																	X										
230923	Starter Wiring of All Automatically Controlled Motors																	X										
230923	Control Diagrams																	X										
230923	Color Coded Wiring Diagrams																	X										
230923	Variable Speed Drive Units																	X										
230923	Control Valves																	X										
230923	Sample of Panel Graphics																	X	X									
230923	DDC Panels																	X										
230923	Computer Program																	X										
230923	Accessories & Auxiliaries																	X										
230923	Sensors & Devices																	X										
230923	Library of Custom Computer Graphics																	X										
230923	Outline of System Test																	X										
232000	Air Conditioning Condensate Pumps																	X										
232000	Specialties & Accessories																	X										

REPORT DATE		FMS ID #PROJECT ID # PV467-CRG CONTRACT REGISTRATION #: PROJECT NAME: MCC Theater										CONTRACT #: TRADE: SHOP DRAWING LOG SHEET #					
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUB MIT TAL	SUB DAT E	SUB SAMPLE	REQ D DEL	FABRIC. TIME	SUBMISSION S	SPEC. SECT. #	REC'D	ACTION	REC'D	ACTION	REC'D	ACTION	REC'D	ACTION
260000	Access Doors		X			CAT CUTS											
260000	Sleeves & Seals		X			X											
260000	Low Voltage Control System		X			X											
260000	Electrical As-Built Drawings		X														
260000	Fire Alarm As-Built Drawings		X														
260000	Electrical Operating & Maintenance Manuals		X			X											
260000	Electrical Warrantees					X											
260000	Electrical Guarantees					X											
260000	Fire Alarm & System Components		X			X											
260000	Short Circuit, Arc Flash & Overcurrent Protection Coordination Study		X			X											
260000	Loss Control Thermographic Survey Reports					X											
260000	Identification					X											
260050	Demolition & Removal		X			X											

260500	Surface Raceway & Fittings		X																
260500	Wireways																		
260500	Flexible Cable Tray & Fittings																		
260500	Trough & Fittings																		
260500	Cable Hangers																		
260500	Wires & Cables																		
260500	Wiring Devices & Wall Plates						X												
260500	Floor Boxes & Fittings																		
260500	Poke Through Devices																		
260500	Disconnect Switches & Fuses																		
260500	Circuit Breakers																		
260500	Surge Protection Devices																		
260500	Submetering																		
260500	Switch Bypass Devices																		
260500	Low Voltage Lighting Power Supply																		
260500	Custom Fabrication Boxes							X											
260500	Exposed Raceway Installations							X											
260500	Wiring Device Wall Plates									X									
260500	Wiring Devices										X								
260548	Vibration Isolation Components & Equipment								X										

TABLE OF CONTENTS

CONTRACT NO. 1 - GENERAL CONSTRUCTION

DIVISION 2 – EXISTING CONDITIONS

Section 024116	Building Demolition
Section 028013	Allowance for Incidental Asbestos Abatement

DIVISION 3 - CONCRETE

Section 033000	Cast-In-Place Concrete
Section 033500	Special Concrete Finishes
Section 035300	Concrete Floor Topping

DIVISION 4 – MASONRY

Section 042200	Unit Masonry-CMU
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DIVISION 5 - METALS

Section 051200	Structural Steel
Section 053000	Metal Decking
Section 054000	Cold Formed Metal Framing
Section 055000	Miscellaneous Metals
Section 055100	Steel Pan Stairs
Section 057010	Ornamental Glass Rail System

DIVISION 6 - WOOD AND PLASTICS

Section 062000	Carpentry
Section 064023	Architectural Woodwork

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Section 072100	Thermal Insulation
Section 078100	Sprayed Fire-Resistive Materials
Section 078413	Firestops and Smoke Seals
Section 079200	Joint Sealers

DIVISION 8 - DOORS AND WINDOWS

Section 081113	Steel Doors and Frames
Section 081416	Wood Doors
Section 083113	Access Doors
Section 083473	Sound Control Door Assemblies
Section 084313	Aluminum Entrances and Storefronts
Section 087100	Door Hardware
Section 088000	Glass and Glazing

DIVISION 9 - FINISHES

Section 092900	Gypsum Drywall
Section 093013	Ceramic Tiling
Section 096400	Wood Flooring
Section 096401	Wood Block Flooring
Section 096500	Resilient Flooring
Section 096800	Carpeting
Section 098413	Acoustic Wall Panels
Section 099000	Painting and Finishing

DIVISION 10 - SPECIALTIES

Section 101400	Identifying Devices
Section 102114	Toilet Partitions
Section 102219	Demountable Partitions
Section 102813	Toilet Accessories
Section 104416	Fire Extinguishers and Cabinets

DIVISION 11 - EQUIPMENT

Section 112429	Fall Protection
Section 113100	Appliances
Section 116133	Theatrical Rigging
Section 116163	Theatrical Lighting Dimming and Control
Section 116183	Theatrical Audio Video Systems

DIVISION 12 - FURNISHINGS

Section 120500	Upholstery
Section 126100	Fixed Theatre Seating

DIVISION 14 - CONVEYING SYSTEMS

Section 144200	Wheelchair Lifts
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CONTRACT NO. 2 - PLUMBING

DIVISION 22 - PLUMBING

Section 220000	General Provisions for Plumbing
Section 220013	Allowance for Incidental Asbestos Abatement
Section 220513	Motors and Starters
Section 220523	Piping, Valves and Fittings
Section 220548	Equipment Bases and Vibration Control
Section 220700	Insulation
Section 220800	Commissioning for Plumbing
Section 222000	Pumping Equipment

CONTRACT NO. 3 – HEATING, VENTILATING, AND AIR CONDITIONING AND FIRE SUPPRESSION

DIVISION 21 - FIRE SUPPRESSION

Section 210000 General Provisions for Fire Suppression
Section 210800 Commissioning of Fire Suppression System

DIVISION 23 - HVAC

Section 230000 General Provisions for HVAC
Section 230013 Allowance for Incidental Asbestos Abatement
Section 230050 Demolition and Removals for HVAC
Section 230513 Motors and Starters
Section 230523 Piping, Valves and Fittings
Section 230548 Equipment Bases and Vibration Control
Section 230549 Noise Control
Section 230700 Insulation
Section 230800 Commissioning of HVAC
Section 230923 Controls and Instrumentation
Section 232000 Pumping Equipment
Section 233000 Ductwork and Air Outlets
Section 237000 Air Handling and Treatment

CONTRACT NO. 4 – CONTRACT FOR ELECTRICAL WORK

DIVISION 26 – ELECTRICAL

Section 260000 General Provisions for Electrical
Section 260013 Allowance for Incidental Asbestos Abatement
Section 260050 Demolition and Removals for Electrical
Section 260500 Basic Materials for Electrical
Section 260548 Electrical Vibration and Noise Control
Section 260800 Commissioning of Electrical
Section 260943 Architectural Dimming Systems
Section 260962 Branch Circuit Transfer Systems
Section 262212 Computer-Grade Isolation Transformers
Section 262416 Panelboards
Section 263200 Emergency Power System
Section 263623 Automatic Transfer Switch
Section 265000 Service Lighting
Section 265100 Architectural Lighting
Section 265561 Theatrical Systems Electrical Requirements

DIVISION 27 - COMMUNICATIONS

Section 270528 Telecommunication and Data Wiring System

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

Section 280500 Common Work Results for Electronic Safety and Security
Section 281100 Security System
Section 283100 Addressable Fire Alarm System

END OF TABLE OF CONTENTS

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CONTRACT # 1
GENERAL CONSTRUCTION WORK

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SECTION 024116

BUILDING DEMOLITION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the building demolition as shown on the drawings and/or specified herein including, but not limited to, the following:
 1. Demolition and removal of existing building.
 2. Canopy structural steel removals at the ground floor 53rd Street façade.
 3. New cast in place concrete removals and associated shoring.
 4. New CMU removals and associated shoring.
 5. Partial gypsum wall board removals.
 6. Disconnecting and capping existing abandoned utility lines.
 7. Removal of debris.
 8. Protection of existing buildings and shoring of the adjacent building foundations, sidewalks, and sidewalk vaults as required for structural integrity and personal safety.
 9. Protection of existing curbs and sidewalks.
 10. Protection of existing finishes to remain – concrete walls and floors, drywall, stainless steel, exterior door and finishes etc.
 11. Temporary covered passageways.
 12. Party wall treatment.
 13. Rodent control.
 14. Maintain (re-route, shore, etc.) all existing utilities and facilities to adjacent buildings which are to remain.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.

- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. The Contractor shall comply with the requirements of all applicable Federal, State, and local safety and health regulations regarding the demolition of structures, including ANSI/NFPD 241 - Building Construction and Demolition Operations.
- C. The Contractor shall be responsible for any damage to any adjacent buildings and adjacent tenant and residential spaces to remain.

1.5 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the products.
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 - 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature,

or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

- B. Prior to beginning work, prepare a careful study of the building to be demolished and map out a definite plan of procedure before demolition is begun, for review by the Commissioner.

1.6 SPECIAL PRECAUTION

A. Lead Paint and Asbestos Dangers in Demolition

- 1. Take adequate precautions (including bagging of asbestos for disposal and protective equipment, such as properly functioning respirators) against injury of Contractor's personnel or public from the following:
 - a. Any material which is likely to contain crocidolite (blue asbestos).
 - b. Inhaling large amounts of lead fumes by welding operations (burning through) at the steel beams coated with accumulation of lead-containing paint.

- B. Refer to Sections 028013, "Allowance for Incidental Asbestos," and Section 028213, "Asbestos Abatement," for additional information.

1.7 JOB CONDITIONS

- A. Buildings and other structures to be demolished will be vacated and discontinued in use prior to the start of the work.

B. Condition of Structures

- 1. The City of New York assumes no responsibility for the actual condition of structures to be demolished.
- 2. Conditions existing at the time of inspection for bidding purposes will be maintained by the City of New York insofar as practicable.

C. Partial Removal

- 1. Items of salvageable value to the Contractor may be removed from the structure as the work progresses. Salvaged items must be transported from the site as they are removed.
- 2. Storage or sale of removed items on the site will not be permitted.

D. Explosives

- 1. The use of explosives will not be permitted.

E. Traffic

- 1. Conduct demolition operations and the removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

2. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

F. Protection

1. Ensure the safe passage of persons around the area of demolition.
2. Erect temporary covered passageways as required by authorities having jurisdiction.
3. Provide interior and exterior shoring, bracing, or supporting to prevent movement or settlement or collapse of structures to be demolished and adjacent facilities to remain. The Contractor shall engage a Professional Engineer licensed to advise on bracing, shoring, underpinning, or other structural requirements. The Contractor shall bear all responsibility for prevention of movement or other structural fault.
4. Promptly repair damages caused to adjacent facilities by demolition operations at no cost to the City of New York.

G. Utilities

1. Maintain any existing utilities required to remain; keep in service and protect against damage during demolition operations.
2. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to the governing authorities.
3. The Contractor shall arrange to shut off utilities serving the structure. Disconnect and seal the abandoned utilities before starting demolition operations. Coordinate all work with local utility companies having jurisdiction.

- H. Rodent Control: Employ a certified exterminator and treat the entire building in accordance with governing health regulations.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

3.1 DEMOLITION

A. Pollution Controls

1. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.
 - a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

2. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to the start of the work.
3. Provide drainage for temporary water use.

B. Building Demolition

1. Demolish building completely and remove from the site. Use such methods as required to complete the work within the limitation of governing regulations.
2. Proceed with demolition in a systematic manner, from the top of the structure to the ground. Complete demolition work above each floor or tier before disturbing supporting members on lower levels.
3. Demolish concrete and masonry in small sections.
4. Remove structural framing members and lower to ground by means of hoists, derricks, or other suitable methods.
5. Break up and remove concrete slabs on grade at street level.
6. Locate demolition equipment throughout the structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

C. Party Wall Treatment

1. Where building to be demolished adjoins another building which is to remain standing, to which it is connected by a party wall, the said party wall shall remain in its entirety. Do not demolish, remove, or disturb such existing party wall.
2. Perform following work in neat, workmanlike manner where applicable to buildings affected.
 - a. If party walls to remain, indicate to any degree that their structural integrity is in question, the Demolition Contractor shall immediately engage a licensed Professional Engineer to advise on bracing, shoring, underpinning, or other structural requirements. The Demolition Contractor shall bear all responsibility for prevention of movement or other structural fault.
3. Bend over anchors at beam ends in standing party wall; brick up open beam holes. Where conditions make it necessary, add required anchoring to party walls to ensure safety thereof.
4. Where wall which intersect standing party walls are to be removed (such as front or rear walls), remove walls; cut neatly at juncture face with standing party wall; parge cut thus made.
5. Repair roofing, cornice, flashings, leader pipe, or other existing arrangement for protection of building against elements which are to be cut or disturbed by removal of adjoining building; render serviceable for purpose for which it was intended.
6. Patch, point, and otherwise render watertight all party walls to remain.

3.2 DISPOSAL OF DEMOLISHED MATERIALS

A. General

1. Remove from the site debris, rubbish, and other materials resulting from demolition operations that are not acceptable as fill material.
2. Burning of removed materials from demolished structures will not be permitted on the site.

- B. Removal: Transport materials removed from demolished structures and legally dispose of off site. Leave the site in an orderly condition to the approval of the City of New York.

END OF SECTION

SECTION 028013 – GENERAL CONTRACTOR WORK
ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

1.01 SCOPE FOR ASBESTOS ABATEMENT WORK

- A. The "General Conditions" apply to the work of this Section.
- B. The Asbestos abatement contractor shall remove asbestos containing materials as needed to perform the other work of this Contract when discovered during the course of work. When required, the Asbestos abatement contractor shall replace the ACM with non-asbestos containing materials. An allowance of **\$15,000.00** for the **General Contractor** is herein established for this incidental work when so ordered and authorized by the Commissioner.
- C. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE RULES AND REGULATIONS OF THE ASBESTOS CONTROL PROGRAM AS PROMULGATED BY TITLE 15 CHAPTER I OF RCNY AND NEW YORK STATE DEPARTMENT OF LABOR INDUSTRIAL CODE RULE 56 CITED AS 12 NYCRR, PART 56 WHICHEVER IS MORE STRINGENT AS PER LATEST AMENDMENTS TO THESE LAWS AND AS MODIFIED HEREIN BY THESE SPECIFICATIONS.
- D. ALL DISPOSAL OF ASBESTOS CONTAMINATED MATERIAL SHALL BE PER LOCAL LAW 70/85.
- E. THE ASBESTOS ABATEMENT CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT CERTAIN METHODS OF ASBESTOS ABATEMENT ARE PROTECTED BY PATENTS. TO DATE, PATENTS HAVE BEEN ISSUED WITH RESPECT TO "NEGATIVE PRESSURE ENCLOSURE" OR "NEGATIVE-AIR" OR "REDUCED PRESSURE" AND "GLOVE BAG".
- F. THE ASBESTOS ABATEMENT CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR AND SHALL HOLD THE DEPARTMENT OF DESIGN AND CONSTRUCTION AND THE CITY HARMLESS FROM ANY AND ALL DAMAGES, LOSSES AND EXPENSES RESULTING FROM ANY INFRINGEMENT BY THE ASBESTOS ABATEMENT CONTRACTOR OF ANY PATENT, INCLUDING BUT NOT LIMITED TO THE PATENTS DESCRIBED ABOVE, USED BY THE ASBESTOS ABATEMENT CONTRACTOR DURING PERFORMANCE OF THIS AGREEMENT.
- G. "Asbestos" shall mean any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumingtonite-grunerite), crocidolite (riebeckite), tremolite, anthrophyllite and actinolite.

GENERAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- H. Prior to starting, the Asbestos abatement contractor must notify the Commissioner of the Department of Design and Construction if he/she anticipates any difficulty in performing the Work as required by these Specifications. The Asbestos abatement contractor is responsible to prepare and submit all filings, notifications, etc. required by all City, State and Federal regulatory agencies having jurisdiction.

The Asbestos abatement contractor is responsible for submitting the Asbestos Project Notification Form (ACP-7 Form) to the Department of Environmental Protection, Asbestos Control Program, as per Title 15, Chapter I of RCNY and to the NYSDOL as per Industrial Code Rule 56.

The Asbestos abatement contractor is responsible for preparing, and submitting Asbestos Variance Application (ACP-9). If a Variance is required, the Asbestos abatement contractor is responsible to retain a NYSDOL Asbestos Project Designer, as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required variance.

The General contractor is responsible for preparing and submitting an Asbestos Abatement Permit and/or Work Place Safety Plans (WSP) that may be required for the completion of the Contract or incidental work. If such plans are required, the Asbestos abatement contractor is responsible to retain a NYSDOL Licensed Design Professional as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required plans.

The Asbestos abatement contractor is responsible for the submission of all required documents to the NYCDEP to acquire the appropriate Asbestos Project Conditional Closeout (ACP-20) and/or Asbestos Project Completion Forms (ACP-21) on a timely basis for the completion of the incidental work encountered under this contract.

The Asbestos abatement contractor will be required to attend an on-site job meeting with the Construction Project Manager prior to the start of work to examine conditions and plan the sequence of operations, etc.

The Asbestos abatement contractor shall have a NYSDOL/NYCDEP Asbestos Supervisor onsite to oversee the work and conduct a final visual inspection as required by both Title 15, Chapter 1 of the RCNY and NYSDOL Industrial Code Rule 56.

- I. All work shall be done during regular working hours unless the Asbestos abatement contractor requests authorization to work in other than regular working hours and such authorization is granted by the Commissioner. (Regular work hours are those hours during which any given facility, in which work is to be done, is customarily open and functioning, normally between the hours of 8:00 A.M. and 4:00 P.M. Monday - Friday.) If such work schedule is authorized by the Commissioner, the work shall be done at no additional cost to the City.

- J. The Commissioner may order that work be done in other than regular working hours as herein by defined and this order may require the Asbestos abatement contractor to pay premium or overtime wages to complete the work. If the Commissioner orders work in other than regular working hours, the Asbestos abatement contractor shall multiply the unit price for that portion of the work requiring premium wages by 1.50 when computing payment in accordance with Paragraph 1.09. All requests for premium payment must be supported by certified payroll sheets and field sheets approved by the Construction Project Manager.

1.02 QUALIFICATIONS OF ASBESTOS ABATEMENT CONTRACTOR

- A. Requirements: The asbestos abatement contractor must demonstrate compliance with the special experience requirements set forth in subparagraphs (1) through (5) below. The asbestos abatement contractor must, submit documentation demonstrating compliance with all listed requirements. Such documentation shall include without limitation, all required licenses, certificates, and documentation.
1. The asbestos abatement contractor must, whether an individual, corporation, partnership, joint venture or other legal entity, must demonstrate for the three year period prior to the work, that it has been licensed by the New York State Department of Labor, as an "Asbestos abatement contractor".
 2. The asbestos abatement contractor must, for the three year period prior to the work, have been in the business of providing asbestos abatement services as a routine part of its daily operations.
 3. The asbestos abatement contractor proposing to do asbestos abatement work must be thoroughly experienced in such work and must provide evidence of having successfully performed and completed in a timely fashion at least five (5) asbestos abatement projects of similar size and complexity. The aggregate cost of these projects must be at least \$250,000.00 in each of the three years.
 4. For each project submitted to meet the experience requirements set forth above, the asbestos abatement contractor must submit the following information for the project; name and location of the project; name title and telephone number of the owner or the owner's representative who is familiar with the asbestos abatement contractor's work, brief description of the work completed as a prime or sub-asbestos abatement contractor; amount of contract or subcontract and the date of completion.
 5. The asbestos abatement contractor must demonstrate that it has the financial resources, supervisory personnel and equipment necessary to carry out the work and to comply with the required performance schedule, taking into consideration other business commitments. The asbestos

abatement contractor must submit such documentation as may be required by the Department of Design and Construction to demonstrate that it has the requisite capacity to perform the required services of this contract.

- B. Insurance Requirements: The asbestos abatement contractor must provide asbestos liability insurance in the following amount: 1 million dollars per occurrence, 2 million dollars aggregate (combined single limit). The City of New York shall be named as an additional insured on such insurance policy.
- C. Throughout the specifications, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics thereof.

1.03 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITIES

The Asbestos abatement contractor will visit the subject location within one (1) working day of notification to ascertain actual work required. If the project is identified as being "urgent", then work shall commence no later than 48 hours from the time of notification. In this event, the asbestos abatement contractor shall immediately notify when applicable EPA NESHAPS Coordinator, NYSDOL Asbestos Control Bureau and NYCDEP Asbestos Control Program of start of the work and file the necessary Asbestos Notifications and any applicable Variance Applications with the regulatory agencies cited above..

In the event that the project is not classified as "urgent" the Asbestos abatement contractor shall notify the EPA NESHAPS Coordinator, NYSDOL and NYCDEP by submitting the requisite asbestos project notification forms, postmarked 10 days before activity begins if 260 linear feet or more and/or 160 square feet or more of asbestos containing material will be disturbed.

The following information must be included in the notification:

- A. Name and address of building City or operator;
- B. Project description:
 - 1. Size - square feet, number of linear feet, etc;
 - 2. Age - date of construction and renovations (if known);
 - 3. Use - i.e., office, school, industrial, etc.
 - 4. Scope - repair, demolition, cleaning, etc.
- C. Amount of asbestos involved in work and an explanation of techniques used to determine the amount;

GENERAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- D. Building location/address, including Block and Lot numbers;
- E. Work schedule including the starting and completion dates;
- F. Abatement methods to be employed;
- G. Procedures for removal of asbestos-containing material;
- H. Name, title and authority of governmental representative sponsoring project.

1.04 WORK INCLUDED IN UNIT PRICE

The Asbestos abatement contractor will be paid a basic unit price of **\$25.00** per square feet for the removal and disposal of asbestos containing material and replacement of the same with non-asbestos containing materials.

Unit price shall include all costs necessary to do the work of this Contract, including but not limited to: labor, materials, equipment, utilities, disposal, insurance, overhead and profit.

1.05 AIR MONITORING – ASBESTOS ABATEMENT CONTRACTOR

- A. "Air Sampling" shall mean the process of measuring the fiber content of a known volume of air collected during a specific period of time. The procedure utilized for asbestos follows the NIOSH Standard Analytical Method 7400 or the provisional transmission electron microscopy methods developed by the USEPA and/or National Institute of Standard and Technology which are utilized for lower detectability and specific fiber identification.
- B. Air monitoring of Asbestos abatement contractor's personnel will be performed in conformance with OSHA requirements, (All costs associated with this work are deemed included in the unit price.).
- C. Qualifications of Testing Laboratory:

The industrial hygiene laboratory shall be a current proficient participant in the American Industrial Hygiene Association (AIHA) PAT Program. The laboratory identification number shall be submitted and approved by the City. The laboratory shall be accredited by the AIHA and New York State Department of Health Environmental Laboratory Approval Program (ELAP).

Note: Work area air testing and analysis before, during and upon completion of work (clearance testing) will be performed by a Third Party Air Monitor under separate Contract with the City.

1.06 THIRD PARTY MONITORING AND LABORATORY

- A. The NYCDDC, at its own expense, will employ the services of an independent Third Party Air Monitoring Firm and Laboratory. The Third Party Air Monitor will perform air sampling activities and project monitoring at the Work Site.
- B. The Laboratory will perform analysis of air samples utilizing Phase Contrast Microscopy (PCM) and/or Transmission Electron Microscopy (TEM).
- C. The Third Party Air Monitoring Firm and the designated Project Monitor shall have access to all areas of the asbestos removal project at all times and shall continuously inspect and monitor the performance of the Asbestos abatement contractor to verify that said performance complies with this Specification. The Third-Party Air Monitor shall be on site throughout the entire abatement operation.
- D. The NYCDDC will be responsible for costs incurred with the Third Party Air Monitoring Firm and laboratory work. Any subsequent additional testing required due to limits exceeded during initial testing shall be paid for by the Asbestos abatement contractor.

1.07 PAYMENT REQUEST DOCUMENTATION

- B. The following information shall be included for each payment request:
 - 1. Description of work performed.
 - 2. Linear footage and pipe sizes involved.
 - 3. Square footage for boiler & breaching insulation removed.
 - 4. Square footage of non pipe and boiler areas removed, patched, enclosed, sealed, or painted.
 - 5. Square footage of encapsulation, sealing, patching, and painting involved.
 - 6. Total cost associated with compliance with the assigned task.
 - 7. Architectural, Electrical, HVAC, Plumbing, etc. work incidental to the Asbestos Abatement Work.
 - 8. A certified copy (in form 4312-39) to the Comptroller or Financial Officer of the New York City to the effect that the financial statement is true.
 - 9. A signed copy (in form 6506q-6) of certificate of compliance with non-discriminatory provisions of the Contract.

GENERAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

10. Attach a copy of valid workmen compensation insurance.
 11. Valid asbestos insurance per occurrence.
 12. General liability insurance when required.
- C. Each payment request shall include a grand total for all work completed that billing period, the landfill waste manifests and a copy of waste transporter permit. The Department of Design and Construction will inspect the work performed, review the cost and approve or disapprove requests for payment.
- D. EXPOSURE LOG: With this final payment, the Asbestos abatement contractor shall submit a listing of the names and social security numbers of all employees actively engaged in the abatement work of this Contract. This list shall include a summary showing each part of the abatement work in which the employee was engaged and the dates thereof.

1.08 QUANTITY CALCULATIONS

In order to determine the square footage involved for the various pipe sizes of pipe insulation that might be encountered, the following table is to be used.

<u>PIPE INSULATION SIZE O.D.</u>	<u>PIPE SIZE O.D.</u>	<u>SQUARE FOOTAGE PER LINEAR FOOT</u>
2-1/2"	1/2"	0.65
2-3/4"	3/4"	0.72
3"	1"	0.79
3-1/4"	1-1/4"	0.85
3-1/2"	1-1/2"	0.92
4"	2"	1.05
4-1/2"	2-1/2"	1.18
5"	3"	1.31
6"	3-1/4"	1.57
7"	3-1/2"	1.83
8"	4"	2.09
9"	5"	2.36
10"	6"	2.62
12"	8"	3.14
14"	10"	3.67
16"	12"	4.19
18"	14"	4.71

1.09 METHOD OF PAYMENT

Payment shall be made in accordance with Items A through R below. Payment shall be calculated based on the actual quantity of the item performed by the asbestos abatement

GENERAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

contractor, times the unit price specified below. Credits may apply to certain times, as specified below.

- A. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING PIPE INSULATION:** Actual linear footage, multiplied by the square footage factor listed for the respective pipe size in Section 1.09, multiplied by the unit price in Section 1.05.

EXAMPLE: 100 lin.ft. of 1/2" pipe and 100 lin.ft. of 6" pipe, including elbows, tees. Flanges, etc.

$$100 \times 0.65 = 65 \text{ sq.ft.} \quad 65 \times \text{unit price} = \text{Payment}$$

$$100 \times 2.62 = 262 \text{ sq.ft.} \quad 262 \times \text{unit price} = \text{Payment}$$

- B. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER INSULATION:** (all types including Silicate Block and including the removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

EXAMPLE: Item B. removal and replacement of 1000 S.F. of boiler insulation (incl. Silicate block)

$$1000 \text{ S.F.} \times (1.5) \times \text{the Unit Price} = \text{Payment}$$

- C. **REMOVAL, DISPOSAL AND REPLACEMENT OF TANK INSULATION:** (all types including removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

- D. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER UPTAKE, & BREACHING INSULATION:** (all types including stiffening angles and wire lath) Payment shall be made at 2.0 times the unit price per square foot.

- E. **REMOVAL, DISPOSAL AND REPLACEMENT OF DUCT INSULATION:** Payment shall be made at 1.0 times the unit price per square foot.

- F. **REMOVAL, DISPOSAL AND REPLACEMENT OF SOFT ASBESTOS CONTAINING MATERIAL:** (Including sprayed-on fire proofing and sound proofing) Payment shall be made at 1.0 times the unit price per square foot of surface area. Area of irregular surfaces must be calculated and confirmed with DDC representative.

- G. **ACOUSTIC PLASTER REPAIR AND/OR ENCAPSULATION:** Payment shall be made at 0.5 times the unit price per square foot.

- H. **PATCHING OR REPAIR** of items listed in A through F will be paid at 0.33 times the unit price per square foot.

GENERAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- I. **REMOVAL, DISPOSAL AND REPLACEMENT OF WATERPROOFING ASBESTOS CONTAINING MATERIAL:** (including friable and non-friable waterproofing material from interior and exterior walls, floors, foundations, penetrations, louvers, vents and openings other than windows, doors and skylights) Payment shall be made at 0.5 times the unit price per square foot.
- J. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING ELECTRICAL WIRING INSULATION:** (including friable and non-friable wiring insulation) Payment shall be made at 0.33 times the unit price per square foot.
- K. **PAINTING:** Payment shall be made at 0.05 times the unit price per square foot.
- L. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING PLASTER:** from ceilings and walls, including any wire lath and disposal as asbestos containing waste. Payment shall be made at 0.80 times the unit price per square foot.
- M. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING FLOOR TILES, CEILING TILES, TRANSITE PANELS:** (including any adhesive, glue, mastic and/or underlayment) and disposal as asbestos containing waste. Payment shall be made at 0.40 times the unit price per square foot. If multiple layers are discovered, each additional layer shall be paid at 0.20 times the unit price per square foot.
- N. **ADDITIONAL CLEAN UP/HOUSEKEEPING OF WORK AREA:** (excluding pre-cleaning of work area required by regulations) HEPA vacuuming and wet cleaning of asbestos contaminated surface. Payment shall be made at 0.20 times the unit price per square foot. When GLOVE BAG is employed to remove ACM, cost of HEPA vacuuming and wet cleaning of floor area up to 3 feet on each side of glove-bag shall be included in unit price and no extra payment will be made.
- O. **REMOVAL, DISPOSAL OF ASBESTOS-CONTAINING ROOFING MATERIAL:** including mastic, flashing and sealant compound and provide temporary asbestos-free roof covering consisting of one layer of rolled roofing paper sealed with asphaltic roofing compound. Payment shall be made at 0.8 times the unit price per square foot. Credit at a rate of 0.33 times the unit price will be taken for each square foot of temporary roof covering which the Asbestos abatement contractor is directed not to install.
- P. **PICK-UP AND DISPOSAL OF GROSS DEBRIS:** (excluding any waste generated from abatement under Item A-R) at a rate of \$150 per cubic yard for asbestos contaminated waste and \$75 per cubic yard for non-asbestos contaminated waste. This cost includes all labor and material cost associated with work.

- Q. **REMOVAL OF ASBESTOS-CONTAINING BRICK, BLOCK, MORTAR, CEMENT OR CONCRETE:** along with all surfacing materials including wire lath and/or other supporting structures and disposal as ACM waste. Payment shall be made at a rate of \$25.00 per cubic foot of material removed.
- R. **REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING WINDOW/DOOR CAULKING:** including friable and non-friable caulking, weather-stripping, glazing, sealants or other waterproofing materials applied to windows, doors, skylights, etc. Payment shall be made at the rate of \$400.00 per opening regardless of size or configuration. This cost includes labor, consumable materials, set-up/breakdown, removal and disposal, as required.

Note 1: CREDIT: For items listed in A through F, a credit at a rate of 0.33 times the unit price, times the respective multiplier (for each item) will be taken for each square foot of insulation which the asbestos abatement contractor is not directed to reapply.

Note 2: MINIMUM PAYMENT: The minimum payment per call at any individual job sites or various job sites during the same day will be eight hundred dollars (\$800.00).

Note 3: All payments shall be made as described in paragraph 1.09 herein.

Note 4: WORKING HIGHER THAN 12 FEET ABOVE FLOOR LEVEL OR WORK REQUIRING COMPLEX SCAFFOLDING OR CONSTRUCTION WORK PLATFORMS: Provisions are made in this Contract to compensate the Asbestos abatement contractor for work performed in locations that are difficult to access due to work at elevations that are significantly higher than the normal work level. The unit price for these items will be paid at 1.20 times the unit price described in Paragraphs 1.09, A through R for those portions of the work that are more than twelve (12) feet above the grade for that would be judged as the normal working level.

1.10 GUARANTEE

- A. Work performed in compliance with each task shall be guaranteed for a period of one year from the date the completed work is accepted by the Department of Design and Construction.
- B. The Commissioner of The Department of Design and Construction will notify the Asbestos abatement contractor in writing regarding defects in work under the guarantee.

1.11 OCCUPANCY OF SITE NOT EXCLUSIVE

Attention is specifically drawn to the fact that contractors, performing the work of other Contracts, may be brought upon any of the work sites of this Contract. Therefore, the Asbestos abatement contractor shall not have exclusive rights to any site of his work and shall fully cooperate and coordinate his work with the work of other contractors who may

be brought upon any site of the work of this Contract. This paragraph applies to those areas outside the regulated Work Area as defined by Title 15, Chapter I of RCNY.

1.12 SUBMITTALS

A. Pre-Construction Submittals:

1. Attend a pre-construction meeting scheduled by the City of New York Department of Design and Construction. This meeting shall also be attended by a designated representative of the City of New York third party air monitoring firm, facility manager and the Construction Project Manager. At this meeting, the Asbestos abatement contractor shall present three copies of the following items:
 - a. Asbestos abatement contractor's scope of work, work plan and schedule.
 - b. Asbestos project notifications, approved variances and plans to Government Agencies.
 - c. Copies of Permits, clearance and licenses if required.
 - d. Schedules: the Asbestos abatement contractor shall provide to the Construction Project Manager a copy of the following schedules for approval. Once approved, schedules shall be maintained and updated as received. Asbestos abatement contractor shall post a copy of all schedules at the site:
 - (1) A construction schedule stating critical dates of the project including, but not limited to, mobilization, Work Area preparation, demolition, gross removal, fine cleaning, encapsulation, inspections, clearance monitoring, and phase of refinishing and final inspections. The schedule shall be updated biweekly, at a minimum.
 - (2) A schedule of staffing stating number of workers per shift per activity, name and number of supervisor(s) per shift, shifts per day, and total days to be worked.
 - (3) Submit all changes in schedule or staffing to the Construction Project Manager prior to implementation.
 - e. Written description of emergency procedures to be followed in case of injury or fire. This section must include evacuation procedures, source of medical assistance (name and telephone number to nearest

- hospital) and procedures to be used for access by medical personnel (examples: first aid squad and physician). NOTE: Necessary Emergency Procedures Shall Take Priority Over All Other Requirements of These Specifications.
- f. Material Safety Data Sheets (MSDS) for encapsulants, sealants, firestopping foam, cleaners/disinfectants, spray adhesive and any and all potentially hazardous materials that may be employed on the project. No work involving the aforementioned will be allowed to proceed until MSDS are reviewed.
 - g. Worker Training and Medical Surveillance: The Asbestos abatement contractor shall submit a list of the persons who will be employed by him /her to perform the removal work. Present evidence that workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101.
 - h. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.
 - (1) The Asbestos abatement contractor shall provide a permanently bound log book of minimum 8-1/2" x 11" size at the entrance to the Worker and Waste Decontamination enclosure system as hereinafter specified. Log book shall contain on title page the project name, name, address and phone number of the Asbestos abatement contractor; name, address and phone number of Asbestos abatement contractor and City's third party air monitoring firm; emergency numbers including, but not limited to local Fire/Rescue Department. Log book shall contain a list of personnel approved for entry into the Work Area.
 - (2) All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted. Any significant events occurring during the abatement project shall be entered into the log. Upon completion of the job, the Asbestos abatement contractor shall submit the logbook containing a day-to-day record of personnel log entries countersigned by the Construction Project Manager every day.
 - i. Worker's Acknowledgments: Submit statements signed by each employee that the employee has received training in the proper handling of ACM, understands the health implications and risks

involved; and understands the use and limitations of the respiratory equipment to be used.

B. During Construction Submittals:

1. Security and safety logs showing names of person entering workspace, date and time of entry and exit, record of any accident, emergency evacuation, and any other safety and/or health incident.
2. Progress logs showing the number of workers, supervisors, hours of work and tasks completed shall be submitted daily to the Construction Project Manager.
3. Floor plans indicating Asbestos abatement contractor's current work progress shall be submitted for review by the Construction Project Manager.
4. All Asbestos abatement contractors' air monitoring and inspection results.

C. Project Closeout Submittals:

Upon completion of the project and as a condition of acceptance, the Asbestos abatement contractor shall present two copies of the following items, bound and indexed:

1. Lien Waivers from Asbestos abatement contractor, Sub-Asbestos abatement contractors and Suppliers,
2. Daily OSHA air monitoring results,
3. All Waste Manifests (Asbestos and Construction Debris), seals and disposal logs,
4. Field Sign-In/Sign-Out Logs for every shift,
5. Copies of all Building Department Forms and Permits,
6. A Letter of Compliance stating that all the work on this project was performed in accordance with the Specifications and all applicable Federal, State and Local regulations,
7. All Warranties as stated in the Specifications,
 - a. Fully executed disposal certificates and transportation manifest.
8. Project Record: The Asbestos abatement contractor shall maintain a project record for all small and large asbestos projects. During the project, the

project record shall be kept on site at all times. Upon completion of the project, the project record shall be maintained by the building owner. The project record shall be submitted to DDC as part of the close out documents. The project record shall consist of:

- a. Copies of licenses of all asbestos abatement contractors involved in the project;
- b. Copies of NYCDEP and NYSDOL supervisor and handler certificates for all workers engaged in the project;
- c. Copies of all project notifications and reports filed with NYCDEP, NYSDOL and USEPA for the project, with any amendments or variances;
- d. Copies of all asbestos abatement permits, including associated approved plans and work place safety plan;
- e. A copy of the air sampling log and all air sampling results;
- f. A copy of the abatement asbestos abatement contractor's daily log book;
- g. Copies of all asbestos waste manifests;
- h. A copy of all Project Monitor's Reports (ACP-15).
- i. A copy of each ATR-1 Form completed for the asbestos project (if required).
- j. A copy of each Asbestos Project Conditional Closeout Report (ACP-20) if required.
- k. A copy of the Asbestos Project Completion Form (ACP-21).

1.13 PROTECTION OF FURNITURE AND EQUIPMENT

Cover all furniture and equipment that cannot be removed from Work Areas. Movable furniture and equipment will be removed from Work Areas by the Asbestos abatement contractor prior to start of work. At the conclusion of the work (after final air testing), the Asbestos abatement contractor will remove all plastic covering on walls, floors, furniture, equipment and reinstall furniture and equipment. He shall remove and store all sheaths, curtains and drapes, and reinstall same following final clean up.

1.14 UTILITIES

A. General:

All temporary facilities shall be subject to the approval of the Commissioner. Prior to starting work at any site, locations and/or sketches (if required) of temporary facilities must be submitted to the Construction Project Manager for the required approval.

B. Water:

The Department of Design and Construction will furnish all water needed for construction, at no cost to the Asbestos abatement contractor in buildings under their jurisdiction. However, it is the responsibility of the Asbestos abatement contractor to ensure that hot water is provided for showering in the decontamination unit. The Asbestos abatement contractor shall furnish, install and maintain any needed equipment to meet these requirements at his own expense.

C. Electricity:

The Department of Design and Construction will furnish all electricity needed for construction, at no cost to the Asbestos abatement contractor in a building, under their jurisdiction. The Asbestos abatement contractor is responsible for routing the electric power to the abatement Work Area.

All temporary lighting and temporary electrical service for Work Area shall be in weatherproof enclosures and be ground fault protected.

- D. In leased spaces, arrangements for water supplies and electricity must be made with the landlord. However, all such arrangements must be made through and are subject to approval of the Department of Design and Construction. Utilities will be provided at no cost to the Asbestos abatement contractor. However, it is the Asbestos abatement contractor's (or the General contractor's) responsibility to furnish and install a suitable distribution system to the Work Area. This system will be provided at no cost to the City.

1.15 FEES

The Asbestos abatement contractor shall be responsible for any and all fees or charges imposed by Local, State or Federal Law, Rule and Regulation applicable to the work specified herein, including fees or charges which may be imposed subsequent to the date of the Bid opening.

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SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General: Provide cast-in place concrete in accordance with requirements of the Contract Documents.
- B. Provide Architectural Slab and Topping as shown in Contract Documents.
- C. See specification section 033500 for additional requirements for all exposed concrete.

1.2 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations of the following:
 - 1. ACI 301 "Standard Specifications for Structural Concrete".
 - 2. ACI 302.1R "Guide for Concrete Floor and Slab Construction".
 - 3. ACI 303R Guide for Architectural Concrete
 - 4. ACI 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete".
 - 5. ACI 304.2R "Placing Concrete by Pumping Methods".
 - 6. ACI 305R "Hot Weather Concreting".
 - 7. ACI 306.1R "Standard Specification for Cold Weather Concreting".
 - 8. ACI 308 "Standard Practice for Curing Concrete".
 - 9. ACI 309R "Guide for Consolidation of Concrete".
 - 10. ACI 311.1R "ACI Manual of Concrete Inspection", ACI 311.4R "Guide for Concrete Inspection, ACI 311.5R "Batch Plant Inspection and Field Testing of Ready Mixed Concrete".
 - 11. ACI 315 "Details and Detailing of Concrete Reinforcement".
 - 12. ACI 318 "Building Code Requirements for Reinforced Concrete".
 - 13. ACI 347 "Guide to Formwork for Concrete".
 - 14. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Mass and Heavy Weight and Mass Concrete".
 - 15. ACI 211.2 "Recommended Practice for Selecting Proportions for Structural Lightweight Concrete".

16. CRSI-WCRSI "Placing Reinforcing Bars".
17. AWS D1.4 "Structural Welding Code - Reinforcing Steel".
18. AASHTO TP 23, "Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying"
19. SDI "Design Manual for Composite Decks, Form Decks, and Roof Decks"
20. AISC "Code of Standard Practice for Steel Buildings and Bridges"

B. Where the language in any of the documents referred to herein is in the form of a recommendation, suggestion or guide; such recommendation or, suggestion or guide shall be deemed to be mandatory under this Contract.

1.3 SUBMITTALS

- A. Samples: Submit samples as requested in Specification Section 03 35 00.
- B. Shop Drawings
 1. Submit shop details and placing drawings for reinforcing steel.
 2. Submit detailed drawings showing locations of all construction joints, curbs, depressions, sleeves and openings.
- C. Description: Submit a complete description of the system proposed for meeting the specified floor slab flatwork tolerances. Submit survey data from a minimum of two previous slab installations to demonstrate capability to satisfy specified tolerances.
- D. Mill Tests: Submit, as requested, certified mill test reports for cement, metal reinforcement and welded wire fabric.
- E. Certifications for Admixtures: As specified under admixtures.
- F. Test Reports
 1. Submit Preliminary Design Mix Reports at least three weeks prior to the beginning of the work. Submit separate Design Mix Report for each class of concrete and construction procedure anticipated.
- G. Certifications for Joint Fillers, "Dry-Shake" Hardeners, Sealing/Densifying Compounds, and Curing Compounds: As specified under products and elsewhere in the specification and notes.

1.4 PRODUCT HANDLING

- A. Comply with ACI 301, Section 5. Stockpile and use aggregates in a manner which minimizes moisture content variation.

1.5 ENVIRONMENTAL CONDITIONS

- A. Cold Weather Concreting: Comply with ACI 306R.

- B. Hot Weather Concreting: Comply with ACI 305R.

1.6 QUALITY CONTROL

- A. Special Experience Requirements:

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 and shall be approved for work on project. Reference projects should include successfully completed architecturally exposed concrete surfaces. Submit projects, including name, description of responsibilities, scope of work, and references.

- B. Preliminary Design Mix Tests

1. Prepare design mixes in accordance with ACI 301, Section 4.2.3 on the basis of previous field experience or trial mixes. Bear all costs in connection with the design of concrete mixes. Separate design mixes are required for each anticipated and/or actual change in mix materials. Each design mix shall be fully identified as to its proposed use.
 - a. 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.
2. Whenever a change of brand or source for any of the concrete ingredients occurs, additional "preliminary tests" will be required and the cost of these tests shall be borne by the Contractor.
3. Proposed mix designs, preliminary testing procedures and results will be subject to the review and approval of a testing agency engaged by the Commissioner. Molds for preliminary tests will be provided by the City of NY's Testing Laboratory and will be of the same type and manufacture to be used on the Project.
4. Make one test for each design mix to verify that the total chloride (C1) ion content is within the specified limits. Perform chloride tests in accordance with "Standard Method of Sampling and Testing for Total Chloride Ion in Concrete" as contained in Report No. FHWA-RD-77-85 published by U.S. Department of Transportation, Federal Highway Administration.
5. Mix design report for concrete specified to be air entrained shall include ASTM C173 or ASTM C231 test results.

- C. Plant and Field Tests and Inspection

1. Concrete work will be subject to inspection and tests at the plant and in the field. Field and laboratory inspections and tests will be made by a testing laboratory engaged by the Commissioner, without expense to the

Contractor. Records of such tests and inspections will be submitted to the Commissioner, covering the quality and quantity of concrete materials, mixing and placing of concrete, concrete formwork, placing of reinforcing steel and the general progress of the work.

- a. 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 above for Form TR-3: Technical Report for Concrete Design Mix. The Special Inspector shall be an entity compliant with the requirements of the New York City Construction Codes.
2. Facilitate the work of, and cooperate with, the inspectors. Notify the inspectors when formwork and reinforcing steel is in place in order to facilitate inspections. Do not place concrete until these inspections have been completed and all deficiencies reported by an inspector have been corrected to the inspector's satisfaction. On steel framed structures, the entire frame below the concrete level to be placed shall be plumbed, surveyed, inspected and approved by City of NY's Structural Steel Testing Agency prior to concrete placement. Concrete placed prior to all required approvals is subject to removal.
3. At the start of the Project and Monthly throughout the course of the Work, the City of NY's Testing Laboratory will check the following for compliance with the Contract Documents and submit a weekly report to the Commissioner:
 - a. Cement (ASTM C150)
 - b. Aggregate (ASTM C33 or C330)
 - c. Fly Ash (ASTM A618)
 - d. Admixture (ASTM C494 or C1017)
4. If ready-mix concrete is used, each load of concrete arriving at the job shall be accompanied by a delivery ticket which shall be subject to checking by the City of NY's Testing Laboratory at the plant and field and which shall contain the following minimum information:
 - a. Batch plant of origin.
 - b. The yardage of concrete.
 - c. The class of concrete.
 - d. The amount and type of aggregates.
 - e. The amount and type of cement.

- f. The amount(s) and type(s) of admixtures.
 - g. The amount of water.
 - h. The exact time the last materials were discharged into the delivery truck. If, upon reaching the Project site, the concrete cannot be placed within the specified time limits or if the class of concrete delivered is incorrect, the inspector will reject the load for use, and it shall be removed from the site at the Contractor's expense.
5. Batch Plant Inspection: At the start of the Project and at least once each month until the completion of the Concrete work, the City of NY's Testing Laboratory will observe and evaluate the following for compliance with the Contract Documents and submit a report to the Commissioner:
- a. Condition of batching equipment.
 - b. Condition of materials.
 - c. Inspect aggregate stockpiles and storage and bring to the attention of the concrete producer any practices which are causing segregation or contamination within the stockpiles.
 - d. Type of materials used.
 - e. Inspect trucks used to transport concrete to assure that they are clean and in condition to mix and to deliver a uniform mix.
 - f. Mixing time, delivery time.
 - g. Additional pertinent controls; depending on weather, job conditions, and other factors affecting the Work.
6. Compression Test: The City of NY's Testing Laboratory will supply all molds required for tests as described below, using molds of the same type and manufacture for making all test specimens. The testing laboratory will take specimens of each class of concrete beginning with the first truck and as follows:
- a. At least four (4) specimens for each 50 cu. yds. or fraction thereof of each class of concrete and in any case not less than four (4) specimens for any one day's operations shall be sampled directly from the mixer.
 - b. In addition to specimens sampled directly from the mixer, test cylinders for pumped concrete and superplasticized concrete shall also be made from concrete sampled at the point of deposit or as directed by the Commissioner designated for inspection. These test cylinders shall be separate and distinct from those made from the mixer, and shall be made from the same batch and cured and tested in the same manner as described as described for the samples at the point of deposit shall be a minimum of one set of 2 cylinders for every 150 cu. yds. or fraction thereof for each class of concrete mixed in any one day's

concreting. When concrete is being placed directly from the mixer into the forms without any intermediate conveyance, the additional cylinders will not be required.

- c. Samples will be obtained in accordance with ASTM C172.
 - d. The testing laboratory will comply with ASTM C31 in making, curing and subsequently handling test specimens, except as modified herein. Specimens will be tested in accordance with ASTM C39.
 - e. For specimens sampled directly from the mixer, the cylinders will be placed in laboratory storage under moist curing conditions at approximately 70 deg. F. within 24 hours after molding and maintained therein until tested. One specimen of each set will be tested at seven days. If the seven day strength is below 60% of design strength, the Commissioner and the Contractor will be immediately notified. Two cylinders of each set will be tested at 28 days. The fourth cylinder of each set shall be a reserve cylinder for testing at 56 days if the average 28 day strength does not meet specified strength.
 - f. For specimens sampled at the point of deposit, cylinders will be stored and maintained as above and will be tested at 28 days.
7. Air Content: Test cylinders in accordance with ASTM C173 or ASTM C231. Test air each time test cylinders are made or as directed by the Commissioner.
8. Water Test: The water content of freshly mixed concrete will be tested each time cylinders are made and as directed by the Commissioner in accordance with AASHTO T 318.
9. Unit Weight: Test unit weight in accordance with ASTM C138 each time test cylinders are made.
- a. Always check the first truck of a placement.
10. Slump: Test in accordance with ASTM C143.
- a. Test each sample taken for cylinders. For concrete containing superplasticizer added at the site, one test shall be made prior to addition of the admixture, and another test after addition and mixing. For pumped concrete, one test shall be made at the pump and one at the point of deposit. Provide slump cone(s) and rod(s) for use on the job at all times.
11. Flatwork Tolerances: The City of NY's Testing Agency will survey the finished floor surfaces in a manner agreed to by the Commissioner to verify compliance with the flatwork tolerances specified.
12. The City of NY's Testing Agency will perform other testing and inspections as required by local, state and federal codes.

D. Standard of Strength Control

1. Until sufficient test data is available to calculate the standard deviation, the required average concrete strength shall exceed the specified design strength by at least the following:
 - a. Design strength 3000 psi to 4800 psi: 1200 psi
 - b. Design strength 4801 psi to 6000 psi: 1500 psi
2. Each 28-day compression test report shall clearly indicate, as of the report date and for the class of concrete being reported:
 - a. the average of the latest three test results;
 - b. the lowest average of three consecutive test results;
 - c. the percentage of tests falling below specified strength;
 - d. the lowest single test result.
3. Strength Requirements and Compliance Therewith: Concrete will be considered to meet strength requirements of the Specifications when in compliance with ACI 301, Section 1.7.4, Strength of Structure, except as modified by local code.

E. Enforcement

1. If field test performed by the City of NY's Testing Laboratory indicate non-compliance with the Contract Documents, the remainder of the batch of concrete from which the sample in question was taken will be rejected for use and shall be removed from the site at the Contractor's expense.
2. When non-compliant test or trends are observed by the City of NY's Testing Laboratory, such information will be relayed expeditiously by telephone, fax or email to the Commissioner, the Contractor and the concrete supplier and confirmed promptly in writing on different colored paper. The concrete supplier shall take immediate action to correct any deficiency.
3. Concrete found by laboratory test to have excess chlorides will be subject to removal.
4. If concrete strength tests do not comply with the strength requirements of the Contract Documents, the Commissioner may require that test specimens be cut from the structure at locations designated. Specimens shall be secured and tested in accordance with ASTM C42, petrographic analyses shall be performed in accordance with ASTM C856 and/or other tests shall be performed as required by the Commissioner. These tests, if required, will be made at the Contractor's expense. If the results of these tests indicate non-compliance, the Commissioner may require that the concrete be removed from the structure or other corrective action at no additional cost to the Commissioner.
5. Other Tests: In the event that laboratory tests taken from any part of the

structure indicate an apparent failure to develop the ultimate strengths required at 45 days, the Commissioner may, at his discretion, order other tests to be made on the portion of the structure affected to determine the adequacy of such portion to sustain the loads for which its members are designated. These tests, if required, will be made at the Contractor's expense, and shall conform to the requirements of ACI 318 and local codes. If the structure, or any part of the structure, cannot pass the tests, it shall be removed and replaced at the Contractor's expense.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General

1. The total chloride (Cl) ion content in the entire mix shall not exceed 0.15% of the weight of cement.
2. Each concrete material shall be the product of a single plant and raw material source throughout the project.

B. Portland Cement: ASTM C150, Type 1. Use only one brand of cement from one mill throughout the work unless otherwise approved by the Commissioner. The alkali content shall not exceed 0.6% unless:

1. The manufacturer certifies that no alkali reactivity is produced with the proposed combination of materials when tested in accordance with ASTM C227, or
2. A pozzolan, proven by ASTM C441 to be effective in preventing excessive expansion due to alkali-aggregate reaction, is included in the mix.
3. Cements shall be consistent in color presentation throughout the duration of the project.
4. Cement shall be light gray.
5. Cement Replacement Materials:
 - a. White Granulated Blast Furnace Slag; ASTM C989, Grade 120, "NewCem" by LaFarge Cement Co.
 - b. White Metakoalin; "Metamax", by BASF/Master Builders, inc. Cleveland OH, or approved equal.
 - c. Fly Ash or Silica Fume not permitted in Architectural Concrete topping slab.

C. Admixtures

1. Each admixture manufacturer shall certify to the appropriateness of the use of their admixture(s) in the combination, dosages, batching and construction procedures proposed. All structural concrete shall contain a water reducing admixture or a high range water reducing admixture.

2. Air-Entraining: Comply with ASTM C260; providing one of the following:
 - a. "MB-VR" (Master Builders Co.).
 - b. "Daravair" (Construction Products Div., W.R. Grace & Co.).
 - c. "Sika-Aer" (Sika Corp.).
 - d. "Air-Mix" or "AEA-92" (Euclid Chemical Co.).
3. Water Reducing Comply with ASTM C494, Type A; provide one of the following:
 - a. "WRDA with Hycol" (Construction Products Division, W.R. Grace & Co.).
 - b. "Eucon WR-75", "WR-89" or "Eucon MR" (Euclid Chemical Co.).
 - c. "Pozzolith 200N" (Master Builders Co.).
 - d. "Plastocrete 161" (Sika Chemical Corp.)
4. Water Reducing (Retarding): Comply with ASTM C494, Type D; provide one of the following:
 - a. "Plastiment" (Sika Chemical Corp.).
 - b. "Eucon Retarder-75" (Euclid Chemical Co.).
 - c. "Daratard-17" (Construction Products Div., W.R. Grace & Co.).
 - d. "Pozzolith 100XR" (Master Builders Co.).
5. Accelerating Admixture: Comply with ASTM C494, Type C or E. Admixture shall be chloride-free and non-corrosive. Provide one of the following:
 - a. "Pozzutec 20" (Master Builders Co.).
 - b. "Daraset" (Construction Products Div., W.R. Grace & Co.)
 - c. "Accelguard 80", "Accelguard 90" or "Accelguard NCA" (Euclid Chemical Co.).
6. High Range Water Reducing Admixture (Superplasticizers): Comply with ASTM C494, Type F. For all concrete, use only with prior approval of the Commissioner. Provide one of the following:
 - a. "Eucon 37", "Eucon 1037" or "Plastol 5000" (Euclid Chemical Co.).
 - b. "Rheobuild 1000" (Master Builders Co.).

- c. "Sikament FF" (Sika Chemical Corp.).
- d. "WRDA-19" (Construction Products Div., W.R. Grace & Co.).
- 7. High Range Water Reducing Retarding Admixture (Superplasticizers): Comply with ASTM C494, Type G. Use only with prior approval of the Commissioner. Provide one of the following:
 - a. "Eucon 537" (Euclid Chemical Co.).
 - b. "Rheobuild 716" (Master Builders Co.).
 - c. "Daracem 100" (Construction Products Div., W.R. Grace & Co.).
- 8. Fiber Reinforcement Admixture: Integral fiber reinforcement shall be polypropylene fibrillated fibers, minimum 4 pounds per yard, and shall be "Tuf Strand SF" by Euclid Chemical or approved equal.
- 9. Other Admixtures: Use only with the prior written approval of the Commissioner. Do not use any admixtures which contain chlorides.
- D. Water: ASTM C94. Clean, clear, odorless, potable. Wash water shall not be used.
- E. Aggregates
 - 1. Fine Aggregate: For Uses Not Otherwise Specified: ASTM C33.
 - a. Minimum 12% passing No. 50 sieve.
 - b. Minimum 3% passing No. 100 sieve.
 - c. Fineness Modulus: Minimum 2.5, maximum 3.0.
 - d. For Pumped Concrete: 15% to 30% passing a No. 50 sieve; 5% to 10% passing No. 100 sieve; FM minimum 2.4, maximum 3.0, with maximum daily variation 0.20.
 - e. If aggregate has particles finer than passing a #20 sieve, the particles shall be light gray or light tan in color
 - 2. Coarse Aggregate: For Uses Not Otherwise Specified: ASTM C33.
 - a. Maximum size 57.
 - b. Size 67 for general use.
 - c. Size 7 or 8 for pumped concrete and tight pours.
 - 3. Lightweight coarse aggregate: ASTM C330.
 - 4. Combined Aggregate Gradation: Combined aggregate gradation for slabs and other designated concrete shall be 8% - 18% for large top size aggregates (1½ in.) or 8% - 22% for smaller top size aggregates (1 in. or

3/4 in.) retained on each sieve below the top size and above the No. 100.

- F. Ground Granulated Blast Furnace Slag: ASTM C989, Grade 120. The ratio of the amount of the ground granulated blast-furnace slag to the total amount of ground granulated blast furnace slag and cement in the mix not to exceed 40 percent of cementitious content and based on a successful test slab placement.
- G. Fly Ash: ASTM C618, Class C or F. No additives or contaminants derived from the fly ash precipitation process which are detrimental to the concrete (such as soda ash) shall be allowed. The fly ash producer shall have a minimum of 3 years experience in the production of acceptable fly ash and shall practice an effective quality control program to guard against contamination of the fly ash.
- H. Metal Reinforcement: ASTM A615, new billet steel, Grade 60 unless otherwise shown.
 - 1. For fabrication tolerances conform to ACI 117, Section 2.2.
 - 2. All reinforcing bars shall have distinguishing marks plainly indicated thereon, which shall agree with those given on the shop drawing relating to or calling for the bars.
 - 3. Epoxy Coated reinforcement shall comply with ASTM A775 and ASTM D3963. Comply with CRSI recommendations. The manufacturing plant shall be CRSI Epoxy Plant Certified.
- I. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications. All bar supports shall be galvanized.
 - 1. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).
- J. Grout: ASTM C1107, free of gas-producing or gas-releasing agents, oxidizing catalysts, inorganic accelerators and chlorides. If requested by the Commissioner, grout a sample 4 ft. x 4 ft. x 1/2 in. plate in the field and demonstrate a minimum of 95% bearing after curing 14 days. Cure grout in accordance with manufacturer's instructions. Provide one of the following:
 - 1. Non-Metallic
 - a. "Five Star Grout" (U.S. Grout Corp.).
 - b. "Masterflow 928" (Master Builders Co.).
 - c. "Euco NS" (Euclid Chemical Co.).
 - 2. High Flow Grout:
 - a. "Hi-Flow Grout" (Euclid Chemical Co.)
 - b. "Masterflow 928" (Master Builders Co.)

K. Curing Materials: One of the following:

1. Clear Curing and Sealing Compound (VOC Compliant, 350 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class A, 25% solids content minimum. Moisture loss shall be not more than 0.40 Kg/m² when applied at 300 sq. ft./gal. Manufacturer's certification is required. Subject to project requirements provide one of the following products:
 - a. "Super Diamond Clear VOX" or Super Rez Seal VOX" (Euclid Chemical Co.)
 - b. "Masterkure 100W" (Master Builders Co.) or approved equal.
2. Curing Compound (Strippable): All other slabs, where indicated on the drawings or where approved, shall be cured with the specified strippable curing compound conforming to ASTM C 309. For use on surfaces to be covered with finish or coating material applied directly to concrete, such as liquid densifier/sealer, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials. Provide:
 - a. "Kurez DR VOX" (Euclid Chemical Co.) or approved equal.
3. Polyethylene Film: ASTM C171.
4. Waterproof Paper: ASTM C171.

Verify compatibility with applied floor finishes.

L. Liquid Sealer/Densifier: High performance, deeply penetrating concrete densifier; odorless, colorless, VOC - compliant, non-yellowing silicate based solution designed to harden, dustproof and protect concrete floors subjected to heavy vehicular traffic and to resist black rubber tire marks on concrete surfaces. The compound must contain a minimum solids content of 20% of which 50% is silicate. Provide products from one of the following:

1. "Euco Diamond Hard" (Euclid Chemical Co.).
2. "Seal Hard" (L & M Construction Co.) or approved equal.

M. Expansion Joint Filler Strips: Preformed sponge rubber strips complying with ASTM D1752, Type I. Verify compatibility with any joint sealers to be applied over the filler strip.

N. Formwork

1. For unexposed surfaces and rough work, use Exterior Type Douglas Fir, Grade B-B, (concrete form) Plywood, conforming to NBS PS-1, minimum 3/4 in. thick, or undressed lumber, No. 2 common or better. Before reusing forms, withdraw nails and thoroughly clean surfaces to be in contact with concrete.
2. For exposed surfaces not otherwise specified see Specification Section 03 35 00.

- O. Form Ties: For securing forms where surfaces will be exposed in the finished work, use tie screws with removable plastic cones, removable bolts, special removable tie wires or Series 300 stainless steel snap ties. For all other forms, use either bolts or wires. Use ties of such type that when forms are removed, no metal is closer than 1-1/2 in. from the finished concrete surface.
- P. Form Coating: Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- Q. Threaded rebar fasteners/couplings: Threaded inserts and couplings for rebar splices, to develop at least 125% of the specified rebars yield strength. F.C. Dayton Barsplice, Inc. couplings or approved equal.
- R. Polymer Patching Mortar: "Euco Thin Coat, Concrete Coat" (horizontal repairs), "Verticoat or Verticoat Supreme" (vertical and overhead repairs) by The Euclid Chemical Co. or "Sikatop 121 or 122" (horizontal repairs), "Sikatop 123" (vertical and overhead repairs) by Sika Chemical Corp, or approved equal. These patching mortars may be used when color match of the adjacent concrete is not required. Prior approval by the Commissioner is required.
- S. Underlayment Compound: Free-flowing, self-leveling, pumpable cementitious base compound, "Flo-Top" by The Euclid Chemical Co. or approved equal. The compound shall exhibit the following properties:
 - Compressive Strength (ASTM C109) - 3600 PSI @ 7 days
- 5000 PSI @ 28 days
 - Bond Strength (ASTM C1042) - 700 PSI @ 7 days
- 1000 PSI @ 28 days
- T. Patching Additive: Shall be a liquid, acrylic-polymer bonding agent specifically made to be integrally mixed with mortar. Additive shall be "Acryl Set" by BASF/Master Builders or approved equal.
- U. High density polystyrene foam, used to reduce the volume of concrete fill, where shown in details, shall have a minimum 60 PSI compressive strength. Polystyrene shall not emit toxic fumes when exposed to high temperature. Submit product data for approval.
- V. Macro Synthetic Fibers: Tuf-Stand SF by Euclid Chemical, MasterFiber by BASF, or approved equal.
- W. Bonding Agent: Weldcrete, Sika Armatec, or Euclid Duralprep. Follow manufacturer instructions.

2.2 MIXES

- A. Classes of Concrete: The strength, unit weight and other design parameters of the concrete for each portion of the structure shall be in accordance with the requirements indicated on the Drawings.

B. Architectural concrete for floor topping slab shall be located as designated on the drawings. All exposed concrete should have a smooth, dense, trowel finished surface with minimal cracking and curling.

1. Basis of Design. The following basis of design is provided as a guideline to meet the architectural intent for all exposed floor slabs:

<u>Compressive Strength:</u>	<u>4000 psi @ 28 days for concrete on composite deck</u>
	<u>6000 psi @ 28 days for cast in place concrete</u>
<u>Shrinkage:</u>	<u>< 0.02% @ 28 days</u>
<u>Slag:</u>	<u>Yes</u>
<u>Cement:</u>	<u>Light Gray</u>
<u>Macro Synthetic Fibers:</u>	<u>Tuf-Strand SF - 4 lbs/cy in 4000 psi mix</u>
<u>High Range Water Reducing Admixture:</u>	<u>Plastol 5000</u>
<u>Coarse Aggregate:</u>	<u># 57 (1"); #67 (3/4" for topping)</u>
<u>Air Content:</u>	<u>< 3%</u>
<u>W/cm:</u>	<u>0.50 maximum</u>

2. The mix designs should generally conform to the following:

	4000 psi Normal Weight Concrete-on-Metal Deck	6000 psi Reinforced Normal Weight Concrete
Cementitious	620 lbs.	760 lbs.
Sand	As required	As required
Coarse Aggregate	1600 lbs. (3/8")	1800 lbs. (1")
Water	310 lbs.	290 lbs.
HRWR Admixture, Plastol Series	30 oz. +/- or as required	40 oz. +/- or as required
Macro Synthetic Fibers, Tuf-Strand SF	4 lbs.	-----
Shrinkage Reducing Admixture, Conex	20 lbs.	20 lbs.
Air Content	1.5%	1.5%
Slump, (Water)	2" - 3"	
Slump, (After HRWR)	7" - 9"	7" - 9"
Maximum Shrinkage (ASTM C157 Modified, 7-day of moist curing)	0.02% @ 28 day (0.24" in 10 ft.)	0.02% @ 28 days (0.24" in 10 ft.)
W/cm	0.50	0.38

3. A pre-slab meeting with a detailed agenda is required. The Commissioners representative, General Contractor, Concrete Contractor, Concrete Producer, testing laboratory, Admixture & Fiber Representative and other firms required

by the City of New York shall attend. Complete minutes of the meeting shall be emailed to the attendees within 5 business days of the meeting by the Commissioner.

4. A successful mockup, as outlined in specification section 03 35 00, is required prior to the placing of these high performance concrete.

C. Proportioning of Concrete

1. Assume full responsibility for the strength, consistency and handling of concrete. Design mixes in accordance with ACI 211.1 or ACI 211.2 (as modified by local code).
2. Use the minimum amount of water necessary to produce a mix that can be worked readily into corners of forms and around reinforcement without permitting segregation of materials or free water to collect on surfaces.
3. Adjust the consistency of any mix to allow for specific placing methods and conditions. The slump of concrete filling small, thin or complicated forms shall be greater than for large masses, the degree of slump being governed by the least dimensions of the form. Maximum design slump shall be not more than 3 in. for slabs and sloping concrete surfaces and not more than 4 in. for all other concrete. For concrete proportioned with a superplasticizer, the design slumps shall be a maximum of 3 in. prior to addition of the admixture and a maximum of 8 in. after addition and mixing.
4. Measure materials for concrete by weighing. Separately weigh each size of aggregate and the cement; cement accurate within 1%, aggregates accurate within 2%. Cement in sacks of ninety-four pounds need not be weighed, but weigh bulk cement and fractional packages. Measure mixing water by weight or volume accurate within 1%.
5. Durability: Air entrain concrete, where shown, in accordance with ACI 301, Section 4.2.2.4, Air Content, except that the air content shall comply with ACI 318, Chapter 4 for Severe Exposure. Maximum water/cement ratio shall be 0.50 (4000 psi at 28 days or more) for concrete subject to freezing and thawing. All concrete subjected to deicers and/or required to be watertight shall have a maximum water/cement ratio of 0.45 (4500 psi at 28 days or more). All reinforced concrete subjected to brackish water, salt spray or deicers shall have a maximum water/cement ratio of 0.40 (5000 psi at 28 days or more). All trowel finished interior slabs, subjected to vehicular traffic, shall have a maximum w/c ratio of 0.48.
6. Fly Ash: Use a maximum of 150 lbs. per cu. yd. Fly ash shall not exceed 20% of total cementitious materials. Fly Ash is not allowed in the Architectural Concrete Topping Slab.
7. Pumped Concrete (normal concrete): Comply with ACI 304.2R.
 - a. Provide separate design mixes for each 200 ft. distance (sum of horizontal and vertical) from the pump.

- b. The maximum slump shall be 8 in. at the pump after the addition of the high range water-reducing admixture. The concrete shall arrive at the job site at a slump of 2 in. – 3 in. (3 in. to 4 in. for concrete receiving a "shake-on" hardener or lightweight concrete), be verified, then the high-range water-reducing admixture added to increase the slump to the approved level. All other concrete shall have a maximum slump of 4 in.
 - c. Confirm pumpability of mix design by performing a pump test in accordance with ACI 304.2R, section 4.9, unless results from a previous use of the proposed mix in a similar pumping operation are acceptable to the Commissioner.
- D. Self-Consolidating Concrete (SCC): Compressive strength and water/cement ratio as indicated on the plans. Test placement on the jobsite will be required to confirm flow, setting time, and self-consolidating characteristics. All self-consolidating concrete shall contain the specified high-range water-reducing admixture and viscosity-enhancing admixture when and as required.
- E. "Quick-Dry" Concrete: Maximum W/cm – 0.40, superplasticized, 3% maximum air content. The floor finish shall be as required by the manufacturer of the specified floor coating or covering
- F. Cement Fill
- 1. Mix cement fill for steel pan-type stairs and platforms in the proportions, by weight, of one part Portland cement, 1-1/2 parts sand and 1-1/2 parts coarse aggregate. Grade the coarse aggregate from 1/8 in. with at least 95% passing a 3/8 in. sieve and not more than 10% passing a No. 8 sieve.

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION MEETING

- A. At least one week prior to commencement of concrete work, meet at the Project site to review methods and sequence of concrete construction, standard of workmanship, material selection, testing and quality control requirements, review of the proposed design mixes, placement procedures, off-site batching requirements, coordination of the work with other trades and other pertinent topics related to the Work. The contractor shall send a pre-construction meeting agenda to all attendees 20 days prior to the scheduled date of the meeting. Meeting shall include the following:
- 1. Commissioner
 - 2. General Contractor
 - 3. Concrete Subcontractor
 - 4. City of New York's Testing Laboratory(s)
 - 5. Ready mix concrete supplier

6. Admixture Manufacturer(s) Representative(s)
 7. Lightweight Aggregate Supplier
 8. Any other subcontractor and/or material supplier or manufacturer required.
- B. The minutes shall include a statement by the concrete contractor indicating that the proposed mix design and placing techniques will produce the concrete quality required by these specifications.

3.2 FORMWORK

- A. General: Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Forms shall be well constructed, carefully aligned, substantial, firm, securely braced and fastened together in their final position and set to give the finished structure the specified camber, plus allowance for shrinkage and settlement.
1. Forms shall conform to the lines, dimensions and shapes of concrete shown providing for openings, offsets, sinkages, reglets, chamfers, blocking, screeds, anchorages, inserts, recesses, keys, slots, projections and other features as required.
 2. Make forms clean and free of foreign material before placing concrete. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
 3. Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from other trades providing items. Accurately place and support items built into forms.
- B. Design of Formwork
1. Comply with ACI 301, Section 2.2.2.
 2. Provide forms so that no discernible imperfection is in evidence in finished concrete surfaces due to deformation, bulging, jointing, or leakage of forms. Design forms to withstand the action of mechanical vibrators.
 3. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent structures of surfaces. Provide crush plates or wrecking plates where stripping may damage surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses and the like to prevent swelling and to provide for easy damage free removal.
 4. Where infill concrete is shown, match formwork spacing and layout to existing adjacent.

C. Tolerances

1. Comply with ACI 301, Section 2.3.1.2, except as otherwise noted.
2. Variation from Plumb
 - a. In any 10 ft.: 1/8 in.
 - b. In entire length/height: 1/2 in.
3. Variation from Building Line
 - a. In any 10 ft.: 1/4 in.
 - b. In entire length/height: 3/4 in.
4. Floor surfaces shall be finished to 1/8" in 10 feet

D. Preparation of Form Surfaces

1. Comply with ACI 301, Section 2.2.1.3.
2. Use non-staining mineral oil or form lacquer.

E. Formwork Verification: The contractor shall instrument check (straight edge, level, optical survey, stringline, F-meter, etc.) All formwork to be in compliance with the tolerances specified in section C above.

3.3 REINFORCEMENT

A. General: Comply with ACI 301, Section 3. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.

B. Tolerances: Comply with ACI 301, Section 3.3.2.1.

C. Placing

1. Comply with ACI 301, Section 3.3.2. When splices not shown on the Drawings are approved by the Commissioner, such splicing shall conform to ACI 318.
2. Place reinforcing bars having assigned positions so that distinguishing marks agree with those given on the shop drawings relating to or calling for the bars.
3. Secure all reinforcing bars in place with high-density plastic supporting and spacing devices and metal tying devices. Reinforcing in concrete members that have one or more surfaces exposed, whether painted or unpainted finish shall be tied with 14 ga. soft annealed galvanized wire. Uncoated tie wire in exposed members will not be accepted.

D. Restore damaged bars to full capacity in accordance with CRSI requirements

and in a manner acceptable to the Commissioner.

- E. Minimum Reinforcement: Where no other reinforcement is shown provide #4 @ 12 inches on center each way each face. For concrete fill or toppings, provide one layer of 6 x 6-W 1.4 x W 1.4 welded wire fabric per 6 inches of thickness.
- F. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction. Securely support all mesh in its specified location.

3.4 MIXING CONCRETE

A. Ready Mixed Concrete

1. Comply with ASTM C94.
2. Add mixing water only at the batch plant. Begin the mixing operation within 30 minutes after the cement has been intermingled with the aggregates.
3. Discharge the concrete completely at the site within 1-1/2 hours after the introduction of the cement to the aggregates. In hot weather reduce this time limit so that no stiffening of the concrete shall occur until after it has been placed.

B. Batch Mixing at Site

1. Comply with ASTM C94.
2. Excessive mixing requiring the addition of water to preserve the required consistency will not be permitted. Mix concrete to a consistency which can be readily placed without segregation.
3. Equip mixers with a device for measuring and dispensing admixtures. When required, the slump of concrete may be increased prior to placement by the use of a high range water reducing admixture.

C. Retempering: No water shall be added to the mix after the initial batching operation. Concrete which is placed after the unauthorized addition of water is subject to removal. Redosage with the superplasticizer may be done with approval of the Commissioner as to methods and procedures.

D. When required, the slump of concrete as delivered to the site may be increased prior to placement by the use of a high range water reducing admixture. Dosage of superplasticizer shall be within the guidelines established by the manufacturer and agreed to by the Commissioner. Alternative Mix Design Reports with the recommended site dosage(s) of superplasticizer shall be submitted prior to use.

3.5 JOINTS AND EMBEDDED ITEMS

A. Construction Joints

1. Comply with ACI 301, Section 2.2.1.

2. Form all construction joints with a shear key. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise shown.

B. Expansion Joints

1. Comply with ACI 301, Section 2.2.1.4.
2. Install joint filler to allow the required dimension for sealant, as indicated. Dimensions shown on Drawings are based on an assumed design temperature of 70 deg. F. Concreting procedures shall take into account the ambient temperature range at the time of the respective operations.

C. Embedded Items

1. Comply with ACI 301, Section 2.2.1.5. For embedded items associated with structural steel, comply with AISC requirements.
2. Accurately set anchorage devices by line and transit, and coordinate the locating of all anchorage devices to be set for the accommodation of the work of other trades.
3. Locate anchor bolts and embed plates as shown on the Drawings and on shop drawings. Obtain necessary templates from the steel and mechanical trades as required for the proper setting of anchor bolts, embed plates and other items for structural steel and mechanical equipment, as required.
4. Assist other trades in the installation of piping, pipe sleeves, conduit and similar items where such items are to be installed in concrete. Provide frames to securely hold anchor bolts and anchorage devices in place during construction, and take care that no displacement occurs during the pouring of concrete. Under this Section furnish and set items not furnished by other trades using approved standard type items suitable for their intended purpose.

3.6 PLACING CONCRETE

A. Preparation Before Placing: Conform to ACI 301, Section 5.3.1.

1. Testing and Inspection specified in Paragraph "Quality Control" shall be completed before concrete placement.
2. For flatwork, clean the entire formwork or deck surface of dust and dirt, loose anchors stud ferrules, and other foreign material.
3. Dampen and cool subgrades and formwork as required.
4. Instrument check all formwork for compliance with specified tolerances before concrete placement.

B. Preparation of Form Surfaces

1. Coat contact surfaces of forms with an approved, nonresidual, form-coating compound before reinforcement is placed. Do not allow excess

form coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's written instructions and recommendations.

C. Conveying

1. Comply with ACI 301, Section 5.3.2.2. and ACI 304R.
2. Provide a spout or downpipe and elephant trunk or other appropriate method to prevent concrete from falling freely through a height greater than 5 ft. Free fall in walls and columns shall not exceed 15 ft.
3. For pumped concrete, comply with ACI 304.2R. For lightweight concrete that is to be pumped, the aggregate shall be uniformly pre-wetted or pre-saturated in such a manner and to the extent recommended by the manufacturer in order to minimize loss of workability of the plastic concrete.

D. Depositing: Comply with ACI 301, Section 5.3.2.4 and ACI 304R.

1. Deposit concrete within 5 ft. of its final position in uniform layers not exceeding 18 in. No more than 30 min. shall elapse between layer placements. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
2. Consolidate concrete to maximum density using internal vibration. Insert and withdraw vibrators vertically drawing out entrapped air and excess water. Do not use vibrators to transport concrete within forms. Do not insert vibrators into lower layers of concrete that have begun to set. 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. Pay particular attention to providing adequate vibration in the vicinity of sleeves and embeds in heavily reinforced elements and other elements as required. Provide form vibrators to ensure maximum density of concrete.
3. All deposits of concrete in walls, beams or slab placements shall have a subsequent deposit place on top and/or adjacent to the fresh face and consolidated within 30 minutes. Plan floor placements so the sequence of deposits follows this requirement.

E. Additional concrete at metal decking: Allow for an additional 3/8" of concrete at metal deck slabs to "fill" metal deck deflections flat between steel framing.: Comply with ACI 301, Section 5.3.2.4 and ACI 304R.

F. Metal Decking: Comply with Steel Deck Institute recommendations as regards depositing of concrete on metal decks. Shore decking as required to prevent deck deflections in excess of 3/4".

3.7 CURING

A. Comply with ACI 301, Section 5.3.6.

B. All exposed interior slabs, not receiving a liquid densifier, and troweled slabs

receiving mastic applied adhesives or "shake-on" hardeners shall be cured with the specified curing and sealing compound. Exterior slabs, sidewalks, curbs, and architectural concrete, not receiving a penetrating sealer, shall be cured with the specified clear, non-yellowing curing and sealing compound. Maximum coverage shall be 400 ft²/gallon on steel troweled surfaces and 300 ft²/gallon on floated or broomed surfaces for the curing/sealing compound.

- C. Use the specified strippable curing compound on surfaces to be covered with finish or coating material applied directly to concrete, such as liquid densifier/sealer, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials. Apply in strict accordance with manufacturer's instructions.

3.8 FORM REMOVAL

- A. Do not remove forms until the concrete has thoroughly hardened and has attained sufficient strength to support its own weight and construction live loads to be placed thereon, without damage to the structure. In general, do not disturb forms for framing until the concrete has attained at least 40% of design strength for side forms and 80% of design strength for bottom forms. Be responsible for proper form removal and replace any work damaged due to inadequate maintenance or improper or premature form removal.
- B. Where use of metal form ties extending to within less than 1-1/2 in. of the face of permanently exposed concrete has been unavoidable, cut off such ties at least 1-1/2 in. deep in the concrete, but not less than 72 hours after concrete has been cast. Remove forms by methods which will not spall the concrete or cause any injury whatsoever. Hammering or prying against concrete will not be permitted.

3.9 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on the Architectural, Mechanical and Structural drawings and other Contract Documents. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

3.10 PATCHING/REPAIR

- A. Comply with ACI 301, Section 5.3.7.
- B. Honeycombing to be immediately patched upon removal of forms. Areas with extensive honeycombing shall be brought to the attention of the Commissioner and the City of NY's Testing Agency.

- C. Remove and replace concrete that, in the Commissioner's opinion, does not satisfy the requirements of the Contract Documents if repair cannot be accomplished to the Commissioner's satisfaction.
- D. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching.
- E. Repair isolated random cracks and single holes not over 1 in. in diameter by dry pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack before bonding compound has dried. Compact dry pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- F. All structural repairs shall be made with prior approval of the Commissioner as to methods and procedures. Submit a procedural outline of the proposed repair work, including a description of materials, preparation, sequencing, etc. for the Commissioner's approval.

3.11 FINISHING

- A. General Requirements for Flatwork: Strike-off top surfaces of all flatwork true and level to the required tolerances. Use construction techniques such as adjustment of pour size, adjustable screeds, pre-shoring/shoring/re-shoring and other appropriate means to ensure compliance with these requirements. Camber of unshored structural steel is shown on the Drawings. Provide concrete, in addition to scheduled nominal slab thickness, to allow for the steel or formwork deflections and camber (see Section "Metal Decking") and provide finished slabs level within the specified requirements. The steel camber is calculated as 75% of the deflection due to wet weight of concrete. Assume 0.5 inch average wet weight deflection where no camber is shown or specified. Monitor and survey pour areas prior to, during and after concreting operations.
- B. Flatwork Finish Tolerances: All flatwork surfaces shall be tested for flatness and levelness in accordance with the F-number system (ASTM E1155). This testing shall be complete within 48 hrs. of slab installation. In areas of shored construction, measurements shall be taken prior to removal of shores. Reports of tests shall be submitted within 72 hrs. All floors are random traffic floors. Floors shall conform to the following surface profile tolerances:

All polished floors shall achieve an $F_F 50/F_L 25$ profile on unshored areas. An F_L Screed or Screed Rail is required to achieve the F_L number. The shored floors shall achieve a $F_F 50/F_L 35$ profile.
- C. Fill or grind completed floors as necessary to achieve specified finish tolerances. Filling, where required, shall be with a self-leveling cementitious product capable of being tapered to a feathered edge or repair topping.
 - 1. Repair any floor section measuring below either the minimum local F_F number or the minimum local F_L -number.

2. Repair any floor where the entire tested installation measures less than the specified overall values.

D. Float Finish: Place, consolidate, strike off and level concrete slab to proper elevation. After the concrete has stiffened sufficiently to permit the operation, and water sheen has disappeared, the surface shall be floated, at least twice, to a uniform sandy texture. Provide a float finish for slab surfaces scheduled to receive the following:

1. Ceramic tile (except adhesive-set).
2. Concrete fill or topping.

E. Troweled Finish: After the surface has received a float finish, the concrete shall be troweled at least twice to a smooth dense finish. Do the second troweling after the concrete has become so hard that no mortar will adhere to the edge of the trowel, and exert heavy pressure to thoroughly compact the surface. Leave floors with a smooth, hard finish free of blemishes and true to the maximum flatness tolerance specified. Trowel finish surfaces scheduled to receive the following:

1. Resilient flooring.
2. Adhesive-set ceramic tile.
3. Carpeting.
4. Where no other finish is specified.

Note areas requiring "quick-dry" concrete.

3.12 CEMENT FILL

- A. For steel pan-type stairs and platforms install cement fill on a continuous wire mesh of not less than 14 ga. welded wire fabric, 2 in. square, supported approximately 1/2 in. above the bottom of pans. Screed cement fill level and finish with wood float.
- B. At stair treads provide abrasive nosing on hard troweled concrete fill.

3.13 LIQUID SEALER/DENSIFIER FINISH

- A. Apply this compound on exposed interior floors subjected to vehicular abrasion and shake on hardener slabs as indicated on the drawings. Application shall be made in strict accordance with the directions of the manufacturer and just prior to completion of construction. Spray, squeegee or roll on liquid densifier to clean, dry concrete surface. The liquid should be scrubbed into the surface with a mechanical scrubber. Keep the surface wet with the densifier during the application process. When the product thickens, but not more than 60 minutes after initial application, the surface shall then be squeezed or vacuumed to remove all excess liquid

1. Exposed in the finished work.
2. To receive carpeting.
3. As noted elsewhere in the Contract Documents.

3.14 GROUTING

- A. Mix grout in accordance with the approved manufacturer's instructions to a consistency which will permit placement. Place grout so as to ensure complete bearing and elimination of air pockets.
- B. Where high fluidity and/or increased placing time is required, use the specified high flow grout. This grout shall be used for all base plates larger than 10 square feet.

END OF SECTION

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SECTION 03 35 00

SPECIAL CONCRETE FINISHES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General: Work of this Section includes requirements for new architectural concrete work and cleaning and repair of in-place existing architectural concrete work, including concrete materials, mix design, formwork, reinforcement, placement and finishing treatments.
- B. Related Work: Architectural Concrete Topping 03 53 00

1.2 STANDARDS

- A. Comply with specifications for structural cast in place Concrete Specification Section 03 30 00
- B. Where the language in any of the documents referred to herein is in the form of a recommendation, suggestion or guide; such recommendation or, suggestion or guide shall be deemed to be mandatory under this Contract.

1.3 SUBMITTALS

- A. General: Do not proceed with the construction of the cast-in-place architectural concrete in the project, including fabrication of the formwork, until all samples, product data, mock-up and shop drawings have been approved by the Commissioner.
- B. Shop Drawings
 - 1. Submit shop details and placing drawings for reinforcing steel.
 - 2. Submit formwork shop drawings showing the layout and details of formwork for the work, including the mock-ups. Show layout of all form joints, crack control joints, construction & expansion joints, tie locations and exposed embedments. Show details of shop assembly of formwork and field assembly of construction and control joints, reveals, recesses, embedments, ties, back-up, clean out panels, sleeves, openings, and the means to be used to tightly seal all joints and maintain alignment.
 - 3. Reinforcing steel cover, location of clear placing passages through reinforcing for placing trunks.
- C. Placing: Submit layout or description of each placement showing sequence and projected time between deposits.
- D. Product Data: Manufacturer's name and technical information for each of the following products:

1. Cement.
 2. Aggregates, each type
 3. Admixtures, each type, including manufacturer's certifications, as specified under Admixes.
 4. Form surface material, each type
 5. Compressible Foam gaskets.
 6. Form release coating
 7. Reinforcing accessories
 8. Form ties
 9. Curing materials.
 10. Cleaning solutions
 11. Water repellent sealer
 12. Inserts and embedments, each type
 13. Crack control device.
 14. Concrete mix supplier certification
 15. Qualifications for Concrete Carpenter, Laborer, Reinforcing Steel Foremen and designated Quality Control Person
- E. Mill Tests: Submit, as requested, certified mill test reports for cement, metal reinforcement and welded wire fabric.
- F. Samples:
1. Formwork contact materials, each type, 12 inches square
 2. Reveal form strips, each size, 12 inches long
 3. Foam gaskets, 12 inches long
 4. Form ties, one each type
 5. Reinforcing supports, tie wire, one each type
 6. Crack control device, 12" long
 7. Concrete Samples for color determination:
 - a. Submit the following
 - b. Concrete color samples: 12"x12"x1", cast flat, using specified form material, to establish the color. Use mix ingredients as specified

herein. Finish with specified finish treatment. Submit as required to attain approval of the Commissioner. See form box detail at the end of this section.

8. Final Samples:
 - a. Submit samples of approved color mix and finish treatment, with specified finish for record:
 - b. Three 12"x12"x2-1/2" cast vertically. Cast each panel simulating techniques to be used in production casting to reduce the surface air voids and achieve the specified criteria. See vertical form box detail at the end of this section.

G. Mock-up for Formed Concrete Work:

1. After all samples, product data, and the shop drawings for the Mock-up are approved construct a mock-up of the work in a location approved by the Commissioner and as described below.
2. Mock-up shall consist of one wall panel:
 - a. Foundation of a size and reinforcement adequate to support the work.
 - b. Wall panel: 4'-0" wide x 8'-0" high x 8" thick. Use HDO on one wall side and ends, and Finn-Form on one wall side.
 - 1) One butt form joint horizontally, each side
 - 2) Tapered thru-the-wall ties.
 - 3) Concealed snap ties
 - c. Reinforce all units as in a typical building wall. Add additional reinforcement as required for support.
 - d. Use approved form face material, reinforcement and accessories and assemble formwork as intended for the building construction.
 - e. Place concrete with methods to be used for typical placements in building, including anticipated time delays between deposit lifts.
 - f. Finish exposed hardened surfaces with specified finishes when directed by the Commissioner.
 - 1) Commissioner and the cleaning solution manufacturer's technical representative shall be present when finishing is applied.
 - 2) Apply applications of cleaning solution in 12" wide areas full height of the wall on one side of mock-up. Use varying dilutions of solution as directed by the Commissioner.
 - 3) Apply selected finish to opposite side when directed by the Commissioner.
 - 4) Apply sealer to finished side when directed by the Commissioner.
3. If mock-up is not approved by the Commissioner, remove and replace

with others at no additional cost.

4. Mock-up shall be located so it can remain throughout construction. Protect mock-up from damage during construction. Remove mock-up when directed by the Commissioner.

H. Mock-up for Floor

1. Minimum 10 ft. x 10 ft. area. Butt slab to wall mock-up and put in floor reveal at interface between wall and slab.
2. Finish with hard trowel finish using specified procedures to be used on the floor topping slabs.
3. If mock-up is not approved by the Commissioner, remove and replace with others and no additional cost to the Owner.
4. Mock-up shall be free-standing, located in the adjacent courtyard, so it can remain throughout construction. Protect mock-up from damage during construction. Remove mock-up when directed by the Commissioner.

- I. Concrete mix designs: Submit Preliminary Design Mix Reports at least three weeks prior to the beginning of the work. Submit separate Design Mix Report for each class of concrete and construction procedure anticipated.

1.4 QUALITY ASSURANCE

A. Special Experience Requirements:

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 and shall be approved for work on project. Submit projects, including name, description of responsibilities, scope of work, and references.

- B. The contractor shall employ qualified personnel to perform the work described in this section and on the drawings.

- C. Concrete Quality Control Technician: Assign a quality control person to oversee the architectural concrete work. The primary duty is to be responsible for the required execution of the work.

- D. Project Pre-construction Meeting: After approval of products and color samples and as early as possible, but not less than 30 days prior to the fabrication of the formwork, the Contractor shall schedule a meeting at a mutually agreed time. The meeting shall include the Commissioner, the Contractor, the Concrete Subcontractor, Formwork Fabricator, Labor Forman, Commissioner's Testing Agency and Concrete Supplier. Meeting agenda will be to discuss the materials, methods of forming and placing, coordinating and quality control procedures involved in the Architectural and Structural Cast-in-Place Concrete work and the interface with the non-architectural and related work.

E. Preliminary Design Mix Tests

1. Prepare design mixes in accordance with Specification Section 03 30 00

Cast In Place Concrete.

1.5 PERFORMANCE REQUIREMENTS

- A. Responsibility for the design of Cast-in-Place Architectural Concrete in conformance with the requirements of the drawings and specifications and performed using the highest standards of quality for visual and durable concrete rests with the Contractor.
- B. Design of the mix and formwork shall be performed by Contractor's registered professional Engineer, registered in the State where the project is located, and submittals for the same shall be sealed by said Engineer. Design shall include structural integrity, alignment and formwork tightness under placing pressures that will be encountered.
- C. Performance Criteria: All cast-in-place architectural concrete formwork shall be performed so that no evidence of the following will be evident when the concrete is subject to imposed loads, temperature and weather conditions:
 - 1. Damage of any kind.
 - 2. Cracking, other than at control joints, due to improper forming and placing.
 - 3. Out of alignment or incorrect profiles.
 - 4. Surface voids not completely covered by a circle 11/16 inches in dia. (10 cent coin) or more than 25 surface voids larger than 1/8 inch, in longest dimension, in any area 1 ft. square.
 - 5. Voids, sand pockets or discoloration due to fluid loss through the formwork.
 - 6. Rockpockets and honeycombs.
 - 7. Discoloration of any kind, including that caused from staining and from improper placing of the concrete.
- D. If any of the above-mentioned deficiencies occur, the Commissioner may order the affected concrete replaced or repaired with acceptable concrete. Repair only when directed by the Commissioner. Corrected deficiencies must meet with the Commissioner approval.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General
 - 1. Comply with the Materials Requirements of the Structural Concrete Specification Section 03 30 00.
- B. Formwork

1. For unexposed surfaces and rough work, use Exterior Type Douglas Fir, Grade B-B, (concrete form) Plywood, conforming to NBS PS-1, minimum 3/4 in. thick, or undressed lumber, No. 2 common or better. Before reusing forms, withdraw nails and thoroughly clean surfaces to be in contact with concrete.
2. Smooth flat form surfaces: Shall be one of the following as selected on the mock-up by the Commissioner:

Panels shall be one of the following as selected by the Commissioner after use on the mock-up.

- a. FinnForm: Plastic coated, birch plywood, minimum 14 plys per inch, 3/4" thick panels. Provide in sizes up to 5' x 10' to cover surface areas between joint lines shown on the drawings. Panels shall be as manufactured by Plywood & Door Corp. or approved equal.
- b. High Density Overlay – HDO: Smooth flat form surfaces: Surfaces designated "smooth" on the drawings shall be High Density Plastic Overlay plywood, 3/4" thick, 8' x10' panels to cover surface areas between joint lines shown on the drawings. Panels shall be "Pourform 45" by Ainsworth; "Multipour" by Simpson; "Armor Ply" by Sylvan Industries, or approved equal.

2.2 MIXES

- A. Comply with Requirements of 03 30 00 Cast In Place Concrete Specification

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with Requirements of 03 30 00 Cast In Place Concrete Specification
- B. Repairs of existing concrete to follow structural details on sheet S-203. Infill of existing openings that remain architecturally exposed is subject to the same acceptance criteria as new concrete work.

END OF SECTION

SECTION 035300

CONCRETE FLOOR TOPPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the concrete floor topping as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Carpentry - Section 062000.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
 - 1. ASTM C 618, Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Uses as a Mineral Admixture in Portland Cement Concrete
 - 2. ASTM C 311, Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete
 - 3. ASTM C 989, Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars
 - 4. Standard Practice ACI 226.R1. Ground Granulated Blast-Furnace Slag as a Cementitious Constituent in Concrete

B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:

1. Concrete materials of this Section shall contain post-industrial and/or post-consumer recycled content as follows:
 - a. Flyash: Concrete shall incorporate flyash as a replacement for at least 25% (by weight) of the Portland cement. All design mixes are subject to review and approval by the Structural Engineer.
 - b. Ground Granulated Blast Furnace (GGBF) Slag: Concrete shall incorporate GGBF Slag as a replacement for at least 25% (by weight) of the Portland cement. All design mixes are subject to review and approval by the Structural Engineer.
 - c. Recycled Steel: Reinforcing bar, rods, steel wire, welded wire fabric, anchors and ties, and miscellaneous steel accessories shall contain a minimum of 75% combined post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials).
 - d. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
2. Concrete materials manufactured within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable
4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

C. Codes and Standards: ACI 301 "Specifications for Structural Concrete Buildings"; ACI 318, "Building Code Requirements for Reinforced Concrete"; and ACI 302; comply with applicable provisions.

D. Comply with ACI 302 section 7.7.2 and 7.8.

1.5 MOCK-UP IN CONJUNCTION WITH FINISH TRADES

- A. Mockups: Cast topping mockups to demonstrate expansion joints, color one saw cut control joint, surface finish, bonding, texture, tolerances, and standard of workmanship.
1. Build mockups approximately 6 foot by 6 foot in a concealed location below the upper lobby. Mockups shall be left in place for comparison and quality control with the final product.
 2. Notify Commissioner seven days in advance of dates and times when mockups will be constructed.
 3. Obtain Commissioner's approval of mockups before starting construction.
 4. If Commissioner determines that mockups do not meet requirements, demolish and remove them from the site and cast others until mockups are approved.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- B. Materials and methods employed as part of the fabrication of the accepted mockup must be identical to those performed and provided as part of an approved installation.
- C. Demolish and remove mockups when directed.

1.6 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content. Provide concrete mix designs indicating the amount of recycled content, by weight.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. Manufacturer's Data: Submit manufacturer's product data with installation instructions for materials including reinforcement, admixtures, joint materials, curing materials and others as requested by Commissioner.
- C. Laboratory Reports: Submit 2 copies of laboratory test or evaluation reports for concrete materials and mix designs. Do not use mix until approved by Engineer.
 1. Mix Proportions and Design: Proportion mixes complying with mix design procedures specified in ACI 301.

PART 2 PRODUCTS

2.1 SELF-LEVELING CONCRETE TOPPING

- A. Provide "Ardex SD-T Self Drying, Self Leveling Concrete Topping" as manufactured by Ardex Inc., or equivalent product of W. R. Bonsal, Maxxon, Conspec, or approved equal.
1. Topping shall be able to be installed from 1/4" to 2" in one pour, and tapered to match the existing elevations.
 2. Topping shall be applied to a minimum average thickness of 1/4" over highest point in the subfloor. Provide thickness required to achieve level with other floors; height varies depending on finish.
 3. Topping material shall achieve compressive strength of 6100 psi after 28 days per ASTM C 109/mod.
 4. Topping shall be walkable after 2 to 4 hours at 70 deg. F.
 5. Topping shall be able to be surface treated as soon as it can be walked on without damage.
- B. Materials
1. Portland cement based, self drying, self leveling topping.
 2. Primer: As recommended by topping manufacturer.
 3. Water shall be clean, potable and sufficiently cool (not warmer than 70 deg. F.)
 4. Aggregate as applicable for deep fill areas shall be 1/8" to 1/4" washed, dried and graded pea gravel.
 5. Wear Surface: The finished SD-T surface shall be normal smooth trowel, coated with specified sealer. Matte sheen and number of coats shall be as approved by the Commissioner.
 6. Sealer: Stonelok 2K by Richard James Specialty Chemicals Corp. or Commissioner approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where concrete floor topping 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 have been corrected by the Contractor in a manner acceptable to the Commissioner.

3.2 INSTALLATION

- A. Topping Applied to Hardened Concrete: Remove dirt, loose material, oil, grease, paint or other contaminants, leaving a clean surface.
 - 1. Base slab surface shall be roughened by shot blasting a minimum of 1/16" in depth.
- B. After shot blasting apply bonding agent as per manufacturer's instructions.
- C. Placing and Compacting: Spread topping mixture with reinforcing evenly over prepared base, bring to required level with straight-edge and strike-off. After placement, do not work surface further until ready for floating. Begin floating when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power driven floats. Consolidate surface with power-driven floats, or by hand floating if area is small or inaccessible to power units.
- D. Slab Finishes
 - 1. Screed to true and level alignment unless indicated sloped on drawings, then uniformly slope as indicated.
 - 2. Tool all salient edges of concrete.
 - 3. Do not absorb water with neat cement.
 - 4. Make sharp arrises at wall to floor conditions unless otherwise indicated.
 - 5. Finish/steel trowel.
 - 6. Finish shall be high penetrating satin sheen absorptive coating.
- E. Check and level surface plane to tolerance not exceeding 1/8" in 10'-0" when tested with a 10'-0" straightedge. Cut down high areas and fill low areas during placement only. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth finish.
 - 1. Apply sealer in accordance with manufacturer's instructions.
- F. Performance: Failure of concrete topping to bond to substrate (as evidenced by a hollow sound when tapped), or disintegration or other failure of topping to perform as a floor finish, will be considered failure of materials and workmanship. Repair or replace toppings in areas of such failures.

END OF SECTION

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SECTION 04 22 00
UNIT MASONRY-CMU

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide load bearing, concrete unit masonry, and other masonry Work as specified herein, as shown on the Drawings, and as needed for a complete and proper installation. The terms Concrete Masonry Unit (CMU) and Concrete Block are inter-changeable.
- B. On-site Work and factory pre-fabricated Work of the same type shall be matching in appearance and construction.
- C. For other than load bearing walls, see and coordinate with architectural masonry specification.

1.2 WORK FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Dovetail Anchor Slots

1.3 WORK INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Metal Fabrications, Loose Lintels, Built-in Work - Section 05 50 00

1.4 RELATED SECTIONS

- A. Cast-in-Place-Concrete - Section 03 30 00
- B. Grouting -- within Section 03 30 00
- C. Unit Masonry -- Section 04 20 00
- D. Cold-Formed Steel - Section 05 40 00
- E. Lintels -- Section 05 12 00

1.5 DESIGN REQUIREMENTS

- A. No air-entraining admixtures or material containing such shall be permitted in the mortar. Also, no anti-freeze compounds, calcium chloride, or other compounds, unless expressly permitted otherwise, shall be permitted in the mortar.
- B. Mortar types to be used at the following locations, unless otherwise stated:
 - 1. Reinforced masonry, masonry walls supporting structural steel or timber - Type S
 - 2. Masonry below grade and exposed to earth - Type M

1.6 REFERENCES

- A. American Society of Testing and Materials (ASTM) standards, latest editions.

1. A153 "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Products".
2. A240 "Standard Specification for Heat-Resisting Chromium and Chromium Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels".
3. A580 "Standard Specification for Stainless and Heat-Resisting Steel Wire".
4. A615 "Standard Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement".
5. C33 "Standard Specification for Concrete Aggregates".
6. C55 "Standard Specification for Concrete Building Brick".
7. C62 "Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)".
8. C90 "Standard Specification for Hollow, Load-Bearing Concrete Masonry Units".
9. C109 "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-inch or 50 MM Cube Specimens)".
10. C129 "Standard Specification for Non-Load-Bearing Concrete Masonry Units".
11. C140 "Standard Methods of Sampling and Testing Concrete Masonry Units".
12. C144 "Standard Specifications for Aggregate for Masonry Mortar".
13. C145 "Standard Specification for Solid Load-Bearing Concrete Masonry Units".
14. C150 "Standard Specification for Portland Cement".
15. C207 "Standard Specification for Hydrated Lime for Masonry Purposes".
16. C270 "Standard Specification for Mortar for Unit Masonry".
17. C315 "Standard Specification for Clay Flue Linings".
18. C331 "Standard Specification for normal weight; Lightweight Aggregates for Concrete Masonry Units".
19. C404 "Standard Specifications for Aggregates for Masonry Grout".
20. C476 "Standard Specification for Grout for Reinforced and Nonreinforced Masonry".
21. C595 "Standard Specifications for Blended Hydraulic Cements".

B. Industry Standards.

1. "Standard for Concrete Masonry Units" - UL 618- Underwriters Laboratory.

C. American Concrete Institute (ACI) standards as modified by NYC Building Code.

1. ACI 530-92 "Building Code Requirement for Masonry Structures".

2. ACI 530.1-92 "Specification for Masonry Structures".

1.7 SUBMITTALS

A. Product Data

1. Submit complete data for concrete masonry units. Submit a list indicating the maximum dry weight of each type and size of CMU to be used in the project.
2. Provide name of aggregate producer.

B. Samples

1. Submit 3 of each masonry units.
2. Submit 3 of each type of anchor, tie, continuous reinforcement.

C. Quality Control Submittals

1. Schedule of Uses: By mortar type.
2. Certificates
 - a. Submit the normal weight, lightweight CMU producer's certificate stating that the minimum equivalent thickness and mix design are in conformance with UL 618 for the indicated fire rating.
 - b. Submit normal weight, lightweight CMU producers certificate stating aggregate used is 100% lightweight, expanded shale, clay, or slate (rotary kiln) aggregate, in accordance with ASTM C331.
 - c. Furnish notarized Building Department affidavit from masonry manufacturer (Form 10H) stating materials delivered to project comply with the Specification requirements.
 - d. Furnish notarized Building Department affidavit from masonry supplier (Form 10J) stating materials delivered to project comply with the Specification requirements.
 - e. Submit BSA or MEA approvals.

1.8 QUALITY ASSURANCE

A. Qualifications

1. Company specializing in the Work of this Section shall have a minimum of three years experience and projects with similar quantity of materials.

B. Regulatory Requirements

1. Building Code: Work of this Section shall conform to all requirements of the NYC Building Code and all applicable regulations of governmental authorities having jurisdiction, including safety, health, noise, and anti-pollution regulations. Where more severe requirements than those contained in the Building Code are given in this Section, the requirements of this Section shall govern.

2. UL 618: Fire rating of CMU and assemblies shall conform to the requirements UL 618.
3. NYC Board of Standards and Appeals (BSA) approvals, or
4. NYC Materials and Equipment Acceptance (MEA) approvals.

C. Certification

1. Reinforced and unreinforced masonry shall conform to the material acceptance, certification and inspection requirements of Article 7, Chapter 1 - Subchapter 1 and Tables 10-1 and 10-2 of the Building Code (Title 27).

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in undamaged condition and store in location and with protection as needed for the following:

1. All Masonry Units: Prevent harm from contaminants, temperature changes, corrosion, and other causes.
2. Concrete Masonry Units: Limit moisture absorption in conformance with the applicable ASTM.
3. Cementitious Mortar and Grout Materials: Keep in dry conditions.
4. Aggregates: Keep in dry, clean area where grading can be controlled.
5. Accessories, Ties, and Reinforcement: Keep in area to prevent corrosion and to keep clean.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Construction Requirements

1. Salt or other chemicals for lowering the freezing temperature of the mortar shall not be used.
2. Masonry units, mortar, and grout shall be preconditioned and masonry protected for the following cold weather conditions:
 - a. Air temperature 40°F to 32°F:
 - 1) Heat mixing water or sand to minimum of 70°F and to maximum of 160°F.
 - b. Air temperature 32°F to 25°F:
 - 1) Heat mixing water and sand to minimum of 70°F and to maximum of 160°F.
 - 2) Provide heat source to maintain a minimum air temperature 32°F on each side of masonry construction.
 - c. Air temperature 25°F to 20°F:

- 1) Heat mixing water and sand to minimum of 70°F and to maximum of 160°F.
 - 2) Provide heat source to maintain a minimum air temperature of 32°F on each side of masonry construction.
 - 3) Provide wind breaks for wind in excess of 15 miles per hour.
- d. Air temperature 20°F and Below:
- 1) Heat mixing water and sand to a minimum of 70°F and to maximum of 160°F.
 - 2) Provide enclosures and heat source to maintain a minimum air temperature of 32°F on each side of masonry construction during construction.
 - 3) Keep temperature of masonry units a minimum of 30°F when laid.

B. Protection Requirements

1. Mean Daily Air Temperature of 40°F to 32°F:
 - a. Protect masonry from rain or snow for 24 hours.
2. Mean Daily Air Temperature of 32°F and Below:
 - a. An air temperature of at least 32°F shall be maintained on each side of masonry for a period of at least 48 hours if Type M or S mortar is used and at least 72 hours if Type N or O mortar is used.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Aggregate for Concrete Masonry Units (CMU)
1. Northeast Solite Corporation, Mt. Marion, N.Y.
 2. Norlite Corporation, Cohoes, N.Y. or approved equal.
- B. Reinforcement and Ties, Top of Wall Channels, Neoprene Sponges.
1. Hohmann & Barnard, Inc., Hauppauge, N.Y.
 2. Dur-O-Wall, Arlington Heights, IL. or approved equal.
- C. Masonry Cleaner
1. ProSoCo, Inc., South Plainfield, N.J.
 2. Sure-Kleen or approved equal.
- D. Mortar Additives: Biordi Co. or approved equal.

- E. Calcium Silicate Masonry Units (CSMU)
 - 1. Arriscraft U.S.A. Corporation, distributed by Tri-State Stone, Inc., New York, N.Y. or approved equal.

2.2 CMU DISTRIBUTORS

- A. Consolidated Brick and Building Supplies, Inc., N.Y., N.Y.
- B. Tri-State Brick & Building Materials, Inc. N.Y., N.Y.
- C. Belden-Stark Brick Corp., N.Y., N.Y.
- D. Glen-Gery Corp., N.Y., N.Y.
- E. Ram Building Products, Glen Cove, N.Y.

2.3 MATERIALS

A. Base Materials

- 1. Portland Cement
 - a. Type I: ASTM C150
 - b. Type II: ASTM C150
- 2. Sand for Mortar Mix: ASTM C144
Sand shall be natural sand with 100% passing the No. 8 sieve.
- 3. Aggregate for CMU: 100% Light Weight aggregate: ASTM C331, expanded clay shale or slate (rotary kiln process). No mixture with other aggregates allowed.
Normal Weight: ASTM C33
- 4. Aggregate for Masonry Grout: ASTM C404
- 5. Hydrated Lime: ASTM C207; Type "S"
- 6. Water - Clean, potable New York City water free of injurious materials.
- 7. Mortar additive for use in setting of exterior elements with horizontal surfaces exposed to weather.
 - a. Additive shall be non-toxic, non-flammable, and non-hazardous during storage, mixing, application, and when cured.
 - b. Finished mortar shall be resistant to urine, dilute acid, dilute alkali, sugar, brine, and calcium chlorides and other salts used in deicing salts.
- 8. Premixed sand and lime for mortar mixes not allowed.

B. Concrete Masonry Units (CMU)

- 1. Types
 - a. Hollow Load Bearing: ASTM C90, Grade N-I. Aggregate shall conform to ASTM C331 (ASTM C33 for normal weight).

- b. Solid Load Bearing (units with 75% or more net area), including Bond Beam Units: ASTM C145, Grade N-I. Aggregate shall conform to ASTM C331 (ASTM C33 for normal weight).
 - c. High Strength CMU: Compressive strength shall be 3500 psi. Provide only where indicated on Drawings. Aggregate shall conform to ASTM C331 (ASTM C33 for normal weight).
 - d. Concrete Brick: ASTM C55, Type 1, Grade N-1, standard modular size. Aggregate shall conform to ASTM C33.
2. Size
- a. Nominal face dimension 8" x 16", except as noted otherwise.
 - b. Provide half units, corner units, half-high units, "U" shaped lintel/bond beam units, and units of special size and shape or with multiple grinds, e.g., two faces, two ends, or any faces as required by the Drawings to accomplish the work.
3. Unit Weight: Unit weight of concrete for normal weight, lightweight aggregate CMU not to exceed 90 pcf when tested in accordance with ASTM C140 (105 pcf for the high strength CMU).
4. UL Fire Ratings: Units manufactured with equivalent solid thicknesses, face shell thicknesses, web thicknesses, and other characteristics to obtain fire ratings as indicated on the Drawings.

C. Reinforcement and Ties

- 1. Provide reinforcement and ties as specified herein unless otherwise noted. Provide additional reinforcement and ties as required to withstand all transportation, seismic and other design loads and to obtain fire resistance ratings.
- 2. Material
 - a. Reinforcement and Ties for Exterior Walls: Formed from stainless steel, 18-8, type 304.
 - 1) Sheet steel: (No. 2B Finish), cold-rolled, annealed, ASTM A240.
 - 2) Wire steel: ASTM A580.
 - b. Reinforcement and Ties for Interior Walls: Hot-dip galvanized (after fabrication), ASTM A153.
 - c. Factory-fabricated corners and tees at corners and intersecting walls for continuous type reinforcing.

D. Miscellaneous Accessories

- 1. Plastic tubing for weep holes: medium density polyethylene, size 3/8" O.D. diameter (minimum 1/4" I.D.) x 4" long.

E. Reinforcing Steel

1. Deformed bars conforming to ASTM A615, Grade 60.

2.4 MIXES

A. Mortar (basic)

1. Shall conform to ASTM C270 and BIA M1-88. Provide Type I Portland cement. Masonry cement shall not be used as a substitute.
 - a. Type M: 1 part gray cement, 1/4 part lime, 3³/₄ parts dry sand. Minimum compressive strength shall be 3000 psi at 28 days.
 - b. Type S: 1 part gray cement, 1/2 part lime, 4¹/₂ parts dry sand. Minimum compressive strength shall be 3000 psi at 28 days.
 - c. Type N: 1 part gray cement, 1 part lime, 6 parts dry sand. Minimum compressive strength shall be 750 psi at 28 days.
 - d. Type N "White": 1 part white cement, 1 part lime, 6 parts dry white sand. Minimum compressive strength shall be 750 psi at 28 days.

B. Colored Mortar

1. Proportion mortar coloring with other mortar mix ingredients to obtain desired color, as approved by the Authority. Provide white cement instead of gray cement where required to meet the desired color. Do not exceed 1 part pigment to 10 parts cement, by weight.

C. Grout for Masonry

1. Mixes
 - a. Fine Grout: 1 part Portland Cement, 0-1/10 part Hydrated Lime, 2¹/₄-3 times the sum of volumes of cementitious materials of fine aggregate (Proportions by volumes).
 - b. Coarse Grout: 1 part Portland Cement, 0-1/10 part Hydrated Lime, 2¹/₄-3 times the sum of volumes of cementitious materials of fine aggregate, and 1-2 times the sum of the volumes of cementitious materials of coarse aggregate (Portions by volume).
 - c. Aggregates for Mixes: ASTM C 404.
2. Location
 - a. For spaces less than 2" in horizontal direction, use fine grout.
 - b. For spaces 2" and more in horizontal direction, use coarse grout.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine all adjoining Work on which this Work is in anyway dependent for proper installation and workmanship. Report to the Authority any conditions which prevent the performance of this Work.

3.2 PROTECTION

- A. Cover top of masonry wall with waterproof plastic membrane at the end of the work period and at other times when Work needs to be protected from rain and other precipitation. Extend cover down sides as needed to thoroughly protect the Work.
- B. During cold weather, do not use wet masonry units and frozen masonry units.
- C. Do not use frozen materials or lay masonry on frozen materials; remove frozen materials from wall. Refer to Part 1 of this Section, "Environmental Requirements" for temperature restrictions.
- D. Remove excess mortar from walls as soon after laying units as practicable to prevent staining and to facilitate cleaning of wall.
- E. Brace walls as needed until sufficiently set, or until intersecting walls provide lateral support.

3.3 MIXING PROCEDURES FOR MORTAR

- A. Measure material by volume or equivalent weight. In measuring by volume, measure ingredients by container. Do not measure by shovel.
- B. Mix ingredients in a clean mechanical mixer for a minimum of 3 minutes, maximum of 5, with the minimum amount of water to produce a workable consistency.
- C. Mortar that has stiffened because of evaporation of water from the mortar shall be retempered as frequently as needed to restore the required consistency. Mortar shall be used within 2¹/₂ hours after initial mixing.

3.4 LAYING - GENERAL

- A. Lay units true to dimensions, plumb and level, square; exterior and interior bond work in bond indicated on the Drawings or specified herein. Lay courses level with joints uniform; vertical joints spaced properly for plumb alignment.
- B. Fill bed joints and cross joints solid with mortar. Furrowed bed and spotted cross joints not permitted. For hollow block units, apply mortar full length on all bearing surfaces.
- C. "Tooth" temporary openings in exposed masonry walls, to maintain proper bond when closed.
- D. Tool joints in exposed masonry units to provide a neat, smooth, compacted surface.
- E. Remove excess mortar, leaving masonry surface clean.
- F. Cut concrete masonry units with circular masonry saw.
- G. Build-in miscellaneous metal inserts and other items not furnished under this Section but specified to be installed under this Section.
- H. Use running bond, unless otherwise noted on drawings.

3.5 CONCRETE MASONRY UNITS (CMU)

A. General

1. Lay blocks in Type S mortar, with cells vertical. Provide running bond unless shown otherwise on the Drawings or as indicated below, bonded at corner angles. Provide stack bond where block will be finished wall surface exposed to view. Reinforced concrete masonry or concrete masonry walls with structural steel bearing on it shall be laid with Type S mortar.
2. Where interior partitions intersect other partition or walls, bond together with metal wall ties spaced 2'-0" o.c. min., vertically. Refer to Article on "Reinforcement".
3. Where interior walls are to be furred, secure furring with hot-dip galvanized steel ties, spaced one for each 4-square feet.
4. Extend interior partitions and furring up to underside of slabs, arches, and beams. Leave sufficient space between partition and slab/arch/ beam to install firestopping materials as specified in Section 07 84 13. If firestopping is not required, provide resilient material such as backer rod and sealant (See Section 07 92 00).
5. Leave temporary openings in interior partitions to permit passage of equipment.
6. Reinforce first two courses above all door openings with a layer of truss mesh reinforcement extending 12" beyond jambs.
7. Provide grout in cores of blocks at jambs, parapets, under lintels, and where indicated on the Drawings.
8. Bond beam units shall be filled with normal weight lightweight concrete having a minimum compressive strength of 3000 psi and reinforced as shown on details.

B. Horizontal and Vertical Face Joints

1. Make joints uniform and 3/8" thick, unless otherwise indicated.
2. Make vertical joints tight.
3. Tool joints with a smooth, non-staining tool, when thumb print hard, at surfaces to be painted or exposed.
4. Point joints tight with a trowel, in unparged masonry below grade.
5. Cut mortar joints flush in surfaces to be covered with other masonry.
6. Remove mortar protrusions that extend into cells or cavities which are to be reinforced and filled.

C. Exposed and Painted Surfaces

1. Smooth, even texture, free of chips, cracks, or other imperfections and free from any material that will stain paint.
2. Set block up with special care for plane, jointing, pattern, and cutting.

3. Keep faces of units clean; clean off mortar droppings on block face immediately.
4. Defective units will be rejected. Replace defective units with perfect units at no extra cost to the Authority.
5. Tool joints with a smooth, non-staining tool to produce a smooth and slightly concave surface.
6. See Drawings for thickness of Concrete block.

D. Controls Joints

1. Construct 1/2" wide vertical control joints in partitions where indicated on the Drawings.
2. Joints to extend full height of partition (floor to underside of slab or beam).
3. Filler (where applicable)
 - a. Polyethylene Foam Bar, or
 - b. Polyurethane Type Filler
 - c. Width as required for partition thickness, minus 1".
 - d. Install filler as partition is erected.
 - e. Filler to extend full height of joint.

3.6 CHASES (IN PARTITIONS)

- A. Provide where shown on the Drawings.
- B. After the installation of mechanical work at chases has been completed and approved, fill all chases solid with masonry, mortar, concrete, or grout. Make necessary provisions for anchoring wainscots, or facings.
- C. Built-in chases; do not cut-in.

3.7 CUTTING AND FITTING

- A. Cut units with a motor-driven carborundum saw; provide smooth, straight edges.
- B. Provide necessary cuts to fit tightly in and around mechanical installations.
- C. Where split block units are used to conceal piping or other installations, provide reinforcement for bonding the split units together.
- D. Drill holes neatly for attachment of handrail brackets and for other items to be attached.

3.8 REINFORCEMENT

- A. Provide reinforcement and ties as specified herein. Provide additional reinforcement and ties as required to withstand all transportation, seismic and other design loads for all masonry work.

- B. Interior Concrete Masonry Unit Walls: (unless otherwise noted)
 - 1. Provide mesh continuous at every third block course.
 - 2. Provide ties at 24" o.c. vertical spacing. Embed in masonry 4" minimum each wall.
 - 3. Provide straps at 48" o.c. vertical spacing.
- C. At structural steel locations maintain spacing of veneer anchors using anchors suited to conditions.
- D. Lap ends of adjoining strips of continuous reinforcement 6".
- E. Size (width) of reinforcement as required for 4", 6", 8", 10", 12" partitions.
- F. In partitions where control joints are indicated, keep reinforcement 1" short of each end of blocks at control joint.
- G. Install continuous reinforcement over all door openings in first and second mortar joints above door frame or lintels.

3.9 BUILT-IN WORK

- A. Where sleeves are required in brick walls or in partitions, furnish standard wrought iron pipes of necessary sizes and lengths and build in where shown.
- B. Set reglets for flashing, where required, and rake out to a depth of 1½".
- C. Maintain bucks, frames, and other built-in work in their proper position. Do not remove any braces or stays from these items until they are securely supported by and fastened to masonry.
- D. Set all loose lintels (exterior and interior), bolts, plates, and other items furnished under Section 05 12 00 and specified to be installed in this Section.
- E. Build into partitions and walls: Frames for grilles, convectors, access doors, and boxes for electrical equipment.
- F. Do not build wood blocks into walls for securing of grounds. Grounds shall be secured to the masonry by carpenter, nailing directly into masonry units or joints.
- G. Where ducts pass through cross-corridor fire zone partitions, build-in frames furnished under Section 05 50 00.
- H. Provide necessary special jamb blocks, regular and irregular angle blocks where required to obtain smooth, evenly jointed and regular block patterns.

3.10 MASONRY WALL REPAIRS

- A. Before cleaning masonry walls, examine faces for holes, cracks, and other defects. If corrections cannot be made to provide an appearance acceptable to the Commissioner, replace defective units.

3.11 QUALITY CONTROL

- A. The City of New York shall provide, under the requirements of paragraphs 27-132 and 27-602, Tables 10-1 and 10-2, and R&R 9/29/83 (Appendix A) of the Building Code a Licensed Professional Engineer Designated for Special/Controlled Inspection who will inspect the masonry construction.
- B. The Professional Engineer Designated for Special/Controlled Inspection shall make inspections and any testing deemed necessary.

3.12 CLEANING

- A. Concrete Masonry Units
 - 1. Clean wall surfaces to be painted; rub with carborundum stone: remove mortar from surfaces; remove rough edges from joints.
 - 2. Point up holes and joints. Brush with stiff bristle brush. Leave surface in condition to receive paint.
 - 3. Clean other wall surfaces with stiff-bristle brush.
 - 4. Do not use wire brush.

END OF SECTION

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SECTION 05 12 00
STRUCTURAL STEEL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General: Provide structural steel in accordance with the Contract Documents.
- B. Related Work Specified Elsewhere
 - 1. Miscellaneous framing not specifically shown on structural drawings. (Section 05 50 00)
 - 2. Grouting of base plates, leveling and bearing plates.
 - 3. Specific products for Shop and Field painting except as specified herein. (Section 09 90 10).
 - 4. Metal Decking. (Section 05 30 00).

1.2 STANDARD

- A. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions, most recent revisions, and recommendations of the following:
 - 1. AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, Load and Resistance Factor Design" (including all supplements).
 - 2. AISC "Code of Standard Practice for Steel Buildings and Bridges", except in Paragraph 4.4.1, delete section (a), and (c). Delete section (b) for all connections designed by the contractor's engineer. Delete section 3.2 - all contract documents apply to the contractor. As regards section 3.3 - comply with order of precedence given in the contract documents. Section 4.4 - Allow 15 working (business) days for review in the Commissioner's office, plus transit time.
 - 3. Industrial Fasteners Institute "Fastener Standards Book", Sections E, High-Strength Structural Bolting.
 - 4. AISC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts".
 - 5. AWS D1.1 "Structural Welding Code".
 - 6. SSPC "Steel Structures Painting Manual, Volume 2, Systems and Specifications".
- B. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.

1.3 SUBMITTALS

- A. Shop Drawings: Submit shop and erection drawings for all structural steel components showing the following:
1. Types of materials, including sizes and weights of members.
 2. Location, types and details of connections.
 3. Openings.
 4. Cleaning, surface preparation and painting schedules.
 5. Accurate depiction of adjacent conditions, including contractor verified field conditions.
- B. Calculations: Submit calculations of all connections, unless fully detailed on the structural drawings, according to the requirements shown on the Drawings. Calculations shall bear the seal of a Professional Engineer licensed in the State of New York, hired by the contractor.
- C. Job Connection Standards: Submit for review erection drawings and standards describing all connections, together with their capacities (substantiated by related calculations as described in section 1.04.B above). This shall occur sufficiently in advance of the start of fabrication such that agreement between the Commissioner and the engineer responsible for the connection design can be reached prior to the start of piece detailing.
- D. Reports
1. Submit certified copies of mill test reports for all steel furnished. Perform mechanical and chemical tests for all material regardless of thickness or use. No part of the ASTM Specifications will be waived without written consent of the Commissioner.
 2. Submit copies of prequalified and other welding procedures in form prescribed in "Structural Welding Code".
 3. Provide certified fastener test reports for each component lot of high-strength structural fasteners used in the project, including those for any A325 and A490 bolts, F436 washers, F959 DTI's, A563 nuts, or F1852 and F2280 twist-off bolts.
 - a. Certified test results of rotational capacity tests performed on galvanized structural fasteners shall be provided when such fasteners are specified or used.
- E. Manufacturer's Data: Submit product data or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
1. High-strength bolts (each type), including nuts and washers.
 - a. Include Direct Tension Indicators.

2. Structural steel paint. -
3. Shrinkage-resistant grout.

1.4 PRODUCT HANDLING

- A. Do not handle structural steel until paint has thoroughly dried. Care shall be exercised to avoid abrasions and other damage.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. Prior to installation and tightening, fastener components shall be protected from dust, dirt, moisture and other jobsite conditions detrimental to their lubricants and finish. Fastener components that accumulate rust or dirt resulting from job-site conditions shall not be used unless they are cleaned and relubricated (Twist-off bolts shall only be relubricated by the original manufacturer).
- C. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.
- D. Stack material out of mud and dirt and provide for proper drainage. Protect from damage or soiling by adjacent construction operations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.
- B. Steel:
 1. Structural Steel, Plates and Bars: ASTM A992, Grade 50 unless otherwise shown.
 2. Rectangular or Square Hollow Structural Sections (HSS): ASTM A500 Grade B, $F_y = 46$ ksi.
 3. Circular HSS: ASTM A500 Grade B, $F_y = 42$ ksi unless otherwise shown.
 4. Pipe: ASTM A53 Grade B $F_y = 35$ ksi.
- C. High-Strength Structural Fasteners:
 1. Heavy hex structural Bolts: Use only ASTM A325 or A490 bolts manufactured by Infasco or Vermont Fasteners or approved equal. Do not use A490 Bolts where galvanizing or paint with metallic pigment (ie. zinc-rich primer) is to be used.

2. Alternate design fasteners: ASTM F1852 and F2280 twist-off type tension control bolts produced by either manufacturer in 2.1C1 above may be used in lieu of standard structural bolts.
3. Washers: All washers shall have an internal diameter no greater than that of a "standard hole" as defined by AISC.
4. Hardened washers: Use only through-hardened ASTM F436 washers manufactured by Infasco, Vermont Fasteners, Technical Stamping, Prestige or Wrought Washer.
5. Direct Tension Indicators: Use only ASTM F959 DTI's manufactured by Turnasure or Bethfast or approved equal
6. Heavy hex nuts: Use only ASTM A563 heavy hex nuts manufactured by Infasco, Vermont Fasteners, or Unitite.
7. Where shown or noted as galvanized, threaded components shall be hot-dip galvanized complying with ASTM A153, with nuts lubricated in accordance with S2.1 of ASTM A563, and with rotational capacity tests performed on each assembly lot provided..

D. Direct Tension Indicators: ASTM F959, type as required.

1. Use on all A325 and A490 bolts on connections that are slip critical, including those using F1852 and F2280 twist-off type bolts.
2. Prior to fabrication and erection, representatives of the Commissioner, the City of NY's testing agency, the bolt and DTI manufacturers shall meet at the site to ensure that bolting methods and requirements (including inspection) for tensioning of high strength structural connections are fully understood and agreed to.

E. Filler Metal

1. Electrodes for Carbon Steel: Conform to AWS "Structural Welding Code". Minimum Charpy V-notch toughness value of 20 foot-pounds at -20 degrees Fahrenheit.

F. Non-metallic Shrinkage Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining, shrinkage resistant product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621 and ASTM C1107, free of gas-producing or gas-releasing agents, oxidizing catalysts, inorganic accelerators and chlorides. Provide one of the following.

1. "Five Star Grout" (U.S. Grout Corp.).
2. "Masterflow 713" (Master Builders Co.).
3. "Crystex" (L&M Construction Chemicals, Inc.).
4. "Sure Grip Grout" (Dayton Superior).

G. Paint

1. For All Steel Not Otherwise Specified: Provide the following primer at all interior steel, compatible with the finish coats of paint; final color to be approved by Commissioner. One of the following:
 - a. "4-55 Versare" (Tnemec Co. Inc.); 2.0 - 3.5 mils d.f.t.
 - b. "GP-818" (Carboline Co.); 2.0 mils d.f.t.
 - c. "Amercoat 5105" (Ameron Protective Coatings); 2.0 - 3.0 mils d.f.t.
 - d. "Dulux, 67-Y-834" (E.I. DuPont de Nemours); 2.0 mils d.f.t.
 - e. "Ferrox 25" (Con-Lux Coatings, Inc.); 2.0 - 3.0 mils d.f.t.
 2. Milled Surfaces: Light oil coating or strippable protective coating: apply as per AISC requirements prior to shipment.
 3. For all steel which is in contact with subgrade, all columns starting 6 inches above finished floor down to the base plate. Provide finish coat compatible with prime coat noted above. Touch-up in field.
- H. Galvanizing: All exterior structural steel shall be hot dipped galvanized after fabrication and touch-up galvanized in the field after erection.
- I. Threaded rebar fasteners/couplings: Threaded inserts and couplings for rebar splices, to develop at least 125% of the specified rebar's yield strength. F.C. Dayton Barsplice, Inc. couplings or approved equal.

2.2 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated. Fabricate beams with natural camber up.
1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Mill column and bearing stiffeners to give full bearing over the cross section. Mill contact surfaces of bearing and base plates. It is not necessary to plane bottom surfaces of plates on grout beds.
- C. Drill or punch holes at right angles to the surface of the metal, not more than 1/16 in. larger than the connector diameter. Do not make or enlarge holes by burning. Drill material having a thickness in excess of the connector diameter and material thicker than 7/8 in. Holes shall be clean-cut without torn or ragged edges. Remove outside burrs resulting from drilling operations.

- D. Provide holes in members to permit connection of the work of other trades. Use suitable templates for proper location of these holes. Steel requiring adjustment shall be provided with slotted holes as shown.
- E. Provide holes, slots and openings required by other trades together with necessary reinforcing as shown. Use suitable templates for proper location of these opening. Where openings are shown on the Drawings or shop drawings no change in location will be permitted without prior approval.
- F. Manual oxygen cutting shall be done only with a mechanically guided torch. An unguided torch may be used provide the cut is within 1/8 in. of the required line.

2.3 CONNECTIONS

- A. Connections shall be of the types shown on the Drawings unless prior approval is obtained from the Commissioner. Design connections for the capacities and according to the requirements shown on the Drawings. Employ a qualified Structural Engineer licensed in the State of New York to perform the structural design and detailing of connections. The general details shown on the drawings are conceptual only and unless specifically noted, do not indicate the required number of bolts or weld sizes.
- B. All connections shall be one of the following:
 - 1. High-strength structural bolts.
 - 2. Welds.

2.4 BOLTING

- A. Bolts shall be of a length that will extend not less than 1/4 in. beyond the nuts. Enter bolts into holes without damaging the thread.
- B. Use fully pretensioned high-strength structural bolts in bearing and/or friction as shown. Make high-strength bolted joints without the use of erection bolts. Bring members tightly together with sufficient high-strength "fitting-up" bolts which shall be retightened as all the bolts are finally tightened. Manual torque wrenches will not be accepted for final tightening. Protect bolt heads from damage during placing. Bolted connections that have been completely tightened and are ready for inspection shall be marked for identification.
- C. Final tightening of high-strength structural bolts shall be by properly calibrated and sufficiently powerful air-impact, hydraulic or electric wrenches capable of generating ample torque for the diameter and grade of fasteners to be tensioned, unless turn-of-nut method is specifically permitted. Each wrench shall be checked for accuracy at least once daily.

2.5 WELDING

- A. Do not begin structural welding until joint elements are bolted or tacked in intimate contact and adjusted to dimensions shown on Drawings, or both, with allowance for any weld shrinkage that is expected. Weld heavy sections and those having a high degree of restraint with low hydrogen type electrodes. No members are to be spliced without prior review by the Commissioner.

- B. Welding shall be performed by operators who have been qualified within the preceding one year period under AWS standard qualification procedure for the type of work required. All field welders shall be recertified for this project at the job site.
- C. Comply with AWS prequalified tubular joint details for all HSS direct-welded connections.
- D. Weld sizes shown on the drawings are the required effective sizes. Increase weld leg as recommended by AWS to account for dihedral angle and root opening.

2.6 SURFACE PREPARATION

- A. Clean all surfaces not otherwise specified in accordance with SSPC Surface Preparation Specification No. 3 Power Tool Cleaning or as recommended by the paint manufacturer, whichever is more stringent.
- B. Cleaning shall be done after fabrication and immediately prior to shop painting or shipment. Apply shop coat of paint within 4 hours after cleaning and before rust-bloom occurs.
- C. Blast cleaning operations shall not be conducted when the relative humidity of the air is greater than 85% or when the surface temperature of the steel is less than 5 deg. F. above the temperature at which condensation will occur, or when these conditions are anticipated. Remove all traces of blast residue and dust in a manner that will not contaminate the surfaces. Take every precaution to prevent contamination of surfaces. Workmen shall wear gloves free of grease and/or oil when handling blast cleaned steel.

2.7 SHOP PAINTING

- A. All structural steel shall receive a shop coat of paint except as follows:
 - 1. Contact surfaces of welded connections and areas within 2 in. of field welds.
 - 2. Contact surfaces of high-strength bolted connections.
 - 3. Surfaces receiving stud shear connectors.
 - 4. Members to be galvanized.
 - 5. Members to receive spray on fireproofing.
- B. Treat milled surfaces as specified under "Materials".
- C. Apply specified primer to provide a minimum dry film thickness as recommended by the paint manufacturer except for milled surfaces. No painting shall be done when the surface temperature of the steel is below the temperature at which condensation will occur. Apply paint thoroughly and evenly to dry surfaces in accordance with manufacturer's directions.

2.8 SOURCE QUALITY CONTROL

- A. Testing and Special Inspection of structural steel will be performed by a testing agency retained by the City of NY. Provide the testing agency with the following:
 - 1. A complete set of accepted documents required under Paragraph "Submittals".

2. Cutting lists, order sheets, material bills, and shipping bills.
 3. Information as to time and place of all rollings and shipment of material to shops.
 4. Representative sample pieces as requested by the testing agency.
 5. Full and ample means and assistance for testing all materials.
 6. Proper facilities, including scaffolding, temporary work platforms, etc., for inspection of the work in the mills, shop and field.
- B. Each person installing connections shall be assigned an identifying symbol or mark and all shop and field connections shall be so identified so that inspector can refer back to the person making the connection.
- C. The Inspector will perform his duties, when possible, in such a way that fabrication and erection are not unnecessarily delayed or impeded, and as follows:
1. The inspector will make all tests and inspections as required by all applicable federal, state and local Building Laws. The inspector shall make all the tests and inspections indicated on the Drawings.
 2. The technique for radiographic inspection will be in accordance with Section 6, Part B of the "Structural Welding Code". A double film technique will be used. One copy of each film will be sent to the Commissioner, the other will be retained by the Inspector.
 3. Ultrasonic inspection will be performed in accordance with Section 6, Part C of the "Structural Welding Code".
 4. Shop welds will be inspected in the shop before the work is painted or approved for shipment.
 5. The inspector will make all tests and inspections of high strength structural bolt connections as required by AISC "Specifications for Structural Joints Using ASTM A325 or A490 Bolts".
 - a. Undertensioned A325 and A490 bolts are to be further tightened until they meet acceptable inspection criteria for tension. Use of 'stick-wax' lubricant can facilitate ease of tightening.
 - b. Undertensioned F1852 twist-off bolts, evidenced by shearing of the 'break-neck' prior to minimum required clamp force, shall be removed and replaced with new twist-off bolts. (Under no circumstances is lubrication of twist-off bolts permitted other than by the original manufacturer.
 6. Where inspection reveals defects, the extent of inspection will be increased as much as necessary to assure that the full extent of the defects in a joint have been found and to assure that the same defects are not present on similar parts or under similar circumstances.
 7. Work that is not acceptable will be designated by "Repair" or "Reject", as applicable.

8. The Inspector will maintain a daily record of the work he has inspected and its disposition. One copy of each of the reports will be submitted to the Commissioner on a weekly basis.
 - a. Welding reports of test will be made in form prescribed in the "Structural Welding Code".

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION MEETING

- A. Prior to the start of the Work, meet at the Project site to review methods and sequence of structural steel erection, quality control requirements, standard of workmanship, job organization, coordination of the work with other trades, special details and conditions, testing and inspection procedures, and other pertinent topics related to the Work. The meeting shall include Commissioner, the Contractor, the Structural Steel Subcontractor, the City of NY's Testing Laboratory, and any other subcontractors whose work requires coordination with this Work. Also see requirements of Part 2.01.D.2 with regards to bolting.

3.2 CONDITION OF SURFACE

- A. Examine the substrates, adjoining construction and the conditions under which the Work is to be installed. Do not proceed with the Work until unsuitable conditions have been corrected. Consider all conditions which will affect the satisfactory erection of the structural steel systems.
- B. Visit the project site and advise Commissioner of any discrepancy or conflict. Field verify existing construction requirements, existing conditions, restrictions and clearances which may affect structural steel systems erection. Assume responsibility for all errors of detailing and fabrication and for the correct fitting and erection of the structural steel systems.

3.3 ERECTION

- A. Check the alignment and elevations of all column supports and location of all anchor bolts with transit and level instruments before starting erection. Notify Commissioner of any errors. Obtain Commissioner's approval of methods proposed for correcting errors prior to proceeding with corrections and erection.
- B. Drift Pins may be used only to align the several parts. They shall not be used in such manner as to distort or damage the metal.
- C. Oxygen cutting of structural steel for "fitting-up" purposes shall not be done except with the acceptance of the Commissioner.
- D. Make all necessary provisions for temporary shoring and bracing with connections of sufficient strength to bear imposed loads and for completion of erection where structural members are temporarily left out for erection at a later date. Provide temporary planking and working platforms as necessary to effectively complete the work.
- E. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 4. For proprietary grout materials, comply with manufacturer's instructions.
- F. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

3.4 CONNECTIONS

- A. Connections shall comply with requirements specified in Part 2 - Products. Bolts, nuts and washers shall be clean of dirt and rust and lubricated immediately prior to installation (except twist-off bolts, which if used, may not be lubricated by anyone other than the original manufacturer).
- B. Stud shear connectors shall be attached in accordance with requirements of "Structural Welding Code".

3.5 FIELD PAINTING

- A. Field painting shall comply with the requirements specified in Part 2 - Products, "Shop Painting".
- B. After erection, clean exposed surfaces of field connections, unpainted areas adjacent to field connections and damaged areas in the shop coat to the same standards as required for the shop coat and paint with the same primer used in the shop coat.

3.6 ERECTION TOLERANCE

- A. Individual pieces shall be plumbed, leveled and aligned in accordance with the requirements of the "Code of Standard Practice for Steel Buildings and Bridges" except as follows.
 1. Plumbness of individual columns shall be held to 1:1000.
 2. All columns adjacent to elevators shall be within 1 inch of the theoretical centerline.
 3. All exterior columns shall be within 1 inch of the theoretical centerline either toward or away from the building.
 4. The centerline of any two (2) adjacent exterior columns shall be within 3/4 inch of each other either toward or away from the building.

5. All intermediate exterior columns shall be within 3/4 inch of a line between the corner columns.
 6. All measurements relating to the above shall be on the theoretical centerline of the columns.
- B. Dimensions shown on Drawings are based on an assumed design temperature of 70 deg. F. Fabrication and erection procedures shall take into account the ambient temperature range at the time of the respective operations.

3.7 SURVEY

- A. Make an accurate survey of actual column locations and elevations immediately upon the completion of every second level of steel and immediately submit same to the Commissioner. Resurvey shall include level below. Should column locations vary beyond the allowable tolerances, take necessary corrective measures prior to proceeding to next level and modify details and/or procedure as required.
- B. Survey all beam elevations at each end and at center span as applicable as required to establish the in-place camber both prior to and following pouring the supported concrete slab areas. Immediately submit same to Commissioner.

3.8 FIELD QUALITY CONTROL

- A. Field testing and inspection requirements shall comply with Part 2 - Products, "Source Quality Control".

END OF SECTION

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SECTION 05 30 00

METAL DECKING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General: Provide metal decking in accordance with the Contract Documents.
- B. Related Work Specified Elsewhere
 - 1. Structural Steel – Section 051200.
 - 2. Cast-in-place Concrete – Section 033000.

1.2 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations of the following:
 - 1. AISI "Specifications for the Design of Light Gauge Cold-Formed Steel Structural Members".
 - 2. AWS D1.1 "Structural Welding Code".
 - 3. SDI "Design Manual for Composite Decks, Form Decks and Roof Decks".
 - 4. AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings".

1.3 SUBMITTALS

- A. Shop Drawings: Submit shop drawings and manufacturer's data for the following items:
 - 1. Layout of deck panels, including location, gauge and size of each shop piece of decking, details of special conditions, closure panels, cut openings, accessories and supplementary framing where required. Provide full layout and description of embedments and indentations of metal decking, including sizes and spacings. Show welding details to structural framing and side lap connection details.
- B. Reports and Certifications
 - 1. Submit copies of prequalification and other welding procedures in a form and manner prescribed in AWS "Standard Qualification Procedure".
 - 2. Submit certified test reports and certifications showing that composite deck sections will develop a minimum factor of safety of 2 for total load on single span condition.
 - 3. Submit manufacturer's certifications stating that galvanizing complies with the specified requirements.

- C. Calculations: Submit calculations for all deck design criteria and span conditions. Calculations shall bear the seal of a Professional Engineer licensed in the state of New York.
- D. Product Data: Submit, for Commissioner's information only, copies of manufacturer's specifications and installation instructions for metal deck, shear connectors, paint and accessories specified.
- E. Statement of Acceptability: Provide a statement of acceptability from the manufacturer of products which are to be installed on the concrete fill and require venting of the metal deck for application of their products, stating that the vent openings are adequate and are not in conflict with their guarantee requirements.

1.4 STORAGE AND HANDLING

- A. Storage: Store materials off the ground, protected from damage and in manner to permit easy access for inspection and identification. Provide for proper drainage. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Store packaged materials in unopened containers.
- B. Handling: Handle materials in a manner so as to protect surfaces and to prevent distortion of, or damage to, fabricated deck.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel Decking, Galvanized: ASTM A653, Grade A, $F_y = 40,000$ psi minimum, galvanized in accordance with ASTM A525, Coating Designation G60 for all steel decking. Provide tabs or clips for hanging loads.
- B. Miscellaneous Steel Shapes: ASTM A36, shop prime painted, unless otherwise shown or specified.
- C. Accessories: ASTM A526, commercial quality, galvanized. Provide accessories of every kind required to complete the installation of metal decking in the system shown, and as required to provide a finish surface for the application of insulation and roofing. Finish sheet metal items to match finish of decking. Include the following:
 1. Cover plates to close gaps, changes in deck direction, around columns, access openings, and around openings due to the construction sequence.
 2. Supplemental support framing where normal deck bearing is precluded by columns, flange plates, gusset plates, or other framing geometry and around minor openings, around openings due to the construction sequence and wherever required to support fireproofing.
 3. Sheet metal closures, pour stops, cant strips, ridge and valley plates, and continuous edging at open ends of slabs and openings and edges in floors and roof.
- D. Paint
 1. Touch-Up for Galvanized Deck: Zinc rich paint for repairing galvanized surfaces and field welds. Prepare surfaces and repair in accordance with ASTM A780.

2. Prime Surfaces to Receive Exposed Paint Treatment.

2.2 FABRICATION

- A. General: Fabricate deck units of metal thickness, depth and width as shown, in lengths to span three or more supports, unless otherwise shown, with flush, telescoped or nested 2 in. laps at ends and interlocking or nested side laps.
- B. Composite and Non-Composite Floor Decks: Comply with the depth and gage requirements, physical cross-sectional properties of the deck and design criteria shown on the Drawings and as follows:
1. Design the decking for non-shored condition for the wet weight of concrete. Concrete thickness used in the calculations shall include allowance for deck deflections and steel framing deflections. See Cast-In-Place Concrete Specification for additional information on additional concrete. Include allowance for construction loads. Design the decking for a limiting deflection of 0.75 in. or a maximum stress of 0.6 Fy based on either a single span loading or the loading of a single span of multiple span conditions.
 2. Design the decking as a composite deck for the superimposed dead and live loads as indicated, on a simple span condition with a limiting deflection of L/360, steel stress of 0.75 Fy and f_c complying with ACI 318 (working stress).
 3. Comply with other design criteria as indicated in metal decking notes.
 4. Provide deck gauges as required by calculation, but not less than 20 ga. Where decking cannot be designed for the non-shored condition, for instance at certain single span conditions, shore the deck during concrete placement and cure.
 5. All metal floor and roof deck assemblies shall have a diaphragm shear value of no less than 400 pounds per linear foot without the 1/3 stress increase.
- C. Miscellaneous Items
1. Metal cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness and finish as decking. Form to match contour of deck units and approximately 6 in. wide.

2.3 QUALITY CONTROL

- A. The City of New York will engage, at their own expense, a Testing Agency for Special Inspections satisfactory to the Commissioner to inspect metal decking and shear connector installation, to perform tests specified, and to submit reports to the Commissioner.
1. The Testing Agency will be responsible for conducting and interpreting the tests, will clearly state in each report the area tested, whether or not the test result comply with the Contract Documents, will specifically note any deviations there from, and will indicate corrective measures required and taken.
 2. Provide the Testing Agency with the following.
 - a. A complete set of accepted shop and erection drawings.

- b. Cutting lists, order sheets, material bills, shipping bills and test reports.
 - c. Information as to time and place of rollings and shipment of materials to the shop.
 - d. Representative sample pieces requested for testing.
 - e. Full and ample means and assistance for testing.
 - f. Proper facilities, including scaffolding, temporary work platforms and hoisting facilities for inspection of the Work in the mills, shop and field.
3. Each person installing connections shall be assigned an identifying symbol or mark and all shop and field connections shall be so identified so that the Inspector can refer back to the person making the connection.
4. The Inspector will perform his duties, when possible, in such a way that fabrication and erection are not unnecessarily delayed or impeded, and as follows:
- a. Where inspection reveals defects, the extent of inspection will be increased as much as necessary to assure that the full extent of the defects in a joint have been found and to assure that the same defects are not present on similar parts or under similar circumstances.
 - b. Work that is not acceptable will be designated by "Repair" or "Reject", as applicable.
 - c. The Inspector will maintain a daily record of the work he has inspected and its disposition. One copy of each of the reports will be submitted to the Commissioner on a weekly basis. Welding reports of tests will be made in a form prescribed in the "Structural Welding Code".
5. The Contractor shall provide and pay for corrective measures, including additional testing and inspection.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION MEETING

- A. Prior to the start of the Work, and at the Contractor's direction, meet at the Project site to review material selections, methods and sequence of metal decking installation, special details and conditions, standard of workmanship, quality control requirements, job organization, coordination with other trades, and other pertinent topics related to the Work. The meeting shall include the Commissioner, the Contractor, the Contractor's project superintendent, metal decking subcontractor's superintendent, City of NY's Testing Agency, primary component materials suppliers, and any other subcontractors whose work requires coordination with this Work.

3.2 CONDITION OF SURFACES

- A. Examine the substrates, adjoining construction and conditions under which the Work is to be installed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

- B. Verify that the metal decking is free from oil or other substances which would impair adhesion of either concrete or spray-on fireproofing. Clean decking as required to comply with requirements of spray-on fireproofing and/or concrete.

3.3 GENERAL

- A. Install deck units and accessories in accordance with manufacturer's recommendations and instructions and final shop drawings.
- B. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
- C. Coordinate with structural steel erector for delivery and location of decking bundles to prevent overloading of structural members. Do not use floor deck units for storage or working platforms until units are permanently secured.

3.4 ERECTION

- A. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units. Place deck units flat, square and secured to adjacent framing without warp or deflection.
- B. Attach panels to each structural support with 3/4 in. fusion welds spaced not more than 12 in. on center. At joints, weld both panels to support.
 - 1. Button-punch or weld side joints 2 ft. 6 in. on center.
 - 2. Lap end joints in roof panels 2 in.
 - 3. Secure accessories by tack welding, with at least one weld at every corner.
 - 4. Touch-up welds and field cuts with touch-up paint as specified promptly after installation.
 - 5. Provide metal joint covers at abutting ends and changes in direction of floor deck units.
- C. Provide tabs or clips for hanging loads where indicated. Do not hang concentrated loads exceeding 50 lbs. from the metal decking.
- D. At columns, perimeters, shafts, stairs, other openings and areas requiring field cutting, cut decking tight and provide measures and methods to assure deck can support loads. Provide tight fitting closures at open uncovered ends and edges of decking, and miscellaneous supports required to carry metal decking. Secure hole reinforcement to decking with fillet across flutes and projecting beyond sides of openings equal to maximum size of opening unless otherwise shown. Provide angles channels and other attachments required for opening through decking for ducts, shafts, piping and other penetrations. Perform field cutting and trimming square and neat and equal to factory cutting.
- E. Secure closures and angle into position by welding at 18 in. centers maximum unless otherwise shown. Provide angle closures at openings, concrete retainer flashings and

transition flashing as required to make decking complete and ready to receive concrete fill.

- F. Where deck is required to be supported directly by concrete or masonry materials, fasten deck to the support with fasteners spaced not more than 12 in. on center. Fasteners shall be HILTI Kwik-Con II+ Fastening System, or equal, 1/4" diameter with 1 3/4" embedment. Follow fastener manufacturer's installation instructions.

3.5 FIELD QUALITY CONTROL

- A. Establish the welding procedure for the plug weld of the metal decking for each gage used as follows. This procedure is to be witnessed by the City of NY's Testing Agency.
 - 1. Start by clamping a piece of the decking on the top flange of a scrap beam or plate of at least 1/2 in. thickness with the edge of the decking protruding over the edge of the beam by 3 in.
 - 2. Use welding cables of length and size similar to that which will be used on the actual construction.
 - 3. Make a good 3/4 in. puddle weld through the decking to the beam with the crater filled and reasonable reinforcement above the decking. The following are suggested settings for this equipment.
 - a. Electrode: E-60.
 - b. Three (3) welds per electrode.
 - c. 19 second duration per weld.
 - d. Burn-off rate of 4.7 seconds per in.
 - 4. When the weld has cooled, strike the edge of the decking with a sledge hammer so as to rotate the decking around the puddle weld until the decking or the weld breaks.
 - 5. Measure the diameter of the weld nugget remaining on the structural steel. If the weld is not satisfactory, adjust the amperage and repeat by making test welds and breaking them until the proper 3/4 in. nugget is obtained. Once the proper welds are consistently obtained, a minimum of three (3) welds, make another test weld by first welding on a scrap plate to consume at least 6 in. of a new electrode and then immediately, while the electrode is still hot, making another puddle weld. Test this weld and compare the results with the welds made previously and considered satisfactory.
 - 6. Using the same electrode, power supply unit, setting, and cable lengths established above, determine an average burn-off rate for three (3) electrodes. Then make another puddle weld as a final check on the procedure.
 - 7. Qualify each welder on the metal decking using the above procedure, prior to welding any metal decking to the structure.

3.6 CLEAN-UP AND TOUCH-UP PAINTING

- A. Clean-up: Remove metal cuttings and construction debris. Remove grease, oil and other foreign material from metal decking which would prevent proper bonding of concrete fill, sprayed-on fireproofing of roofing materials. Remove ceramic ferrules from all shear studs.
- B. Touch-up Painting: After installation, wire brush, clean and paint scarred and abraded areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.
 - 1. Touch-up galvanized surfaces with specified galvanizing repair paint applied in accordance with ASTM A780 and manufacturer's written instructions.

END OF SECTION

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SECTION 05 40 00

COLD FORMED METAL FRAMING

1.1 GENERAL

- A. Related Documents: Provide cold formed metal framing and related components in accordance with the requirements of the Contract Documents.
- B. Scope of Work includes but is not limited to:
 - 1) Light gage steel framing systems.
- C. Related Work specified in other Section:
 - 1) Cast-in-place concrete (Section 03 30 00).
 - 2) Structural steel framing (Section 05 10 00).
 - 3) Metal deck (Section 05 30 00).
 - 4) Metal fabrications (Section 05 50 00).

1.2 QUALITY ASSURANCE

- A. Codes: Comply with the New York City Building Code and standards listed.
- B. Standards:
 - 1) American Society for Testing and Materials (ASTM):
 - a) ASTM A-307 - Carbon steel externally and internally threaded standard fasteners.
 - b) ASTM A-449 - Quenched and tempered steel bolts and studs.
 - c) ASTM A-570 - Hot-rolled carbon steel sheet and strip, structural quality.
 - d) ASTM A-606 - Steel sheet and strip, hot-rolled and cold-rolled, high-strength, low alloy with improved corrosion resistance.
 - e) ASTM A-607 - Steel sheet and strip, hot-rolled and cold rolled, high-strength, low alloy columbium and/or vanadium.
 - f) ASTM A-611 - Cold-rolled sheet, carbon, structural.
 - g) ASTM A-653 - Steel sheet, zinc-coated (galvanized) alloy coated (galvannealed) by the hot dip process.
 - 1) Grade D (min. yield 50 KSI) for 12, 14 and 16 gage steel.

- 2) Grade A (min. yield 33 KSI) for 18 and 20 gage steel.
 - 3) Grade C (min. yield 40 KSI)
 - h) ASTM A-780 - Practice for the repair of hot dipped galvanized coatings.
 - i) ASTM C-955 - Specification for load bearing (transverse and axial) steel studs, runners (track) and bracing and bridging for screw application of gypsum board and metal plaster bases.
 - j) ASTM C-1007 - Standard specification for the installation of load bearing (transverse and axial) steel studs and related accessories.
- 2) American Welding Society (AWS) (latest edition): Code for Welding in Building Construction.
- a) AWS A5.1 - Mild steel covered arc-welding electrodes.
 - b) AWS A5.2 - Low alloy steel covered arc-welding electrodes.
 - c) AWS A5.17 - Bare mild steel electrodes and fluxes for submerged arc-welding.
 - d) AWS A5.18 - Cold steel electrodes for gas metal arc-welding.
 - e) AWS D1.3 - Structural welding code for sheet steel.
- 3) American Iron and Steel Institute (AISI): Specification for the Design of Cold-Formed Steel Structural Members with Addenda.
- 4) Industrial Fasteners Institute (IFI):
- a) IFI-112 - High performance thread rolling screws.
 - b) IFI-113 - Steel self-drilling tapping screws.
- C. Welder Certification: Welders fabricating the framing assembly must be certified in accordance with the American Welding Society (AWS) D.1.
- D. Qualification of Welders: Field welders shall have been qualified to weld the light gage steel members to be used in the work to structural steel members in accordance with Article 6.8 of AWS Specification for Welding Sheet Steel by an independent agency within one year prior to their being employed on the work.
- E. Certificate of fabricator's current AISC Certification.
- F. Experience Requirements

Installer: The contractor or subcontractor performing the work of this Section must, within the last three (3) consecutive years prior to the bid opening, have successfully completed in a timely fashion projects similar in scope and type to the required work.

1.3 SUBMITTALS

- A. **Manufacturer's Literature:** Submit manufacturer's standard literature, including load tables, installation instructions, fasteners and accessories edited to this job condition. Include erection instructions containing sequence of operations and requirements for temporary bracing.
- B. **Shop Drawings:** Submit shop drawings showing large-scale details of sections and components, and elevations of wall assemblies showing anchorage, relationship to windows and columns and other pertinent items. Shop and field assembly details including cuts and connections. Indicate type and location of shop and field welds, screws, bolts, and other fastening devices. Provide setting drawings and templates and installation instructions.
- C. **Calculations:** Submit structural design calculations by a structural engineer licensed in New York State certifying that work in this section will meet load, deflection and structural requirements. Calculations shall include vertical and horizontal anchorage, and allowance for structural concrete creep and/or structural deflection, wind load deflection and other pertinent information. At the completion of installation inspect and certify that the installation meets the design intent and complies with the Building Code requirements.
- D. **Samples:** Submit samples of studs, framing components, and anchors for review.

1.4 PRODUCT HANDLING

- A. **Delivery:** Deliver light gage metal in manufacturer's clearly identified containers or in preassembled panels clearly marked as to their location.
- B. **Protection:** Protect light gage metal framing from other construction activities. Remove or reinforce bent or damaged members to insure structural integrity.

PART 2 - PRODUCTS

2.1 LIGHT GAGE STEEL FRAMING SYSTEMS

- A. Note that the drawings are for geometric layout and are not intended to dictate stud size, gage, bracing and other items of structural concern.
- B. Manufacturer shall be equal to:
 - 1) Marino/Ware Industries Inc. - Stud-Rite Steel Framing.
 - 2) Dale/Incor Industries Inc.
 - 3) Clark Dietrich Building Systems LLC
- C. **Materials:**

- 1) Main Framing Members: G-60 galvanized steel, generally 6" deep, ASTM A-653, Grade D (for 12, 14 and 16 gage steel), 50 KSI yield (for 18 and 20 gage steel), as per manufacturer's standard to meet wind load bending requirements of 1/760 for masonry and 1/240 for panels with sealant joints and 1/175 for cantilevered spans with panels.
- 2) Sub-Framing Members: 18 gage or lighter G-60 galvanized steel, ASTM A-653, Grade B.
- 3) Provide tracks of equal or greater thickness to the adjoining stud gage. At curved stud walls where curvature of installed stud wall will impact final finish, use CircleTrak, Ready-Track, Contour Track, or equal.
- 4) Connectors: Where specified on drawings provide utility clips with rated load capacities. Provide all fasteners recommended by the manufacturer to achieve the rated load. Provide slotted deflection tracks at the top of walls for interior partitions framing between floor levels.
- 5) Fasteners: Shop welds shall be fillet, plug, butt or seam, or commercially available light gage metal fasteners such as Simpson, ClarkDietrich, Dale/Incor Industries or approved equal, as indicated on shop drawings using E-60 electrode. Field connections shall be as recommended using steel fasteners equal to USG Type S-12 self-drilling screws 1/2" long pan head type or 5/8" low profile head type with Climaseal corrosion resistant finish equal to IMPAX #45 by Construction Fasteners Inc, Hilti Kwik-Pro with zinc plating, Buildex TEK2 HWH with Climaseal or approved equal. U.N.O on detail drawings.

D. Assembly:

- 1) Prefabrication: At Installer's option metal studs may be pre-fabricated into panels prior to erection. Prefabricated panels shall be square and braced against racking.
- 2) Fabrication: (Shop and Field) Framing components shall be cut squarely or at an angle to fit snugly against abutting members. Do not wire tie framing members together.
 - a) Cutting shall be done with a radial arm saw using a 1/8" thick circular blade, high speed (15000-18000 rpm rim speed) with 300 teeth and 6 expansion slots.
 - b) Welding: Shop fusion welding shall be generally used using a direct current welder of 200 or more ampere capacity. Use a heat of 60 to 90 amperes depending on gage of metal.
 - c) Other Fasteners: Use bolts or sheet metal screws where recommended by manufacturer.
- 3) Design Load: Light gage metal framing shall be designed to resist a pressure of 5 psf acting inward or outward on entire wall surface assembly. Bracing shall be for a minimum of 4% of gravity loading. Floor live loads to be per S001. Floor dead loads to include the weight of the assembly with 10 psf service dead load.

- 4) Corrosion Protection: Touch-up welds and abraded surfaces with zinc dust primer equal to duPont Ganicin #347-y-937Gr, meeting ASTM A-790. Coat sill channels with a corrosion resistant coating such as asphalt paint.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verification of Measurements: Verify measurements and dimensions at the job site and cooperate in the coordination and scheduling of the work of related trades and previously installed work.
- B. Preassembly: Preassemble shop assemblies in the largest practical sections. Shop fabricated work shall be marked for final assembly in the field. Provide alignment and splice plates for accurate field fit.
- C. Control Joints: Coordinate masonry control joints with light gage stud framing members to permit thermal movement.
- D. Supplementary Parts: Include supplementary parts necessary to complete cold formed metal work.

3.2 INSTALLATION

- A. Workmanship: Install work in location shown, plumb, level and in line with adjacent materials where required. Fastening shall be as indicated on the shop drawings to industry standards. Align control joints and windows.
- B. Structural Connections: Provide close fitting joints cut flush with adjacent concrete or structural steel supports, cut, drill, punch and tap for the installation and attachment of other work to miscellaneous metal work as follows. Provide laser devices to monitor alignment and plumbness of entire facade.
 - 1) Joints: Make joints as strong and rigid as adjoining sections.
 - a) Welding: Make welds continuous along entire line of contract, except where spot welding is indicated. Grind exposed weld flush and smooth. Perform welding in accordance AWS D1.1. Connect structural members together by welding.
 - b) Fasteners: Where bolted or screwed connections are indicated, such connections may be welded at Installer's option. Seat studs squarely in track with stud web and flange abutting track web.
 - 2) Openings: Coordinate the connections to windows, doors and louvers with the manufacturer. Provide for isolation strip between aluminum louver or window and steel framing.
- C. Anchorage: Except where otherwise specified for a particular of work or for built-in work, metal work shall be fastened to solid concrete or masonry with expansion bolts or to hollow block with toggle bolts.

- D. Fabrication: Fabricator shall inspect the completed cold formed metal framing installation for compliance with the Building Code.
- E. Studs: Provide full-height double studs alongside wall openings between 2'-0" and 4'-0" wide. Provide 4 full-height studs alongside all wall openings between 4'-0" and 8'-0" wide.

3.3 PROTECTION

- A. Protect finished surfaces against damage during subsequent construction operations and remove such protections at time of substantial completion. Touch-up breaks in galvanizing at welds, cuts, etc. with zinc rich primer as recommended by manufacturer.

END OF SECTION

SECTION 055000

MISCELLANEOUS METALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the miscellaneous metal work as indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Rough hardware.
 - 2. Vertical steel ladders.
 - 3. Steel pipe handrails and railings not part of steel pan stair assemblies.
 - 4. Catwalk structure.
 - 5. Miscellaneous framing and supports.
 - 6. Miscellaneous steel trim.
 - 7. Corner guards,
 - 8. Bike rack.
 - 9. Light steel framing and supports, not included as part of work of other trades.
 - 10. Steel and stainless steel framing, bracing, supports, anchors, bolts, shims, fastenings, and all other supplementary parts indicated on drawings or as required to complete each item of work of this Section.
 - 11. Prime painting, touch-up painting, galvanizing and separation of dissimilar metals for work of this Section.
 - 12. Cutting, fitting, drilling and tapping work of this Section to accommodate work of other Sections and of concrete, masonry or other materials as required for attaching and installing work of this Section.
 - 13. 1/2" aluminum angle for reveal base at all WD-1/B-4 base reveals and at exterior signage supports as detailed.
 - 14. Steel plate wall panel at the lower lobby.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Structural steel - Section 051200.
- F. Steel pan stairs - Section 055100.
- G. Painting - Section 099000.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
 - 1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- C. 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.
- D. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

- E. Reference Standards: The work is subject to requirements of applicable portions of the following standards:
1. "Manual of Steel Construction," American Institute of Steel Construction.
 2. AWS D1-1 "Structural Welding Code," American Welding Society.
 3. SSPC SP-3 "Surface Preparation Specification No. 3, Power Tool Cleaning," Steel Structures Painting Council.
 4. SSPC PA-1 "Painting Application Specification," Steel Structures Painting Council.
 5. "Handbook on Bolt, Nut and Rivet Standards," Industrial Fasteners Institute.
- F. Steel Materials: For steel to be hot dip-galvanized, provide steel chemically suitable for metal coatings complying with the following requirements: carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.
- G. Engage the services of a galvanizer who has demonstrated a minimum of three (3) years' experience in the successful performance of the processes outlined in this specification in the facility where the work is to be done and who will apply the galvanizing and coatings within the same facility as outlined herein. The Commissioner has the right to inspect and approve or reject the galvanizer/galvanizing facility.
- H. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance program that has been in effect for a minimum of three years and shall provide the Commissioner with process and final inspection documentation. The galvanizer/galvanizing facility must have an on-premise testing facility capable of measuring the chemical and metallurgical composition of the galvanizing bath and pickling tanks.
- I. Inspection and testing of hot-dip galvanized coating shall be done under the guidelines provided in the American Hot-Dip Galvanizers Association (AGA) publication "Inspection of Products Hot-Dip Galvanized After Fabrication."

1.5 PERFORMANCE STANDARDS

- A. Railings shall be constructed to conform to the following performance standards:
1. Railings shall be designed to resist loads as specified in Article 3, Section 27-558 of the New York City Building Code.

1.6 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.

- b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the products.
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. **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.
- C. **Shop Drawings:** Shop drawings for the fabrication and erection of all assemblies of miscellaneous iron work which are not completely shown by manufacturer's data sheets. Include plans and elevations at not less than 1" to 1'-0" scale, and include details of sections and connections at not less than 3" to 1'-0" scale. Show anchorage and accessory items.
1. Provide Lower Lobby Steel plate layout and shop drawings.
- D. **Engineering Data**
1. Before any railings are fabricated, submit engineering data drawings to the Commissioner for review indicating how performance standards specified here shall be met. The Contractor is responsible for the structural design and supports for these systems and must show his proposed systems on these drawings.
 2. These drawings must show all load conditions and design calculations relative to connections, fastening devices and anchorage, as well as size and gauge of members. Calculations and drawings must be prepared by a Structural Engineer licensed in the State of New York and shall be signed and sealed by this Engineer.
- 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.
- F. **Certification:** For items to be hot-dip galvanized, identify each item galvanized and to show compliance of application. The Certificate shall be signed by the galvanizer and shall contain a detailed description of the material processed and the ASTM standard used for the coating and, the weight of the coating. In addition, and as attachment to

Certification, submit reports of testing and inspections indicating compliance with the provisions of this Section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Metals

1. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
2. Steel Plates, Shapes and Bars: ASTM A 36.
3. Steel Bar Grating: ASTM A 1011/A or ASTM A 36.
4. Steel Tubing: Cold formed, ASTM A 500; or hot rolled, ASTM A 501.
5. Structural Steel Sheet: Hot rolled, ASTM A 570; or cold rolled, ASTM A 611, Class 1; of grade required for design loading.
6. Galvanized Structural Steel Sheet: ASTM A 924, of grade required for design loading. Coating designation G90.
7. Steel Pipe: ASTM A 53, type and grade as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (Schedule 40), unless otherwise indicated.
8. Gray Iron Castings: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.
9. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.
10. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
11. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A 153.
12. Stainless Steel: Comply with the following standards for the forms and types of stainless steel for the required items of work.
 - a. Pipe: ASTM A 312, Grade TP 304
 - b. Sheet, Strip, Flat Bar and Plate: ASTM A 666, Type 304.
 - c. Tubing: ASTM A 554, Grade MT 304.
 - d. Castings: ASTM A 743A, Grade CF 8 or CF 20.
 - e. Bars and Shapes: ASTM A 276, Type 304.

B. Aluminum

1. Comply with the following standards for the forms and types of aluminum for the required items of work.
 - a. Alloy and Temper: Provide alloy and temper as indicated or as otherwise recommended by the aluminum producer or finisher.
 - b. Aluminum Extrusions, Bars and Shapes: Alloy and temper recommended by aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 221 for 6063-T6.
 - c. Extruded Pipe and Tube: ASTM B 429, alloy 6063-T6.
 - d. Aluminum Plate and Sheet: Alloy and temper recommended by aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 209, alloy 6061-T6.
 - e. Bars, Rods and Wire: ASTM B 211.
- C. Grout: Non-shrink, non-metallic grout conforming to the requirements of Section 033000.
- D. Fasteners
 1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
 2. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.
 3. Anchor Bolts: ASTM F 1554, Grade 36.
 4. Lag Bolts: ASME B18.2.1.
 5. Machine Screws: ASME B18.6.3.
 6. Plain Washers: Round, carbon steel, ASME B18.22.1.
 7. Masonry Anchorage Devices: Expansion shields, FS FF-S-325.
 8. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
 9. Lock Washers: Helical spring type carbon steel, ASME B18.21.1.
- E. Shop Paint: Shop prime all non-galvanized miscellaneous metal items using Series 88 Azeron Primer made by Tnemec, ICI Devco "Rust Guard" quick dry alkyd shop coat No. 41403, or "Interlac 393" by International Protection Coatings.
 1. If steel is to receive high performance coating as noted in Section 099000, shop prime using primer noted in Section 099000.
- F. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D 1187.
- G. Galvanize Repair Coating: For touching up galvanized surfaces after erection, provide repair coating that is V.O.C. compliant, equal to "Silver Galv" made by Z.R.C. Worldwide or approved equal. Apply to a dry film thickness of 1.5 to 3.0 mills.

2.2 PRIME PAINTING

- A. Scope: All ferrous metal (except galvanized steel) shall be cleaned and shop painted with one coat of specified ferrous metal primer. No shop prime paint required on galvanized steel or aluminum work.
- B. Cleaning: Conform to Steel Structures Painting Council Surface Preparation Specification SP 3 (latest edition) "Power Tool Cleaning" for cleaning of ferrous metals which are to receive shop prime coat.
 - 1. Steel to get high performance coating as noted in Section 099000 shall be cleaned as per SSPC SP.6 "Commercial Blast Cleaning."
- C. Application
 - 1. Apply shop prime coat immediately after cleaning metal. Apply paint in dry weather or under cover. Metal surfaces shall be free from frost or moisture when painted. Paint all metal surfaces including edges, joints, holes, corners, etc.
 - 2. Paint surfaces that will be concealed after shop assembly prior to such assembly. Apply paint in accordance with approved paint manufacturer's printed instructions, and the use of any thinners, adulterants or admixtures shall be only as stated in said instructions.
 - 3. Paint shall uniformly and completely cover the metal surfaces, 2.0 mils minimum dry film thickness. No work shall be shipped until the shop prime coat thereon has dried.
- D. Touch-Up: In the shop, after assembly and in the field, after installation of work of this Section, touch-up damaged or abraded portions of shop prime paint with specified ferrous metal primer.
- E. Apply one shop coat to fabricated metal items, except apply two (2) coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

2.3 GALVANIZING

- A. Scope: All ferrous metal exposed to the weather, and all ferrous metals indicated on drawings or in specifications to be galvanized, shall be cleaned and then hot-dipped galvanized after fabrication as provided by Duncan Galvanizing or approved equal.
- B. Avoid fabrication techniques that could cause distortion or embrittlement of steel items to be hot-dip galvanized. Fabricator shall consult with hot-dip galvanizer regarding potential warpage problems or handling problems during the galvanizing process that may require adjustment of fabrication techniques or design before finalizing shop drawings and beginning of fabrication.
- C. Cleaning: Thoroughly clean metal surfaces of all mill scale, rust, dirt, grease, oil, moisture and other contaminants prior to galvanizing.
- D. Application: Hot-dip galvanizing shall conform to the following:

1. ASTM A 143: Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel.
 2. ASTM A 123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 3. ASTM A 153: Galvanized Coating on Iron and Steel Hardware - Table 1.
 4. ASTM A 384: Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
 5. ASTM A 385: Practice for Providing High Quality Zinc Coatings.
 6. ASTM A 924: Galvanized Coating on Steel Sheets.
 7. Minimum weight of galvanized coating shall be two (2) oz. per square foot of surface.
- E. Fabricate joints that will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.
 - F. All galvanized materials must be inspected for compliance with these specifications and marked with a stamp indicating the name of the galvanizer, the weight of the coating, and the appropriate ASTM number.
 - G. To minimize surface imperfection (eg: flux inclusions), material to be galvanized shall be dipped into a solution of Zinc Ammonium Chloride (pre-flux) immediately prior to galvanizing. The type of galvanizing process utilizing a flux blanket overlaying the molten zinc will not be permitted.
 - H. After galvanizing all materials not exposed to view must be chromated by dipping material in a 0.2% chromic acid solution.
 - I. Galvanized surfaces, where exposed to view, must have a smooth, level surface finish. Where this does not occur, piece shall be rejected and replaced to the acceptance of the Commissioner.

2.4 ALUMINUM FINISH

A. Aluminum

1. Class II Clear Anodized Finish: AA-M12C22A31, medium satin directional textured mechanical finish; inhibited chemical cleaning; 0.4 mil minimum thick anodic coating conforming to AAMA Spec. 607.1.
2. Baked Enamel Finish: AA-C21C42R1x, cleaned with inhibited chemicals, corrosion coated with an acid-chromate-fluoride-phosphate treatment, and painted with organic coating specified below. Apply baked enamel finish in strict compliance with paint manufacturer's specifications for cleaning, conversion coating and painting.
 - a. Organic Coating: Thermosetting modified acrylic enamel primer/topcoat system complying with AAMA 603.8 except with minimum dry film thickness of 1.5 mils; medium gloss.

3. Exterior High Performance Coating: AA-C12C42R1x, cleaned with inhibited chemicals, conversion coated with an acid-chromate-fluoride-phosphate treatment, and painted with organic coating specified below. Apply finish in strict compliance with paint manufacturer's instructions using a licensed applicator.
 - a. Fluorocarbon Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605-98.
 - b. Custom color and gloss as selected by the Commissioner.

2.5 PROTECTIVE COATINGS

- A. Whenever dissimilar metals will be in contact, separate contact surfaces by coating each contact surface prior to assembly or installation with one coat of specified bituminous paint, which shall be in addition to the specified shop prime paint. Mask off those surfaces not required to receive protective coating.

2.6 WORKMANSHIP

A. General

1. Miscellaneous metal work shall be fabricated by an experienced fabricator or manufacturer and installed by an experienced tradesman.
2. Materials, methods of fabrication, fitting, assembly, bracing, supporting, fastening, operating devices, and erection shall be in accordance with drawings and specifications, approved shop drawings, and best practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected.
3. All work shall be accurately and neatly fabricated, assembled and erected.

- B. Shop Assembly: Insofar as practicable, fitting and assembly of work shall be done in shop. Shop assemble work in largest practical sizes to minimize field work. It is the responsibility of the miscellaneous metal subcontractor to assure himself that the shop-fabricated miscellaneous metal items will properly fit the field condition. In the event that shop-fabricated miscellaneous metal items do not fit the field condition, the item shall be returned to the shop for correction.

- C. Cutting: Cut metal by sawing, shearing, or blanking. Flame cutting will be permitted only if cut edges are ground back to clean, smooth edges. Make cuts accurate, clean, sharp and free of burrs, without deforming adjacent surfaces or metals.

- D. Holes: Drill or cleanly punch holes; do not burn.

- E. Connections: Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to weather. Locate joints where least conspicuous. Unless indicated otherwise, weld or bolt shop connections; bolt or screw field connections. Provide expansion and contraction joints to allow for thermal movement of metal at locations and by methods approved by Commissioner.

1. Welding

- a. Shall be in accordance with "Standard Code for Welding in Building Construction" of the American Welding Society, and shall be done with electrodes and/or methods recommended by the manufacturer of the metals being welded.
 - b. Welds shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth with and to match finish of adjoining surfaces; undercut metal edges where welds are required to be flush.
 - c. All welds on or behind surfaces that will be exposed to view shall be done so as to prevent distortion of finished surface. Remove weld spatter and welding oxides from all welded surfaces.
2. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads exposed to view shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts or adjacent metal.
- F. Operating Mechanism: Operating devices (i.e. pivots, hinges, etc.) mechanism and hardware used in connection with this work shall be fabricated, assembled, installed and adjusted after installation so that they will operate smoothly, freely, noiselessly and without excessive friction.
- G. Built-In Work: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items specified under this Section of the Specifications to be built into concrete, masonry or work of other trades, with necessary templates and instructions, and in ample time to facilitate proper placing and installation.
- H. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.
- I. Coordination: Accurately cut, fit, drill and tap work of this Section to accommodate and fit work of other trades. Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of this work.
- J. Exposed Work
1. In addition to requirements specified herein and shown on drawings, all surfaces exposed to view shall be clean and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, burrs, and other defects that mar appearance of finished work.
 2. Metal work exposed to view shall be straight and true to line or curve, smooth arrises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design.
 3. Exposed fastenings, where permitted, shall be of the same material, color and finish as the metal to which applied, unless otherwise indicated, and shall be of the smallest practicable size.

- K. Preparation for Hot-Dip Galvanizing: Fabricator shall correctly prepare assemblies for galvanizing in consultation with galvanizer and in accordance with applicable Reference Standards and applicable AGA publications for the "Design of Products to be Hot-Dip galvanized After Fabrication." Preparation shall include but not be limited to the following:

1. Remove welding flux.
2. Drill appropriate vent holes and provide for drainage in inconspicuous locations of hollow sections and semi-enclosed elements. After galvanizing, plug vent holes with shaped lead and grind smooth.

2.7 MISCELLANEOUS METALS ITEMS

A. Rough Hardware

1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.
2. Fabricate items to sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts that bear on wood connections; elsewhere, furnish steel washers.

B. Ladders

1. Unless otherwise drawn and detailed, vertical steel ladders shall be eighteen (18) inches wide with 3/4" diameter non-slip steel rungs spaced twelve (12) inches o.c. Stringers shall be 3/8" thick by 2-1/2" wide steel bars; rungs welded to bars. Attach ladders to walls six (6) inches from top and bottom and maximum thirty-six (36) inches o.c. from these points. At the roof, gooseneck the rails back to the structure to provide secure ladder access.
2. All ladders shall be fabricated to support a live load of one hundred (100) lbs. per square foot and a concentrated load of three hundred (300) lbs. per rung; loads not to act simultaneously.

C. Steel Pipe Handrails and Guardrails at Catwalk and Technical Galleries.

1. Steel pipe of size shown on Drawings, Schedule 40. Fittings shall be flush type, malleable or cast iron. Brackets shall be malleable iron, design as selected by the Commissioner.
2. Construction: Form direction changes in rails using solid bar stock or elbows. Connections shall be shop welded and ground smooth and flush, except where field connections and expansion joints are required. Field connections may be welded, internal sleeve and plug weld, or internal sleeve and set screw.
3. Secure handrails to walls with wall brackets. Provide brackets of malleable iron castings, with not more than three (3) inches clearance from inside face of handrail to wall surface. Neatly drill wall plate portion of the bracket into concrete or masonry to receive bolts for concealed anchorage. For installation at drywall,

Drywall trades shall provide plate to receive wall plate portion of bracket and anchor or bolt wall plate through drywall to supporting steel plate. Locate brackets at not more than 5'-0" o.c. unless otherwise shown.

4. Provide wall return fittings of cast iron, flush type, with the same projection as that specified for wall brackets.
5. Longitudinal members shall be parallel with each other and with floor surface or shape of stair to a tolerance of 1/8" in 10'-0" linear feet. Center line of members within each run of railing shall be in the plane.
6. For steel pipe posts where indicated, anchor posts in concrete by means of pipe sleeves set and anchored into concrete. Provide sleeves of galvanized steel pipe, not less than six (6) inches long and having an inside diameter not less than 1/2" greater than outside diameter of the inserted pipe. Provide steel plate closure secure to bottom of sleeve and of width and length not less than one (1) inch greater than outside diameter of sleeve. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with non-shrink, non-ferrous grout. Cover anchorage joint with a round steel flange welded to post. Posts shall be set plumb within 1/8" vertical tolerance.
7. Steel pipe handrails shall be capable of resisting a two hundred (200) lb. force applied to rail from any direction and a uniformly distributed load of fifty (50) lbs. per linear foot applied downward or horizontally, loads not to act simultaneously.

D. Loose Steel Lintels

1. Provide loose structural steel lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together to form a single unit where indicated. Provide not less than eight (8) inches bearing at each side of openings, unless otherwise indicated.
2. Loose lintels shall conform to the following Schedule:

Opening Width (Maximum)	WALL THICKNESS		
	4 inches	6 inches	8 inches*
2'-0"	3-1/2" x 3-1/2" x 1/4"	6" x 4" x 5/16"	3-1/2" x 3-1/2" x 1/4"
3'-0"	3-1/2" x 3-1/2" x 5/16"	6" x 4" x 5/16"	3-1/2" x 3-1/2" x 5/16"
4'-0"	3-1/2" x 3-1/2" x 5/16"	6" x 4" x 5/16"	3-1/2" x 3-1/2" x 5/16"
5'-0"	4" x 3-1/2" x 3/8"	6" x 4" x 3/8"	4" x 3-1/2" x 5/16"
6'-0"	5" x 3-1/2" x 3/8"	6" x 4" x 3/8"	5" x 3-1/2" x 5/16"
7'-0"	5" x 3-1/2" x 3/8"	5" x 5" x 1/2"	5" x 3-1/2" x 3/8"
8'-0"	5" x 3-1/2" x 3/8"	5" x 5" x 5/8"	5" x 3-1/2" x 3/8"

* Two angles at all openings in eight (8) inch walls.

3. At columns or vertical surfaces where lintels cannot bear on masonry, provide clip angles sized for structural capacity of lintel.

E. Miscellaneous Light Steel Framing

1. Light steel framing, bracing, supports, framing, clip angles, shelf angles, plates, etc., shall be of such shapes and sizes as indicated on the drawings and details or as required to suit the condition and shall be provided with all necessary supports and reinforcing such as hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly support and rigidly fasten and anchor same in place and to steel, concrete, masonry and all other connecting and adjoining work.
2. All light steel framing steel shall be furnished and erected in accordance with the applicable requirements of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" by the American Institute of Steel Construction and as specified herein.

- F. Steel framing, plate reinforcing, supplementary steel framing or reinforcing, bracket assemblies, and the like required for the support, framing, reinforcing, bracing, etc., of work of this Section shall be of such sizes and shapes as indicated on the drawings, or as required to suit the conditions, and shall be provided with all necessary supports and accessory items such as inserts, hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly and rigidly fasten, anchor or attach work of this Section in place and to the concrete, masonry and other connecting and adjoining work.

- G. Stainless Steel Framing: Fabricate frames from stainless steel tubes to the sizes and shapes indicated. Miter and weld frame members at corners. Secure perforated plate or other metal items to be mounted in frames with fully continuous welds; all welds shall be ground smooth and flush.

- H. Corner Guards: Provide steel corner guards (painted) at theater and stainless steel (#4 finish) per schedule. Unless otherwise indicated, use 4" x 4" x 1/4" steel angles to a height of four (4) feet above finished floor with 1-1/4" x 8 1/4" bent steel strap anchors welded to backs of angles at each end and approximately sixteen (16) inches o.c. Set and adjust guards to finish flush with adjacent surfaces.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where miscellaneous metal is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 ERECTION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

- B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- C. Fitting Connections: Fit exposed connections accurately together to form tight hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units that have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- D. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance, and quality of welds made, and methods used in correcting welding work.
- E. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- F. Field Touch-Up of Galvanized Surfaces: Touch-up shop applied galvanized coatings damaged during handling and installation. Use galvanizing repair coating specified herein for galvanized surfaces.

END OF SECTION

SECTION 055100

STEEL PAN STAIRS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the steel pan stairs as indicated on the drawings and specified herein, including but not limited to, the following:
 - 1. Steel pan stairs, including all clips, hangers, inserts, braces and other supports.
 - 2. Steel and stainless steel pipe handrails, guardrails and intermediate rails for steel stairs, including supports, brackets, and anchors.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Structural steel - Section 051200.
- F. Miscellaneous metals - Section 055000.
- G. Installation of inserts in drywall furnished by this Section - Section 092900.
- H. Finish painting - Section 099000.
- I. Ornamental glass rail system - Section 057010.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.

- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- C. Qualification of Welders: Use only certified welders and the shielded arc process for all welding performed in connection with the work of this Section. Protect adjacent surfaces when field welding to prevent damage or stain. Welders and welding operators must be qualified by tests as provided by AWS.
- D. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with:
1. "Specifications for Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction.
 2. "Code for Welding in Building Construction" of the American Welding Society.
 3. "Metal Stairs Manual" of the National Association of Architectural Metal Manufacturers.
- E. Conflicting Requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards of these specifications, the provisions of the more stringent shall govern.
- F. Field Measurements: If construction process permits, take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress. Allow for trimming and fitting wherever taking field measurements before fabrication might delay work.
- G. Tolerances: Allow for construction tolerances as required.
- H. Coordination: Coordinate this work with the work of all other trades interfacing with metal pan stairs, such as structural openings, sprinklers and standpipes, and other trades as required.

1.5 DRAWING SUBMISSION

- A. General: It is the intent of the Working Drawings to display the layouts and general design parameters upon which the Shop Drawings shall be developed. Detail development and all connections shall be part of Shop Drawing Development.
- B. Shop Drawings.
 - 1. Before any steel stairs are fabricated, submit shop drawings to the Commissioner for approval.
 - 2. Show all locations, markings, quantities, materials, sizes and shapes, and indicate all methods of connecting, anchoring, fastening, bracing, for the stair construction, support and attachment to the work of other trades.
- C. Engineering Data
 - 1. Before any metal pan stairs are fabricated, submit engineering data drawings to the Commissioner for review. The Contractor is responsible for the structural design and supports for the stair system and must show his proposed system on these drawings.
 - 2. These drawings must show all load conditions and design calculations relative to connections, fastening devices and anchorage, as well as size and gauge of stair members. Calculations and drawings must be prepared by a Structural Engineer licensed in the State of New York and shall be signed and sealed by this Engineer.

1.6 LEED SUBMISSION

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the products.
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.7 SAMPLES SUBMISSION

- A. Submit the following listed samples and other samples as may be requested by the Commissioner, to show the quality standards:
 1. Railing bracket.
 2. Exposed weld.
 3. Exposed bolted connection.
 4. Bent pipe railing.
 5. Finished stainless steel bent pipe railing, with applied directional finish
 6. Flat stock guardrail at theater 1 mezzanine balcony
- B. Samples shall be submitted cleaned and shop primed and shall represent standards to which all respective materials used in the Project shall meet.

1.8 PERFORMANCE STANDARDS

- A. Stairs and railings shall be constructed to conform to the following performance standards, unless greater required by Code:
 1. Stairs and platforms shall support a live load of one hundred (100) psf and a concentrated live load of three hundred (300) lbs. and shall have a live load deflection limited to 1/360 of the span. Loads shall not apply simultaneously.
 2. Railings shall withstand a two hundred (200) lb. force applied to rail from any direction, and a uniformly distributed load of 50 lbs./lin. ft. applied downward or horizontally, loads not to act simultaneously.

1.9 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect steel pan stair before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Commissioner and at no additional cost to the City of New York.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Structural Steel: ASTM A 36.
- B. Steel Sheets: ASTM A 245, Grade C, minimum ten (10) gauge for platforms, twelve (12) gauge minimum for treads and risers.
- C. Steel Pipe: ASTM A 53, Type E., Grade A, and ASTM A 501. Use standard malleable iron fittings for steel pipe.
- D. Malleable Iron Castings: ASTM A 47, Grade 35018.
- E. Bolts and Nuts: ASTM A 307, Grade A bolts.
- F. Machine Screws: Fed Spec. FF-S-92.
- G. Expansion Bolts: "Cinch" type, galvanized, of approved manufacture.
- H. Threaded End Hanger Rods: Minimum 3/4" diameter, ASTM A 36.
- I. Stainless Steel: Comply with the following standards for the forms and types of stainless steel for the required items of work.
 - 1. Pipe: ASTM A 312, Grade TP 304
 - 2. Sheet, Strip, Flat Bar and Plate: ASTM A 666, Type 304.
 - 3. Tubing: ASTM A 554, Grade MT 304.
 - 4. Castings: ASTM A 743A, Grade CF 8 or CF 20.
 - 5. Bars and Shapes: ASTM A 276, Type 304.
- J. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- K. Bituminous Paint: Fed. Spec. TT-C-494.
- L. Concrete Fill and Reinforcing Materials
 - 1. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 3000 psi.
 - 2. Nonslip-Aggregate Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.
 - 3. Welded Wire Fabric: ASTM A 185, 6 by 6 inches – W1.4 by W1.4, unless otherwise indicated.

M. Safety Nosings for Interior Steel Pan Steps

1. Provide three (3) inch wide, STSF-P cast iron safety nosing with hatched abrasive surface extending to end of stringers, manufactured by Nystrom or equal made by Wooster Products Inc., American Mason Safety Tread Co., or approved equal.
2. Provide anchors spaced not more than four (4) inches from each end and not more than twelve (12) inches o.c. Furnish nosings to concrete trades for installation.
3. Apply asphaltic coating to surfaces in contact with concrete.

2.2 FABRICATION

A. General

1. Steel pan stair work shall be fabricated by an experienced manufacturer in accordance with approved shop drawings and best practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand strains and stresses to which material will be subjected.
2. Fabricate shop assemblies in largest practical sizes to minimize field work. All exposed surfaces shall be clean and free from all dirt, stains, grease marks, scratches, waves, dents, buckles, tool marks, rattles, and other objectionable defects which mar appearance or use of finished work.
3. Cutting: Cut materials by sawing, shearing, or blanking. Flame cutting will be permitted when ground back to clean edges. Cuts shall be made accurately, clean, sharp and free of burrs, without deforming adjacent metals.
4. Connections: Make connections with tight joints, capable of developing full strength of the members, flush. Locate joints where least conspicuous. Use concealed fasteners where possible. Weld or rivet shop connections; bolt, screw or weld field connections.
 - a. Welding: Welds shall be continuous, except where spot welding is specifically permitted. Welding shall conform to the Standard Code of the American Welding Society. Exposed welds are required to be ground flush.
 - b. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts, or upset thread ends. Exposed bolts and screw head shall be flat and countersunk, unless otherwise indicated on drawings. Remove projecting ends of bolts and screws. Punch or drill holes; do not burn.

B. Stairs and Platforms

1. Provide stringers, risers, sub-treads and platforms matching profiles as shown. Form tread pan and riser in a continuous piece to receive the finished tread; tread shall be a minimum of twelve (12) gauge. Weld risers and treads to carrier angles which shall be welded to the structural steel stringers. In some locations stringers are concealed; steel ups may be required per details. Fasten countersunk bolts or stud welded clips through mesh for cement fill. Provide welded-on clips for the support of gypsum drywall soffits.

2. On intermediate platforms, provide metal bases formed of stringers. Miter and weld and grind smooth internal and external corners of metal bases. Form platform runs of minimum ten (10) gauge steel.
3. Countersink bolt heads and screws on finished surfaces or cut off flush with such surfaces.
4. Properly fit and securely fasten together all parts making exposed joints close fitting. Cut, drill, punch and tap as required for installation.
5. Make joints as strong and rigid as adjoining sections. Weld continuously along entire line of contact except where spot welding is indicated.
6. Give ferrous metal surfaces a shop coat of primer. Before painting, thoroughly clean surfaces with wire brushes or other proper and effective means of removing loose scale, filings or other objectionable materials.
7. Remove grease prior to painting. Separate dissimilar metals in or adjacent to work of this Section with a coat of bituminous paint on each surface prior to installation.
8. Closure and Filler Plates: Where indicated on drawings or as required, at least twelve (12) gauge sheet steel, securely fastened to top and bottom of stringer and adjacent wall, by welding or screws.
9. Struts, Hangers, Platform Headers and Subframing
 - a. Provide supports as detailed and required, including all struts, clip angles, angles or hangers which are required and necessary for support of stair construction.
 - b. Supports shall be of size suitable for the support load, as required. Struts, angles and hangers shall be supported by and directly connected to the structural framing. Struts and hangers, with their connections, shall be concealed.
 - c. Provide other inserts, anchors and/or other subframing as may be required to complete the stair construction and properly support it on the structural framing.

C. Steel Handrails, Railings, Posts and Brackets

1. Provide steel pipe of size shown on drawings, Schedule 40. Use heavier weight pipes and/or reinforce pipes internally as required to meet performance standards given in paragraph 1.7 herein. Fittings shall be flush type, malleable or cast iron. Wall brackets shall be steel design as detailed.
2. Handrail, post and railing spacing shall meet Code requirements.
3. Construction: Form direction changes in rails using solid bar stock or elbows. Connections shall be shop welded, except where expansion joints are required. Field connections shall be welded for continuity. All exposed welds shall be ground smooth and flush.
 - a. If elbows are not available for angles shown, bends shall maintain full diameter of pipe, use mandrel, no kinks, ripples, flats are acceptable.

4. Fabricate steel tubing with wall thickness of 0.120".
5. Anchor posts to steel with steel flanges, angle type or floor type as required by conditions, welded to posts and bolted to the steel supporting members.
6. Secure handrails to walls with wall brackets. Provide brackets as shown on drawings. For installation in drywall, furnish Drywall Section steel plate to receive wall plate portion of bracket and anchor or bolt wall plate through drywall to supporting steel plate. Locate brackets at not more than 5'-0" o.c. unless otherwise shown.
7. Anchor rail ends into adjacent walls with steel flanges welded to rail ends and anchored into the wall construction as described above.
8. Shop prime as specified above for stairs and platforms.

D. Stainless Steel Handrails

1. Fabricate handrails for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove flux immediately.
 - d. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
 - e. Form changes in direction of railing members by radius bends.
 - f. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, or otherwise deforming exposed surfaces of handrail and railing components.
 - g. Provide wall returns at ends of wall-mounted handrails, close ends of returns.
 - h. Close exposed ends of handrail and railing members with prefabricated end fittings.
 - i. Brackets, Flanges, Fittings, and Anchors: Provide brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.
 - 1). Furnish inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
 - 2). For railing posts set in concrete, provide preset sleeves of steel, not less than 6 inches long and inside dimensions not less than 1/2 inch greater than outside dimensions of post, with steel plate forming bottom closure.
2. Handrail, post and railing spacing shall meet Code requirements.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where steel pan stairs are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Work in the field shall comply with the same requirements as specified for shop work above.
- B. Except where otherwise shown or specified for a particular item of work or for built-in work, fasten metal work to solid masonry with expansion bolts. Fastenings to wood plugs in masonry will not be accepted. Drill holes to the exact diameter of the bolts using a rotary drill for concrete and a percussion drill for other masonry. Thread screws full length to the head of the screw.
- C. Provide connecting members needed for properly securing the work to masonry, drywall and structural framing, including bolts, machine screws, rods, hangers, inserts, sleeves, plates, anchors, expansion bolts, washers and other items as required. Furnish built-in items to drywall trades as required for proper anchorage.
- D. Leave work exposed to view, including stair soffits, clean, smooth and neatly finished. All exposed welds shall be dressed smooth.
- E. Include supplementary parts necessary to complete each item even though such work is not definitively shown or specified.
- F. Coordinate and schedule the work of this Section with the work of other trades. Furnish anchors, sockets, fastenings and other miscellaneous items to be embedded in concrete or masonry, or required for securing metal work to other construction so as not to delay job progress.
- G. Attach wall railings to the wall construction, using appropriate bolts and anchors to meet performance standards.
- H. Install work plumb and true to the exact lines and levels, in the correct location and in proper relation to adjoining work.
- I. Touch up marred and abraded shop paint of exposed surfaces after erection in the field.
- J. Posts shall be set plumb within 1/8" vertical tolerance. Longitudinal members shall be parallel with each other and with floor surface or slope of stair to a tolerance of 1/8" in ten (10) linear feet. Center lines of members within each run of railing shall lie in the same vertical plane. Field joints of connecting sections shall be hairline.

3.3 TOUCH-UP PAINTING

- A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop coat, and paint exposed areas with same material used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

END OF SECTION

SECTION 057010

ORNAMENTAL GLASS RAIL SYSTEM

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the ornamental glass rail system as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Glass balustrade as shown on drawings.
 - 2. Aluminum shoe.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Steel stairs - Section 055110.
- F. Ornamental metals - Section 057000.
- G. Glass and glazing - Section 088000.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.

- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- C. 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, specifications, and 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.

1.5 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the products.
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. Shop Drawings: Submit for all items of work, at full scale as far as practical, showing metal and glass thicknesses, arrangement of components, of joining, of jointing, details of all field connections and anchorages, diagrams and details explaining provisions for thermal movement, fastening and sealing methods, glazing methods, and support methods, metal finishes and all other pertinent information.
1. Engineering design and calculations for glass railing assembly - see Article 1.7 herein.
- C. Samples - Submit
1. Glass, 12" x 12" for each type and thickness indicated.
 2. Metal Finishes
 - a. Submit finish samples, 6" x 6", for finish system specified.
 - b. The samples submitted shall be representative of the workmanship and finishes of all work of this Section to be incorporated in the completed project.

1.6 PRODUCT HANDLING

- A. Glass: At all times during transport, storage and handling of glass, provide cushions at glass edges to prevent damage. Protect glass faces from scratches and abrasion. Protect glass edges from chipping or other damage. Deliver each piece of glass with factory labels (indicating glass type, quality and thickness) and do not remove labels until installation has been approved.
- B. Glazing Materials: Deliver glazing materials in manufacturer's unopened containers, fully identified with trade name, color, size, hardness, type, class and grade. Store glazing materials where they will be free from damage in accordance with manufacturer's recommendations.
- C. Finished Materials: Protect finishes against soiling, staining or damage from scratches and abrasion. Maintain protection during construction until project completion or as otherwise directed by the Commissioner.
1. Provide wrappings, strippable coatings or other means approved by the Commissioner.
 2. During construction, remove protection for visual observation of finish as directed by the Commissioner and replace to maintain protection.

1.7 PERFORMANCE STANDARDS

- A. Glass rail assembly shall be designed and installed to resist the simultaneous application of a lateral force of 50 PLF and a vertical load of 100 PLF, both applied to the top of the railing. The rail shall resist a total lateral force and total vertical load of at least 200 lbs. each.
- B. Submit calculations and drawings signed and sealed by a Professional Engineer licensed in the State of New York indicating that glass rail system can meet these performance criteria.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide materials which have been selected for their surface flatness, smoothness, and freedom from surface blemishes where exposed to view in the finished unit. Surfaces exposed to view that exhibit pitting, seam marks, roller marks, "oil-canning," stains, discolorations, or other imperfections on the finished units will not be acceptable.
- B. Manufacturer: Blumcraft, Livers Bronze Co. Inc., CRL, or approved equal.
- C. Aluminum: Comply with the following standards for the forms and types of aluminum for the required items of work:
 - 1. Alloy and Temper: Provide alloy and temper as indicated or as otherwise recommended by the aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B 221 for 6063-T5; minimum thickness of 0.125".
 - 2. Finish: Aluminum to have mill finish with bituminous coating to separate it from dissimilar metals.
- D. Stainless Steel: Comply with the following standards for the forms and types of stainless steel for the required items of work:
 - 1. Type: AISI Type 302/304, unless otherwise indicated.
 - 2. Tubing: ASTM A 554; minimum wall thickness of 0.050"; thicker if required to meet performance standards specified herein.
 - 3. Finish: All stainless steel shall have No. 6 satin directional polish finish.
- E. Flat Glass (G-1): Flat glass for this Section shall be clear, low iron, fully tempered and laminated, transparent and glazing quality conforming to ASTM C 1048 and ASTM C1172.
 - 1. Thickness: 3/4".
 - 2. Exposed Edges: Arrised edge (1/16"), ground smooth and polished.
 - 3. Sealed Edges: Arrised edge (1/16") and ground.

F. Glazing and Sealing Materials

1. Neoprene Setting Blocks: Solid 70 to 90 Shore A hardness, size to suit condition.
2. Neoprene Wedges and Spacers: Solid 50 Shore A hardness, size to suit condition.
3. Neoprene Cushions and Gaskets: Closed cell sponge, 20 to 30 Shore A hardness, size to suit condition.
4. Epoxy Adhesive: Pourable, non-shrinking, 70 to 80 Shore A hardness, formulated to suit glazing conditions and stress conditions.
5. Sealant: One-part silicone, sealant, 20 to 30 Shore A hardness, clear or custom color as selected by the Commissioner. "Silicone Sealant 1200" by General Electric, Momentive, Dow Corning or Approved Equal. Sealant primers and backing as and if recommended by sealant manufacturer.

G. Protection for Metals: Bituminous paint conforming to FS TT-C-494.

H. 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.

I. Fasteners: Furnish of basic metal and alloy, matching finished color and texture as the metal being fastened, unless otherwise indicated. Unless otherwise shown, provide Phillips flat-head screws for exposed fasteners.

2.2 WORKMANSHIP

A. General: Materials, methods of fabrication, fitting assembly, bracing, supporting, fastening, and erection shall be in accordance with drawings and specifications, approved shop drawings, and of the 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. Connections: Make connections with tight joints, capable of developing full strength of member, flush. Locate joints as approved by the Commissioner. 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 with joints accurately fitted, flush and rigidly secured with hairline contacts.

1. 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 surface will be free of imperfections such as pits, runs, splatter, cracks, warping, dimpling, depressions or other forms of distortion or discoloration. Remove weld splatter and welding oxides from all welded surfaces.

2. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads, 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.
- C. 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.
- D. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.
- E. 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.
- F. 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 which mar appearance of finished work. Ornamental metal work exposed to view shall be straight and true to line or curve, smooth arrises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design. 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.
- G. Materials used 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.

2.3 FABRICATION

- A. Tolerance: Unless otherwise indicated herein, all work of this section shall be plumb, square, level, and correctly aligned within the following limitations:
 1. Offset from true horizontal, vertical, and design locations shall not exceed 1/8" per 10' of length for any component, not cumulative.
 2. Maximum offset from true alignment between abutting components shall not exceed 1/32".
- B. Metal and Glass Railings
 1. Glass shall be tempered at straight runs and laminated where indicated curved. All glass shall be accurately cut to size at factory (field check dimensions), with clean cut edges. Vertical edges of glass shall be ground smooth with arrises eased and polished. Vertical edges of glass shall be square at abutting glass joints in straight runs, square at curved glass pieces, mitered to angle indicated on drawings at abutting glass corner joints (unless otherwise indicated on drawings), and square or angled at terminating edges, as indicated on drawings to suit the plane of the surface against which the glass terminates. Tempering shall be done so that tong marks will be concealed in top rail or in bottom shoe when glass is installed.

2. Metal top rail shall be fabricated from ornamental stainless steel tubing and channels, Type 304 stainless steel tubes and channels; see drawings for locations, sizes as shown on drawings. Continuously weld channel to cut-out in underside of tubing. Reinforce inside of railing as required. Curve railing to radius indicated on drawings, without deformation of railing. Corners and directional changes in railing shall be mitered and continuously welded, with curved portions at corners and directional changes in railing fabricated from same size material or rail, continuously welded to railing. The radius and curvature of railings at corners and changes in direction shall be same as in the straight or curved runs, there shall be no flattening or distortion of railing. Ends of railing shall be as indicated on drawings, continuously welded to railing. All welds shall be ground smooth and flush, and dressed to match adjoining finish. Special attention shall be given to the continuity of the finish at exposed surfaces and edges near the exposed joints, which shall be sharp and square, without burrs, flattening, thinning, easing of edge or other irregularities. Exposed joints in top rail, where permitted, shall be hairline (except 1/8" maximum where thermal movement required), and shall be located only where directed by the Commissioner, with integral sleeve for splicing.
3. Aluminum shoes shall be fabricated from custom extruded aluminum sections (profiles as indicated on drawings). All joints at corners and directional change shall be mitered and continuously welded. All joints and shop connections shall be continuously welded, ground smooth and flush and dressed to match adjoining finish.
 - a. Exposed top of aluminum shoe shall be covered with stainless steel cover plate.
 - b. Aluminum shoes must be fabricated to the dimension tolerances and structural configurations identified in the details.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where ornamental rail assemblies are to be installed and notify the the Commissioner of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. General: Install work of this Section square, plumb, straight, true to line or radius, accurately fitted and located, with flush, tight hairline joints (except as otherwise indicated or to allow for thermal movement), with provisions for other trades, with provisions to allow for thermal movement, and with attachment devices as required for secure and rigid installation. It is the responsibility of the architectural metal erector to assure himself that shop fabricated architectural metal items will properly fit the field condition. In cases where the shop fabricated architectural metal items do not fit the field condition, the item shall be returned to the shop for correction.

B. Attachments

1. Unless otherwise indicated, work to be built into concrete or masonry shall be anchored with shop welded on galvanized steel strap anchors; work to be attached to concrete or masonry shall be anchored by bolts into embedded non-corrosive metal inserts or expansion shields; work attached to structural steel shall be anchored by welds or bolts; work attached to metals other than structural steel shall be anchored by bolts or screws. Power actuated fasteners not permitted unless approved by the Commissioner.
2. All attachment devices shall be of type, size and spacing to suit condition and as approved by the Commissioner. Provide shims, slotted holes, or other means necessary for leveling, plumbing and other required adjustments. Attachment devices for work exposed to view shall be concealed, unless indicated otherwise.
3. Do all necessary drilling, tapping, cutting or other preparations of surrounding construction in the field accurately, neatly and as necessary for the attachment and support of work of this Section, but obtain the Commissioner's approval prior to such preparation to work of others.

C. Glass Railing

1. Aluminum shoes shall be securely, rigidly and accurately attached to adjoining construction, as detailed on drawings and as per approved shop drawings. All fastening devices shall be concealed. Top of aluminum shoes shall be within $\pm 1/32"$ of the design elevations and shall be fabricated to receive stainless steel cover plate.
2. Glass shall be set into aluminum shoe on top of solid neoprene setting blocks. Tong marks in tempered glass shall be concealed. Position glass correctly in shoe with solid neoprene wedges and spacers, and then fill spaces between glass and shoe with pourable epoxy adhesive (except where shoe is sloped, then fill spaces with packed lead wool), leave $1/4"$ space at top for silicone sealant. After epoxy adhesive has fully cured, seal $1/4"$ deep joints between glass and top of shoe with silicone sealant, neatly tooled flat and in same plane as top of shoe. Where indicated, also seal joint between top of aluminum shoe and adjoining construction with silicone sealant, neatly tooled flat and in same plane as adjoining surface of aluminum shoe. Color of sealant as selected by the Commissioner. Vertical joints between glass shall be plumb, properly and accurately located, with $1/16"$ space between glass or adjoining surface, unless otherwise indicated on drawings. Adjust glass, if necessary, so that all joint widths are the same.
3. Top rail shall be set on top of glass before installation of epoxy adhesive in shoe. Cushion top edge of glass with neoprene shims in channel (or slot) of top rail. Properly position and locate top rail with solid neoprene wedges and spacers. Exposed joints in top rail shall be hairline (except $1/8"$ maximum where thermal movement required), joints located only where approved by the Commissioner, and connections at exposed joints shall be concealed. Secure top rail to glass by filling joints between glass and top rail channel solid with sealant (full depth of joint). Tool sealant neatly and flushed with rail. Color of sealant as selected by the Commissioner.

3.3 CLEANING, PROTECTION AND ADJUSTMENT

- A. **Cleaning and Protection:** The Contractor shall protect all work for misuse or damage after installation has been completed. Work which is scratched, etched or damaged will not be accepted by the City of New York, and shall be replaced with acceptable work. Work shall also be protected against soiling, etching or other contamination. This work shall be done at no additional cost to the City of New York.
1. The Subcontractor shall be responsible for all breakage of glass whatever the cause until the building is turned over to the City of New York. He shall replace all broken glass and deliver the entire building with all glazing intact and clean.
 2. Acceptance of building by the City of New York shall not take place until all glass has labels removed, is washed and polished, both sides, by a window cleaner specializing in such work.

END OF SECTION

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SECTION 062000

CARPENTRY

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the carpentry work as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Blocking and miscellaneous wood, including plywood wall lining for telephone and electric closets.
 - 2. Rough hardware.
 - 3. Coat closet pole and shelving.
 - 4. Installation only of finish hardware.
 - 5. Installation only of doors and hollow metal frames.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Architectural woodwork - Section 064023.
- F. Steel doors and frames - Section 081113.
- G. Finish hardware - Section 087100.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions,

or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.

- B. Lumber Standard: Comply with PS 20.
- C. Plywood Standard: Comply with PS 1 and American Plywood Assoc. (APA).
- D. Shop fabricate carpentry work to the extent feasible and where shop fabrication will result in better workmanship than feasible for on-site fabrication.
- E. Grade Marks: Identify lumber and plywood by official grade mark.
 - 1. Lumber: Grade stamp to contain symbol of grading agency certified by Board of Review, American Lumber Standards Committee, mill number or name, grade of lumber, species grouping or combination designation, rules under which graded where applicable, and condition of seasoning at time of manufacture.
 - a. S-Dry: Maximum nineteen (19) percent moisture content as per ASTM D 2016.
- F. Installation of doors, frames and hardware shall conform to the minimum standards of "Installation Guides for Doors and Hardware" of the Door and Hardware Institute.

1.5 LEED PERFORMANCE REQUIREMENTS

- A. The following criteria are REQUIRED for the products included in this section:
 - 1. Engineered wood, not including salvaged wood, shall contain a minimum of 10% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with the Submittal Requirements of this Section.
 - 3. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
 - 4. Wood Materials harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
 - 5. Permanently Installed wood-based materials used in this project that have been certified in accordance with the Forest Stewardship Council (FSC) guidelines shall be documented in accordance with the Submittal Requirements of this Section.
 - a. Applicable products include, but are not limited to, structural framing and general dimensional framing, flooring, finishes, built-in furnishings, miscellaneous blocking, fire rated plywood back panels used for equipment mounting, architectural panels, and plywood.

6. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419, Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints, and Coatings,(LEED BUILDING) where applicable.
 7. Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to the interior shall meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by SCAQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter, less water and less exempt compounds.
 - a. Clear Wood Finishes

1). Varnish	350
2). Sanding Sealers	350
3). Lacquer	550
 - b. Shellac

1). Clear	730
2). Pigmented	550
 - c. Stains
 250 |
 - d. Floor Coatings
 100 |
 - e. Waterproofing Sealers
 250 |
 - f. Sanding Sealers
 275 |
 - g. Other Sealers
 200 |
 8. The calculation of VOC shall exclude water and tinting color added at the point of sale.
 9. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- B. Prohibited Carcinogenic Compounds (Pressure-Treated Wood): International Agency for Research on Cancer (IARC), Lyon, France, www.iarc.fr/

1.6 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the wood product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. Location in which wood materials were manufactured or fabricated and location from which wood was harvested.
 - c. For wood products, indication (Y/N) of whether the supplied product(s) are certified by the Forest Stewardship Council (FSC).
 - d. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment. Include total cost for all wood products and itemized costs for all FSC-certified wood products.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 5. Documentation that all composite wood and agrifiber products do not contain added urea-formaldehyde resins.
- B. Pressure Treatment: Include certification by treating plant stating chemicals and process used, net amount of salts retained and conformance with applicable standards.
 - C. Fire-Retardant Treatment: Include certification by treating plant that treatment material complies with governing ordinances and that treatment will not bleed through finished surfaces.
 - D. Submit 12" x 12" samples of plastic laminate finish of thickness specified for shelving.

1.7 PRODUCT HANDLING

- A. Deliver carpentry materials to the site ready to use with each piece of lumber clearly marked as to grade, type and mill, and place in an area protected from the elements.
- B. Deliver rough hardware in sealed kegs and/or other containers which shall bear labels as to type and kind.
- C. Pile lumber for rough usage, when delivered to the site in stacks to insure drainage and with a minimum clearance of six (6) inches above grade. Cover stacks with tarpaulins or other watertight coverings. Store grounds and similar small sized lumber inside the building as soon as possible after delivery.
- D. Do not store seasoned lumber in wet or damp portions of the building.
- E. Protect fire retardant treated materials against high humidity and moisture during storage and erection.
- F. Remove delivered materials which do not conform to specified grading rules or are otherwise not suitable for installation from the job site and replace with acceptable materials.
- G. All items specified in Section 087100 of this specification entitled "Finish Hardware" shall be received, accounted for, stored and applied under this Section.

- H. Hardware shall be sorted and stored in space assigned by Contractor and shall be kept at all times under lock and key. The safety and preservation of all items delivered will be the responsibility of the Contractor.

1.8 JOB CONDITIONS

- A. Installer must examine the substrates and supporting structure and the conditions under which the carpentry work is to be installed, and notify the Contractor in writing of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer and the Commissioner.
- B. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other work.

PART 2 PRODUCTS

2.1 WOOD MATERIAL

A. General

1. All wood shall be sound, flat, straight, well seasoned, thoroughly dry and free from all defects. Warped or twisted wood shall not be used.
2. For miscellaneous wood blocking, grounds, furring as required, use Utility Grade Coastal Douglas Fir or Southern Pine, free from knots, shakes, rot or other defects, straight, square edges and straight grain, air seasoned with maximum moisture content of nineteen (19) percent. Wood shall be S4S, S-Dry, complying with PS-20.
3. Plywood and rough carpentry for telephone and electric closets, provide 3/4" thick C-D EXT-APA plywood, fire retardant treated as specified herein.
4. Provide plywood wall sheathing behind gypsum wallboard, where indicated, APA Structural 1 Rated Sheathing, interior grade or better, with span rating to suit stud spacing; thickness as noted on drawings; and fire retardant treated as specified in herein. Plywood backing that is part of a fire-rated assembly shall meet all requirements as listed in the UL assembly approval.

B. Wood Treatment

1. All interior wood material specified herein shall be fire retardant treated to comply with the AWPA standards (C20 for lumber, C27 for plywood) for pressure impregnation with fire retardant chemical to achieve a flame spread rating of not more than 25 (UL Class "FR-S") when tested in accordance with UL Test 723 or ASTM E 84. The fire retardant chemicals used to treat the lumber must comply with FR-1 of AWPA Standard P17 and be free of halogens, sulfates and ammonium phosphate.
 - a. After treatment, kiln dry to a moisture content of fifteen (15) percent; if wood is to be painted or finished, kiln dry to a moisture content of twelve (12) percent. Treatment shall be equal to "Dricon" made by Arch Wood

Protection Inc. or approved equal. Provide UL approved identification on treated materials.

2. Treated wood which is cut or otherwise damaged shall be further treated in accordance with the AWWA Standard M-4.

2.2 HARDWARE

- A. Rough Hardware for Treated Woods and Exterior Use: Hot-dipped galvanized or Type 304 stainless steel.
- B. Nails: Common steel wire, untreated for interior work as per ASTM F 1667.
- C. Bolts: Standard mild steel, square head machine bolts with square nuts and malleable iron or steel plate washers or carriage bolts with square nuts and cut washers conforming to the following:
 1. Bolts: ASTM A 307, Grade A.
 2. Nuts: ASTM A 563.
 3. Lag Screws and Bolts: ASME B 18.2.1.
- D. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2; use stainless steel for treated woods and exterior use.
- E. Wood Screws: ASME B 18.6.1.
- F. Concrete and Masonry Anchors: Standard expansion-shield self-drilling type concrete anchors where so shown or noted on the drawings, or where approved by the Commissioner.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where carpentry is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION OF FINISH HARDWARE

- A. All finishing hardware specified in Section 087100 of this specification entitled "Finish Hardware" shall be received, accounted for, stored and applied under this Section.
- B. Hardware shall be sorted and stored in space assigned by Contractor and shall be kept at all times under lock and key. The safety and preservation of all items delivered will be the responsibility of the Contractor.
- C. Hardware shall be carefully fitted and securely attached, in accordance with these specifications and the instructions of the various manufacturers.
- D. Unless otherwise noted, mount hardware units at heights established in Section 081113.
- E. 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, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.
- F. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- G. Drill and countersink units which are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- H. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hair-line joints. Join units with concealed welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar items, if any.
- I. All keys used shall be construction keys which are to be tagged with fiber discs as approved, clearly labeled with identifying inscriptions and then neatly arranged in a temporary cabinet. All construction keys shall be returned to the City of New York.
- J. Adjusting and Cleaning
 - 1. Adjust and check each operating item of hardware and each door, to ensure proper operation and function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite type if no other recommended). Replace units which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.
 - 2. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make a final check and adjustment of all hardware items in such space or area. Clean and re-lubricate operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.3 INSTALLATION OF DOORS AND FRAMES

A. Preparation

1. Remove welded-in shipping spreaders installed at factory.
2. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
3. Drill and tap doors and frames to receive non-templated mortised and surface-mounted door hardware.

B. Installation

1. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
2. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Install frames in accordance with ANSI 250.11-20001, Recommended Erection Instructions for Steel Frames, unless more stringent requirements are specified herein.
 - b. At fire-protection-rated openings, install frames according to NFPA 80.
 - c. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - d. Install frames with removable glazing stops located on secure side of opening.
 - e. Frames set in masonry walls shall have door silencers installed in frames before grouting.
 - f. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - g. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
3. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with post-installed expansion anchors.

- a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
 4. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames conforming to the requirements of Section 072100 - "Thermal Insulation."
 5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar; refer to Section 042000 "Unit Masonry" for installation of frames in masonry walls.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Gypsum Board Partitions: Secure frames in place with post-installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
 9. Installation Tolerances: Adjust steel door frames for squareness, alignment, twist, and plumb to the tolerance given in HMMA 841 of ANSI/NAAMM, current edition.
 10. Steel Doors: Fit hollow metal doors accurately in frames to the tolerances given in HMMA 841 of ANSI/NAAMM, current edition.
 - a. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 11. Glazing: Comply with installation requirements in Division 8 Section "Glass and Glazing" and with standard steel door and frame manufacturer's written instructions.
 - a. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.
 - C. Adjustments: Check and readjust operating finish hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise unacceptable.
- 3.4 BLOCKING AND MISCELLANEOUS WOOD
- A. General
 1. Erect rough carpentry true to line, levels and dimensions required; squared, aligned, plumbed, and securely fastened in place.
 2. Shim where required to true up furring, blocking and the like. Use wood or metal shims only.

3. Do all cutting, fitting, drilling and tapping of other work as required to secure work in place and to perform the work included herein. Do all the cutting and fitting of carpentry work, for the work of other trades as required.

B. Blocking and Miscellaneous Wood

1. Furnish and install all wood grounds, furring, blocking, curbs, bucks, nailers, etc., that may be necessary and required in connection with the carpentry and with the work described for any other trades and including required carpentry for electrical fixtures. All blocking and nailers shall be continuous wherever required, whether or not so indicated.
2. Blocking shall be as required for the proper installation of the finished work and for items in mechanical sections as required. Blocking, edgings, stops, nailing strips, etc., shall be continuous, unless distinctly noted otherwise. Provide blocking as required to install all equipment. Provide blocking and nailers where shown or required to fasten interior sheet metal work.
3. Fastening for wood grounds, furring and blocking shall be of metal and of type and spacing as best suited to conditions. Hardened steel nails, expansion screws, toggle bolts, self-clinching nails, metal plugs, inserts or similar fastenings shall be used, of suitable type and size to draw the members into place and securely hold same.

3.5 TELEPHONE AND ELECTRIC EQUIPMENT MOUNTING BOARDS

- A. Furnish and install 3/4" thick plywood panels to the walls of the telephone and electric equipment rooms in accordance with the requirements of the local utility company.
- B. Secure to wall using proper devices for substrates encountered, spaced twelve (12) inches o.c., maximum around the edges, 1-1/2" from corners, and in three (3) rows of three (3) each in the field. Recess fastening devices flush with the plywood surface. Adjacent panels shall be butted with 1/16" space between without lapping.

3.6 ROUGH HARDWARE

- A. Securely fasten rough carpentry together. Nail, spike, lag screw or bolt as required by conditions encountered in the field and the Contract Documents.
- B. Provide rough or framing hardware, such as nails, screws, bolts, anchors, hangers, clips, inserts, miscellaneous fastenings, and similar items of the best quality and of the proper size and kind to adequately secure the work together and in place, in a rigid and substantial manner.
- C. Secure rough carpentry to masonry with countersunk bolts in expansion sleeves or other acceptable manner, with fastenings not more than sixteen (16) inches apart. Secure woodwork to hollow masonry with toggle bolts spaced not more than sixteen (16) inches apart.
- D. Countersink bolts in nailers and other rough woodwork and include washers and nuts. Cut bolts off flush with surfaces and peen as may be required to receive finished work.

- E. Inserts to secure wood nailers to concrete shall be malleable iron threaded inserts with 3/8" diameter bolts of length to allow for countersinking. Locate at end of each nailer and at intervals not exceeding thirty (30) inches o.c.
- F. Furnish to the mason for building into the work, or attaching the work which is to be built in, anchors, bolts, wall plates bolted to masonry, corrugated wall plugs, nailing blocks, etc., which are required for the proper fastening and installation for the work or other items as called for in this Section.
- G. Detailed instructions with sketches of necessary requirements, shall be given to the masonry trade showing the location and other details of such nailing devices.

3.7 CLEANING UP

- A. General: Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends and debris.
- B. Sweeping
 1. At the end of each working day, or more often if necessary, thoroughly sweep all surfaces where refuse from this portion of the work has settled.
 2. Remove the refuse to the area of the job site set aside for its storage.
 3. Upon completion of this portion of the work, thoroughly broom clean all surfaces.

END OF SECTION

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SECTION 064023

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the architectural woodwork as shown on the drawings and/or specified herein, including, but not limited to, the following:
 1. 1/2" x 2 1/2" CVG douglas fir paneling (WD-1), with 1/8" square reveal.
 2. Custom CNC rounded 3/4" plywood panels, shop painted.
 3. Stainless steel countertop and shelving.
 4. Theater 2 perforated milled ply wood screen with opaque finish.
 5. Theater 1 graduated veneer plywood screen and wall treatment with opaque finish.
 6. Wood trim, moldings, base, frames and rails.
 7. Wood casework and counters with special veneers.
 8. Wood casework and counters with plastic laminate finish.
 9. Hardware for casework.
 10. Wood shelving.
 11. Solid plastic counters.
 12. Surface and wall treatments.
 13. Wood framing and rough lumber as required for work of this Section.
 14. Wood grounds, blocking, nailers, furring as required for work of this Section.
 15. All rough hardware and fastenings for work of this Section.
 16. Drilling concrete and masonry, drilling and/or tapping metal work, as required, for the installation of work of this Section.
 17. Back painting as specified herein.
 18. Shop finish of work of this Section, except items indicated herein to be shop primed only.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Carpentry - Section 062000.
- F. Caulking between architectural woodwork and any wall, floor, or ceiling joints - Section 079200.
- G. Wood doors - Section 081416.
- H. Field finishing - Section 099000.

1.4 QUALITY STANDARDS

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. The quality standards of the Architectural Woodwork Institute, "Architectural Woodwork Standards," 1st Edition, dated October 1, 2009, shall apply to all workmanship including materials and installation, for architectural woodwork and by reference are made a part of this specification. All work shall conform to "Premium" grade requirements of the AWI "Architectural Woodwork Standards," unless otherwise modified herein.
- C. In the event of a dispute as to the quality grade (or grades), the Contractor shall call upon the Architectural Woodwork Institute for an inspection under AWI's Quality Certification Program which shall include a QCP Inspection and Report. The Contractor agrees to abide by the decision of this Report. The cost of said inspection and report shall be borne by the Contractor.
- D. Employ only tradesmen experienced in the fabrication and installation of architectural woodwork.

1.5 LEED PERFORMANCE REQUIREMENTS

- A. The following criteria are REQUIRED for the products included in this section:
 - 1. Engineered wood, not including salvaged wood, shall contain a minimum of 10% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.

2. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with the Submittal Requirements of this Section.
3. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
4. Permanently Installed wood-based materials used in this project that have been certified in accordance with the Forest Stewardship Council (FSC) guidelines shall be documented in accordance with the Submittal Requirements of this Section.
 - a. Applicable products include, but are not limited to, structural framing and general dimensional framing, flooring, finishes, built-in furnishings, miscellaneous blocking, fire rated plywood back panels used for equipment mounting, architectural panels, and plywood.
5. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419, Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints, and Coatings,(LEED BUILDING) where applicable.
6. Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to the interior shall meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by SCAQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter, less water and less exempt compounds.
 - a. Clear Wood Finishes

1). Varnish	350
2). Sanding Sealers	350
3). Lacquer	550
 - b. Shellac

1). Clear	730
2). Pigmented	550
 - c. Stains
 250 |
 - d. Floor Coatings
 100 |
 - e. Waterproofing Sealers
 250 |
 - f. Sanding Sealers
 275 |
 - g. Other Sealers
 200 |
7. The calculation of VOC shall exclude water and tinting color added at the point of sale.
8. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.6 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the wood product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. Location in which wood materials were manufactured or fabricated and location from which wood was harvested.
 - c. For wood products, indication (Y/N) of whether the supplied product(s) are certified by the Forest Stewardship Council (FSC).
 - d. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment. Include total cost for all wood products and itemized costs for all FSC-certified wood products.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. Documentation that all composite wood and agrifiber products do not contain added urea-formaldehyde resins.

B. Shop Drawings

1. Submit shop drawings of all woodwork specified and indicated on the drawings. Shop drawings shall indicate room plans and elevations at 3/4" equals 1'-0" scale and typical construction details at 3" equals 1'-0" scale. Shop drawings shall indicate all materials, thicknesses and finishes.
2. Shop drawings shall show all finish hardware, anchors, fastenings and accessories.
3. Shop drawings shall show all jointing, joint treatment and butt jointing in veneers and plastic laminate.
4. Shop drawings for wood paneling must show complete elevations of rooms to receive paneling as well as panel matching required by these specifications.
5. Shop drawings for cabinet work must show centerline height and horizontal location of all required internal wall blocking.
6. Where architectural woodwork deviates from AWI standards noted herein, shop drawings must identify these deviations.

- C. Samples: Submit samples of each of the following items:
1. Plastic laminate, twelve (12) inches square, including a section of outside corner.
 2. Transparent finish for each species of wood veneer laminated to particleboard, twelve (12) inches square, for each finish specified or shown.
 3. Opaque finish wood veneer laminated to particleboard, twelve (12) inches square for each color, gloss and finish specified or shown.
 4. Each finish type of wood panel, 24" wide x 36" high.
 5. Each type and finish of each type of wood cornice, trim, molding, etc., eight (8) inches long, finish as specified.
 6. Cabinet hardware.

1.7 QUALIFICATIONS

- A. The work of this Section shall be provided by a firm having a minimum of three (3) years' experience on projects of similar size and quality to that specified and shown.

1.8 COORDINATION

- A. Coordinate the work of this Section with other appropriate Sections of the specifications to insure proper scheduling for fabrication and installation of the work specified herein
- B. Coordinate with partition and finish trades to insure that proper provisions are made for the installation of the work specified herein.
- C. Verify all dimensions in the field prior to fabrication of all Architectural Woodwork to assure proper fit.

1.9 PRODUCT HANDLING

- A. All materials and work of this Section shall be protected from damage, from time of shipment from shop to final acceptance of work. Cover, ventilate, and protect work of this Section from damage caused by weather, moisture, heat, staining, dirt, abrasions, any other causes which may adversely affect appearance or use, or which may cause deterioration of finish, warping, distortion, twisting, opening of joints and seams, delamination, loosening, etc., of work of this Section.
- B. Keep all finish carpentry, millwork, and cabinet work under cover both in transit and at the premises. Do not deliver any finish carpentry, millwork or cabinet work before it is required for installation. Protect such work to avoid damage in transit, during erection and after erection until acceptance of the building; use all such methods to provide the proper protection. Remove such protection when directed by the Commissioner.
- C. Deliver finish carpentry, millwork, and cabinet work in a dry stable condition; protect same against injury and dampness. Do not store or install finish carpentry, millwork or cabinet work until after the concrete, masonry and plaster work are thoroughly dry.
- D. Damaged or defective items of work of this Section are subject to rejection and replacement with new by Contractor, at no cost to the City of New York.

1.10 JOB CONDITIONS

- A. Humidity Controls: The ambient relative humidity at the site, including both the storage and the installation areas, shall be maintained between 25% and 55% prior to delivery and through the life of the installation.
- B. Determine equilibrium moisture content and maintain required temperature and relative humidity as required for a tolerance of plus or minus one (1) percent of the specified optimum moisture content until woodwork receives specified finishes. Refer to "Guide to Wood Species Selection," AWI, for method of determining equilibrium moisture content values.
- C. Examination of Substrate and Conditions: The installer must examine the substrate and the conditions under which the work of this Section is to be performed, and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with work under this Section until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- D. Areas to receive architectural woodwork must be fully enclosed with windows and/or curtain wall installed and glazed, exterior door in place, HVAC systems operational and temporary openings closed. Any plaster, wet grinding and concrete work shall be fully dry.
- E. Architectural woodwork shall be allowed to come to equilibrium on site for 7 days prior to installation.

PART 2 PRODUCTS

2.1 BASIC REQUIREMENTS

- A. Wood Moisture Content: Provide kiln-dried (KD) lumber with an average moisture content range of nine (9) to twelve (12) percent for exterior work and six (6) to eleven (11) percent for interior work.
- B. Measurements: Before proceeding with woodwork required to be fitted to other construction, obtain field measurements and verify all dimensions of shop drawing details as required for accurate fit.
- C. Compatibility of Grain and Color: The Commissioner reserves the right to select materials for best compatibility between visually related members and veneers.
- D. Machine and sand woodwork to comply with requirements of Standards for specified grade.
- E. Fabricate woodwork to dimensions, profiles and details shown. Rout or groove back of flat trim members, kerf backs of other wide flat members except plywood or veneered members.
- F. Miter joints by joining, splining and gluing to comply with requirements for the specified grade.
- G. Inspect each piece of lumber and plywood or each unit of woodwork after drying; do not use twisted, warped, bowed or otherwise damaged or defective wood.

- H. Cores and substrates used in the Conservation spaces, and other spaces as noted, shall be free of urea formaldehyde and shall be marine grade plywood.

2.2 GENERAL - MATERIALS

- A. Softwood lumber shall conform to the requirements of the latest edition of American Lumber Standards Simplified Practice Recommendation R-16. Grades shall conform to the grading rules of the Association having jurisdiction, and shall bear the official grade and trademark of the Inspection Bureau of the Association and a mark of mill identification.
- B. Framing and Rough Lumber: No. 1 KD grade Southern Pine or Dense Construction grade Douglas Fir, having extreme fiber in bending stress of at least 1700 psi, surfaced four sides (S4S). Provide fire retardant treatment meeting requirements of Section 06200.
- C. Grounds, Blocking, Nailers, Furring: Southern Pine, Douglas Fir or Sitka Spruce, grade to suit particular purpose and to be straight, square edged, straight grained, surfaced four sides (S4S), and which will retain nails and screws without splitting. Provide fire retardant treatment.
- D. Lumber: AWI Section 3 with the following requirements:
 - 1. Hardwood for Transparent Finish: Premium Grade, select, Quarter Sawn White Oak, matching adjoining veneers unless otherwise shown or specified, and free from cat's eyes, bird's eyes, burls, curls or cross grains.
 - 2. Hardwood for Opaque Finish: Any hardwood which, when finished, will not show any grain, imperfection or other surface defects when used with the opaque finish specified.
- E. Plywood: AWI Section 4; Veneer core, particleboard, or plywood core unless otherwise specified, and with the following requirements:
 - 1. Plywood shall be fir, typical: Premium Grade, face veneers as shown or specified.
 - 2. Elevator Plywood: A-B marine grade douglas fir plywood, $\frac{3}{4}$ " thick with fire retardant treatment. Exposed A face to be sanded down smooth with no raised grains, with 2 coats of Bona Naturale finished, edges. Note this is a long lead item.
 - 3. Particleboard: Premium Grade, fire retardant for wall paneling only equal to Duraflake FR and Duraflake for cabinets. In addition, particleboard and MDF shall be certified to the following EPP CPA 3-08 formaldehyde emission limits:
 - a. Particleboard meets 0.18 ppm.
 - b. MDF meets 0.21 ppm.
 - 4. Edges: Banded with hardwood in accordance with Premium Grade Standards.
- F. Veneers
 - 1. Face Veneers for Transparent Finish: AWI, Premium Grade of species of Premium clear douglas fir. Veneer must be flitch matched, sequence matched, book matched, end matched and centered balanced.

2. Face Veneers for Opaque Finish: Premium Clear douglas fir that, when finished, will not show grain, imperfection or other surface defects when used with the opaque finish specified.

G. Finishing (Wood)

1. Transparent Finish for Paneling, Casework and Trim

- a. AWI Factory Finish System "Conversion Varnish", System 5, Transparent.
- b. AWI Premium Grade.
- c. Degree of Sheen: Matte.

2.3 PLASTIC LAMINATE

- A. Face Sheets: NEMA Publication LD3, Grade GP50, Type I, 0.05" thick, as manufactured by Formica, Nevamar, Wilson-Art. Color, pattern and finish as selected by the Commissioner.
- B. Backing Sheets: Non-decorative, high-pressure plastic laminate, NEMA LD3, Grade BK20, 0.02" thick.
- C. Edges: Finish with plastic laminate to match face and applied before face sheets are applied, unless otherwise shown or specified.
- D. The perforated plywood panels shall be cut using digital cutting methods from a digital document provided by the Commissioner.

2.4 METAL

A. Steel

1. Structural Steel Shapes and Plates: ASTM A 36.
2. Hot-Rolled Carbon Steel Sheets: Commercial quality, ASTM A 569, may be used for concealed parts only. Galvanize sheets for planters.
3. Z clips for wall mounting.
4. Finishes
 - a. Primer for Unexposed Metal: Zinc chromate primer.

B. Stainless Steel

1. Stainless Steel: ASTM A666, Type 304.
2. Apply sound dampening to underside of metal work surfaces, including sinks and similar units. Provide coating with smooth surface and hold coating 1" back from open edges for cleaning.
3. Tops and Shelves: Minimum 0.0781" thick stainless steel, unless otherwise indicated.

2.5 MISCELLANEOUS PRODUCTS

A. Fasteners

1. Wood Screws: FS FF-S-111, type, size, material and finish as required for the condition of use.
2. Nails: FS FF-N-105, type, size, material and finish as required for the condition of use.
3. Anchors: Type, size, material and finish as required for the condition of use.
4. Staples: Upholstery type staples of sufficient strength to hold fabric taut in place without sagging.

B. Adhesives

1. For Laminating Plastic Laminate Surfaces: Urea resin, Type II, as recommended by fabricator.
2. For All Other Uses: polyvinyl acetate resin emulsion or other type as recommended by the fabricator..

2.6 CABINETS WITH PLASTIC LAMINATE FINISH

A. General

1. Fabricate all cabinetry and millwork to the "Premium Grade" standards of the AWI, Section 10.
2. Face construction of cabinets shall be "Flush Overlay."
3. Provide 3/4" thick doors, drawer fronts and fixed panels (including thickness of plastic) except where required to be thicker by Standards; and provide flush units.
4. Provide dust panels of 1/4" thick plywood or tempered hardboard above compartments and drawers, except where located directly below countertops.
5. Exposed Edges: Plastic laminate matching exposed panel surfaces. Ease exposed edge of overlap sheet.

B. Plastic Laminate

1. Plastic Laminate for Horizontal Surfaces: 0.050" thick, general purpose type (high pressure).
2. Plastic Laminate for External Vertical Surfaces: 0.028" thick, general purpose type (high pressure).
3. Plastic Laminate for Post Forming: 0.042" thick, post forming (high pressure).
4. Plastic Laminate for Cabinet Linings: 0.020" thick, cabinet liner (high pressure).
5. Plastic Laminate for Concealed Panel Backing: 0.020" thick, backer type (high pressure).

6. Plastic Laminate Colors and Patterns: As selected by the Commissioner from manufacturer's standard satin finish products. Acceptable Manufacturers: Wilson-Art, Nevamar, Formica.
 - C. Shop Assembly: All work shall be shop assembled. Work that is too large for entrance into the use area shall be fabricated in attachable sections with provisions for reconnection in the using space.
 - D. Material Thicknesses: See drawings for general materials thicknesses. Minimum thickness of solid lumber for web frames, trim, bases, etc., shall be 3/4". Minimum thickness of plywood and particleboard shall be 3/4".
 - E. Sizes: See drawings for woodwork sizes required. The manufacturer shall check field dimensions and verify all openings and actual field conditions prior to fabrication of work.
 - F. Manufacturer is responsible for rigidity and structural stability.
- 2.7 PLASTIC LAMINATE COUNTERTOPS AND VANITIES
- A. Grade: Same as AWI grade required for cabinet work; plastic laminate finish.
 - B. Construction
 1. Provide back-splash and end-splash, where detailed; top-mounted square butt joint, fully covered with matching plastic laminate, eased edges.
 2. Exposed Counter Edges: Plastic laminate matching surface, except as otherwise indicated. Ease exposed edges of overlap sheet.
 3. Cut openings for equipment to be installed. Comply with equipment manufacturer's requirements, but provide internal corners of 1/8" minimum radius. Smooth saw cut and ease edges.
 4. Seal cut edges of counter at openings for sinks and other "wet" equipment, using waterproofing compound recommended by plastic manufacturer and compatible with laminating adhesive.

2.8 BUILT-IN CABINETS, WOODWORK WITH WOOD VENEER FINISH

- A. Construction: Details of cabinet and wood work construction shall conform to design as detailed on the drawings and shall be constructed in accordance with AWI Section 10, Premium Grade.
- B. Finishing: All work shall be factory pre-finished. No field finishing will be permitted, except minor retouching that is necessary after installation to leave work in perfect condition. Field touch-up shall be accomplished using the same finishes as originally applied at the factory. All finishes shall be free from runs, sags and other visual defects. All wood shall be thoroughly hand smoothed and hand sanded to remove all traces of machine and tool marks. All steel or other metal components shall be deburred, thoroughly cleaned and degreased prior to finishing. Requirements for surface preparation shall be in accordance with AWI Standards specified. Surfaces shall be finished as follows:

1. Wood veneers shall be as specified herein, flitches to be selected by Commissioner. Veneer shall be minimum 1/28" thick.
 2. All wood veneer surfaces shall be given transparent finish as specified herein.
 3. Backing Veneer: Provide backing veneer, of same thickness and strength as face veneer for balanced construction, where plywood surface not exposed, not semi-exposed, or not to be finished. Note that interior surface of cabinets, closets, are to be finished.
- C. Edge Banding: All visible edges of case and body members fabricated from plywood shall be banded. Transparent finished wood veneer panels shall be banded with wood species to match face veneers.

2.9 CABINET HARDWARE

- A. Architectural Woodwork Hardware: Provide the following items, or their approved equal, as required:
1. Hinges: Concealed hinges.
 2. Catches: Magnetic; top and bottom.
 3. Pulls: Selected by the Commissioner.
 4. Locks: Directed by the Commissioner.
 5. Drawer Slides: Full extension, 100 lb. capacity.
 6. Shelf Supports: Pin and grommet system.
 7. Finish: Satin Stainless Steel.
 8. Closet Hardware: Oval wardrobe rails, chrome plated steel with center bracket and wall support brackets.

2.10 WOOD FOR RAILS, CAPS, TRIM, BASES, MOLDINGS AND FRAMES

- A. Quality Standard: For the following types of interior architectural woodwork, comply with indicated standards as applicable.
1. Standing and Running Trim: AWI Section 6.
 2. Miscellaneous Millwork: AWI Section 6.
 3. Stair Handrails: AWI Section 7.
- B. Wood Work for Transparent Finish: Except as otherwise indicated, comply with the following:
1. Grade: Premium.
 2. Species of Solid Wood: Quarter Sawn Species as noted on drawings.
- C. Woodwork for Paint Finish: Except as otherwise indicated, comply with the following:

1. Grade: Premium.
2. Species of Solid Wood: Solid, paint grade, sound clear Poplar or Birch.

2.11 HARDWOOD VENEERED PLYWOOD PANELS

- A. Type: Interior grade, hot press laminated with waterproof adhesive, pre-finished, with face veneers and core construction as specified herein, meet AWI Section 8 standards.
- B. Core Construction: Shall be fire retardant treated, meeting requirements of Section 06200; type at fabricator's option.
- C. Thickness: 3/4" thick.
- D. Face Veneers: Panels shall be flitch matched, sequence matched, book matched, end matched, center balanced, Quarter Sliced Oak, vertical grain, and shall be matched for color. Use this veneer in all other areas where wood paneling is required. All panels shall be matched one to the other using "blueprint" matching method. Veneer shall be minimum 1/28" thick.
- E. Finish: Veneers shall be finely sanded and clear factory pre-finished using AWI System noted herein.
- F. Panel Sizes: See drawings for panel sizes required.
- G. Exposed edges of panels shall be solid sections matching face veneer.
- H. Where wood doors are set in veneered wood paneling, veneer on door shall be sequenced to fit veneer pattern; doors to meet the requirements of Section 081416.

2.12 SOLID PLASTIC COUNTERS AND WALL TREATMENTS

- A. Provide 1/2" thick "Corian" counters as manufactured by E.I. Du Pont or approved equal made by Avonite, Wilson Art or Gibraltar meeting standards specified herein. Counters to be of two color as selected by the Commissioner.
 1. Color A: Glacier White.
 2. Color B: Deep Nocturne.
- B. Material: Cast, filled, acrylic; not coated, laminated or of composite construction, meeting ANSI Z124-1980, Type Six, and ISS FA-2.01 "Classification and Standards Publication of Solid Surfacing Material" as published by the International Solid Surface Fabricator Association.
- C. Counters shall be adhesively joined with no exposed seams, having edge details shown on drawings.
- D. Material shall conform to the published performance characteristics of ISSFA-2-01.
- E. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints.
- F. Sealant: Manufacturer's standard mildew-resistant, FDA/UL recognized silicone sealant in colors matching components.

G. Fabrication

1. Fabricator must be properly trained by the solid surface manufacturer.
2. Factory fabricate components to custom sizes and shapes indicated, in accordance with approved shop drawings.
3. Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints.
4. Provide factory cutouts for plumbing fittings and accessories as indicated on the drawings.
5. Cut and finish component edges with clean, sharp returns. Route radii and contours to template. Repair or reject defective and inaccurate work.

H. Warranty: The manufacturer shall warrant to the City of New York that the manufacturer will repair or replace, at his option, without charge, such product that fails due to a manufacturing defect during the first 10 years after initial installation. This includes all labor charges needed to repair or replace the product covered hereunder.

2.13 FABRICATION - GENERAL

- A. Provide lumber framing for architectural woodwork, complete with all bracing and fastening devices as required for a rigid installation, and as required to sustain the imposed loads.
- B. Do all fabrication from field measurement with provision for scribing as required to meet built-in conditions.
- C. Coordinate the work of this Section with the work of other trades.
- D. Fabricate units in largest practicable sections. Assemble in the shop for trial fit, disassemble for shipment and reassemble with concealed fasteners.
- E. Maintain relative humidity and temperature during fabrication, storage and finishing operations matching that of the areas of installation.
- F. Details indicate the required type and quality of construction. Modifications to conform to manufacturer's standards will be considered providing they comply with the Contract Documents, maintain the profiles shown and subject to acceptance by the Commissioner.
- G. Reinforcing shown is minimum. Provide additional reinforcing as required to ensure a rigid assembly. Exposed surfaces shall be free from dents, tool marks, warpage, buckle, glue and open joints, or other defects affecting serviceability or appearance. Accurately fit all joints, corners and miters. Conceal all fasteners. Make threaded connections up tight so that threads are entirely concealed.
- H. Factory finish all items where possible. Defer final touch-up, cleaning and polishing until after delivery and installation.
- I. Comply with AWI, Premium Grade standards for sanding, filling countersunk fasteners, back priming and similar preparations for the finishing of architectural woodwork, as applicable to each unit of work.

- J. Prepare all countersunk wood screw attachments for wood plugs. Wood plugs shall match surrounding species and grain direction; putty filling is not acceptable.

2.14 FABRICATION - SPECIFIC ITEMS

A. Casework

1. Include all preparations for mechanical, electrical, telephone and plumbing work required.
2. Provide cabinet hardware for casework as shown.
3. Provide dust panels in body webs and between drawer units.
4. Provide wood veneers for exposed surfaces as specified herein before.
5. Hollow core doors will not be permitted.
6. Provide matching veneers for edge treatments of case body members where transparent finishes are indicated or specified.
7. Provide drawers with slides as specified. Drawers shall not rest on web body frames.
8. Provide wood veneers for transparent finish, of matching and continuing grain, for drawer and door edges.

B. Paneling

1. General Paneling Requirements

- a. Panel type shall be AWI, Premium Grade construction.
- b. Panel joints shall be flush type unless otherwise shown.
- c. Provide concealed wood blocking and framing, anchors, clips, splines, supporting and attaching devices.
- d. Provide cut-outs to receive attachments, mechanical and electrical work as required.

2. Wood Veneer Paneling

- a. Comply with AWI Section 8.
- b. Provide veneers as specified and as shown, including all matching requirements. Run veneer in the direction shown.

3. Stile and Rail Paneling

- a. Comply with AWI Section 8.
- b. All exposed edges of panel cores shall be edge banded.
- c. Grain direction shall be as shown.

C. Closet and Storage Shelving

1. Provide closet and storage shelving in accordance with AWI Section 600, Custom Grade, unless otherwise shown or specified.

2. Exposed edges shall have hardwood edge bands.
- D. Standing and Running Trim: Provide standing and running trim of the sizes, profiles, species and finish as specified or shown and complying with AWI Section 6, Premium Grade.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where architectural woodwork is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 FRAMING

- A. Use specified framing lumber, sizes and spacing as indicated on drawings and as required to support loads.
- B. Framing shall be cut square on bearings, closely fitted, accurately set to required lines and levels, rigidly secured in place at bearings and connection with nails, lag screws and/or bolts as required by conditions.

3.3 GROUNDS, BLOCKING, NAILERS AND FURRING

- A. Provide all wood grounds, blocking, nailers, furring, and the like for work of this Section, where shown and where required, dressed to size indicated or required to suit the condition. Install grounds, blocking, nailers, furring, etc., rigidly, in proper alignment, trued with a long straight edge.

3.4 ROUGH HARDWARE

- A. Provide all rough hardware, such as nails, screws, bolts, anchors, hangers, clips and similar items. Hardware shall be of the proper size and kind to adequately secure the work together and in place, in a rigid and substantial manner. Use galvanized hardware at exterior walls, and at other locations where subject to moisture or where water will be present.
- B. Secure wood to concrete and to solid masonry with countersunk bolts in expansion sleeves or other approved manner, to steel with countersunk bolts, to hollow masonry and to drywall with heavy duty countersunk toggle bolts. Space fastenings not more than sixteen (16) inches apart. Hardened cut nails, power-driven fastenings, or other suitable devices may be used where approved by the Commissioner.
- C. Connections and fastenings shall be made in such manner as will compensate for swelling and shrinkage and shall permit the work to remain permanently in place without any splitting or opening of joints.

3.5 INSTALLATION OF CABINET FINISH HARDWARE

- A. All items of finish hardware furnished under this Section shall be carefully fitted and secured in place as part of the work of this Section. Locations and positioning of hardware shall be subject to the Commissioner's approval. Care shall be taken not to

mar or damage hardware, or other work. Install doors plumb and true. Hardware shall be fitted to assure operation without forcing.

- B. After preliminary fitting of hardware, the Contractor shall remove trim for painting and finishing work; after which he shall reinstall the hardware in a permanent manner.
- C. Upon completion of the work, before final acceptance of the building by the City of New York, the Contractor shall, in the presence of the Commissioner, show that all hardware is in satisfactory working order; fit all keys in their respective locks and, upon acceptance of the work, shall tag and deliver all keys to the Commissioner and City of New York.
- D. When directed by the City of New York, at any time during the first year after the completion of the Contract, the Contractor shall return to the building and adjust and refit the work and hardware, and leave such items in satisfactory working order.

3.6 GENERAL INSTALLATION

- A. Wall anchorage and general installation procedures for cabinetry work shall conform to AWI Section 10, Article entitled "EXECUTION", Sub-Article 6.1 with all related subparagraphs.
- B. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level (including countertops), and with 1/16" maximum offset in flush adjoining surfaces, 1/8" maximum offset in revealed adjoining surfaces.
- C. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation.

3.7 TRIM, MOLDINGS, ETC.

- A. Install with minimum number of joints possible, using full-length pieces for each run. Stagger joints in adjacent and related members. Cope at returns, miter corner.
- B. Joints of all trim and/or moldings shall be set tight, miter exterior angles and cope interior angles. Joints, except end joints less than twelve (12) feet apart, will not be permitted in straight runs of trim and/or moldings and rails.
- C. Secure all trim and/or moldings with glue and blind nail with finishing nails. Set exposed nail heads in finished work and putty. Sand all work to remove any tool marks and irregularities.
- D. Wood shall receive finish as specified in Section 099000 - Painting.

3.8 WOOD RAILS

- A. Wood shall be planed straight, square and level, then sanded smooth with flush finished surfaces. Joints shall occur over supports. Right angle joints shall be mitered.

- B. All exposed fastening devices shall be countersunk and set below finished wood surfaces, and fitted with matching wood plugs; sand plugs and finish smooth and flush with exposed surfaces.
- C. Handrails shall be capable of withstanding a force of two hundred (200) lbs. applied to rail at any point from any direction.
- D. Provide all hardware and metal supports required for complete installation as detailed on drawings.

3.9 VENEERED WOOD PANELS

- A. Provide a system of concealed panel hanger clips, shims and corresponding wall clips to support the panel system. Face nailing shall not be permitted.
- B. Hang the panels in the designated locations. Panels shall be straight, level, flat and flush with adjoining panels.
- C. Where reveals are indicated, keep panels spaced so that reveals are parallel and of widths shown.

3.10 CLOSET AND STORAGE SHELVING

- A. Provide closet and storage shelving at the locations shown. Provide hang rods where shown. Set adjustable center hangers.

3.11 CABINET WORK AND MILLWORK

A. General

1. Materials and workmanship shall conform to the Quality Standards of the Architectural Woodwork Institute specified herein and to the drawings.
2. Cabinet work and millwork shall be performed by experienced cabinet work and millwork company, having craftsmen skilled in their trade.
3. Fabricate all cabinet work and millwork completely in the shop, in complete and/or as large units as practical, leaving only fitting, assembly, installation and a minimum of fabrication and finishing to be done at the building. Assembled work shall be rigidly secured and permanently fastened together with concealed fasteners.
4. Afford Commissioner every facility for inspection of work at shop or mill at such times as the Commissioner may select.
5. As far as practicable, use concealed fastenings for joining and assembling the work. Where this is impossible, the means of securing shall be placed in inconspicuous places and methods of joining and assembling submitted for Commissioner's approval prior to fabrication.
6. Mill all finish wood accurately to detail, with clean cut moldings, profiles and lines, machined, sanded smooth, housed, jointed, blocked, put together in the best manner, with provision for swelling and shrinkage, and to assure the work remaining in place without warping, splitting or opening of joints.

7. Cut trim to dimensions and profiles shown, from solid stock.
 8. Make all trim and the like in single lengths wherever possible; joints mitered, glued and splined. Continuous members shall have tight flush joints, doweled or splined and glued.
 9. Make all joints hairline tight, fitted accurately and joined with hardwood splines or dowels, glued together, or by other method approved by Commissioner. Use screws, not nails, for fastenings.
 10. Gluing shall, where practicable, be by the hot plate press method and glued surfaces shall be in close contact throughout. Glue stains on finished work will not be permitted.
 11. Cover surface fastenings, where permitted, with matching wood plugs or wood putty. Finish exposed edges of plywood with matching solid stock. Lock miter external corners; tongue and groove internal corners to allow for contraction and expansion.
 12. Machine sand with grain, finish with hand sanding, leave exposed surfaces free from machine or tool marks that will show through the finish.
 13. Work which adjoins drywall, concrete, or other finish shall be fitted and scribed in a careful manner and ample allowance shall be given for cutting and scribing.
 14. Erect work true to lines, levels and dimensions, square, aligned and plumb, securely and rigidly fastened in place.
- B. Cabinet Work: Provide all items of cabinet work indicated on drawings and as herein specified.
1. Tops, sides, backs, bottoms, dividers, shelves, fronts, doors and drawer fronts shall be of plywood or flakeboard core, with the specified wood veneer or plastic laminate as indicated on drawings.
 2. Drawer sides and backs shall be 1/2" thick solid clear selected white birch, suitable for clear finish. Drawer bottom shall be 3/8" thick plywood with clear selected white birch veneers, suitable for clear finish.
 3. Cabinet doors and drawers shall be flush mounted.
 4. Adjustable shelves in cabinets shall have grommets spaced 2" o.c.
 5. Fixed shelves shall be dadoed into side supports and glued.
 6. Shelves shall be 3/4" thick for spans up to 30"; for spans in excess of 30" to 48" shelves shall be 1" thick.
 7. All cabinets shall have closed top, sides, bottom, and back with veneers to match face work. Cabinets to fit accurately into indicated locations; scribe moldings permitted only where indicated.
 8. Countertops, counters, counter fronts, shelves, etc., indicated on drawings to have plastic laminate, shall have plastic laminate shop applied to 3/4" thick core, with plastic laminate backing sheet on underside or back of countertops, counters and

shelves. Plastic laminate shall be pressure laminated to core with laminate at external corners. Provide concealed wood framing to support plastic laminate counters, securely fastened to wall and to underside of counters.

- C. Countertops shall be installed to support a minimum concentrated live load of 150 lbs. acting downward at mid span at outer edge of counter without causing deformation and damage.

3.12 WOOD BASES

- A. Provide plywood backing, toggle bolted to substrate, if substrate not suitable for securing wood base.
- B. Machine wood bases from specified wood, to profiles indicated on drawings.
- C. Set base level and plumb. Where indicated on drawings, face of wood base shall be flush with wall above. Glue wood base to substrate or to plywood backing, and screw or nail wood base to substrate or to plywood backing with countersunk wood screws or with finishing nails, recess wood screw heads, and spackle with wood putty, set and spackle nails with wood putty. Do not nail or fasten wood base to floor. Ends of wood base shall be either splined or ship lapped.
- D. Where no wood backing occurs, screw apply base at each stud with screw countersunk and wood putty applied and sanded smooth and flush with base.

3.13 WOOD DOOR FRAMES

- A. Where indicated on drawings, provide wood frames and bucks for wood doors. Bucks shall be braced, set straight and plumb and have anchors for building into adjoining construction; space anchors not over two (2) feet apart (one foot from corners). Machine wood frames from specified solid wood to profiles indicated on drawings. Set frames plumb, level, square; securely attached to adjoining construction. Wood frames, bucks and trim shall conform to details.

3.14 PAINTING AND FINISHING

- A. General: All painting and finishing work of this Section shall be shop applied, unless otherwise noted, as specified below. All painting and finishing shall match approved samples. Field finish painting, where specified below, shall be by painting Subcontractor, as specified for in Painting Section.
- B. Schedule of Painting and Finishing
 - 1. Shop Primer On:
 - a. Wood bases.
 - b. Wood trim and moldings to be field finish painted.
 - c. Ferrous metal work.
 - 2. Shop Natural Finish On:
 - a. Wood paneling.
 - b. Wood cabinets with wood veneers.

- C. Back-Painting: All work of this Section in contact with concrete or masonry or other moisture areas and all concealed surfaces of cabinet and millwork, shall be back-painted with one (1) coat of oil based paint prior to installation, shop applied where practicable.
- D. Field Touch-Up: Field touch-up shall be the responsibility of the installing Subcontractor, and shall include the filling and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and mars, and final cleaning up of the finished surfaces.

3.15 CLEAN UP AND PROTECTION

- A. Clean Up: At regular intervals during the course of the work, all debris and excess material shall be cleaned up and removed from the site. Upon completion of installation, clean all spaces of debris caused by woodwork installation.
- B. Protection: Protect all woodwork from marring, defacement or other damage until final completion and acceptance of the project by the City of New York. Repair or replace all defective units prior to final inspection as directed by the Commissioner. Any units that cannot be satisfactorily repaired in the opinion of the Commissioner shall be replaced with new units of same original design, at no additional cost to the City of New York.

END OF SECTION

SECTION 072100

THERMAL INSULATION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. The Work of this Section includes all labor, materials, equipment, and services necessary to complete the thermal insulation as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Miscellaneous blanket insulation.
 - 2. Attachment devices.

1.3 RELATED SECTIONS

- A. Firestops and Smoke seals - Section 078413.
- B. Gypsum Board Assemblies - Section 092900.

1.4 SUBMITTALS

- A. Submit product data for each type of product indicated, including recycled content.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.

1.5 QUALITY ASSURANCE

- A. Fiberglass insulation shall contain a minimum of 20% (by weight) recycled content, calculated by adding the post-consumer recycled content percentage to one-half of the post-industrial recycled content percentage.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site, ready for use, in the manufacturer's original and unopened containers and packaging, bearing labels as to type and brand. Delivered materials shall be identical to approved samples.
- B. Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged or otherwise not suitable for installation and replace with acceptable materials.
- C. Take every precaution to prevent the insulation from becoming wet, cover with tarps or other weather/watertight sheet goods.

PART 2 PRODUCTS

2.1 BLANKET INSULATION

- A. Provide flexible glass fiber blankets/batts equal to "Fiberglass Flame Spread 25 Insulation" as manufactured by Owens Corning or equivalent product of Johns Manville, Certainteed, or approved equal, conforming to ASTM C 612, Type 1A or ASTM C 665, Type III, Class A, faced on one side with foil reinforced Kraft vapor retarder; maximum flame spread and smoke developed indices 25 and 50 respectively.
- B. Insulation shall have an R value of not less than 3.7/inch and shall be 3.5" thick unless otherwise noted on the drawings.

2.2 ACCESSORIES

- A. Clips for Securing Insulation to Encountered Surfaces: Spindle anchor and washer type consisting of perforated metal plates with spindle welded to center and snap on washers. Spindle and washers shall receive a corrosion-resistant electro-zinc plating. Adhesives for securing clips in place shall be recommended by the approved clip manufacturer.
 - 1. Acceptable Manufacturers
 - a. Miracle Adhesives Corp.
 - b. Stic-Klip Mfg. Co., Inc.
 - c. Midwest Fasteners.
 - d. Or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where thermal insulation is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. General
 - 1. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.
 - 2. Install insulation in as large components as practical and to cover entire areas indicated on the drawings, closely butted together at sides and ends, and against walls, beams, etc. Neatly fit and cut insulation around all projections such as pipes, conduits, hangers and all other elements encountered in the field, which will result in complete coverage of the scheduled areas.
 - 3. Discard, off the site, insulation which becomes damaged during the course of installation, or is no longer in a physical condition to function for use intended, and replace with new material.

4. Align joints accurately, with adjoining surfaces set flush.
5. Set vapor barrier faced units with vapor barrier to inside of construction, except as otherwise shown. Do not obstruct ventilation spaces. All joints in vapor barriers shall be sealed with 4" wide, foil faced duct tape to prevent vapor and air migration.
6. Tape joints and ruptures in vapor barriers, using tape specified above, and seal each continuous area of insulation to surrounding construction so as to ensure vapor tight installation of the units.
7. Where insulation is impaled on stick clips, provide clips not less than 3" from corners or edges and not more than 12" o.c.
8. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
9. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.
10. Apply a single layer of insulation to the required thickness, unless a double layer is required, to make up the total thickness shown.

3.3 INSTALLATION OF BLANKET OR BATT FIBERGLASS INSULATION

- A. Install blanket fiberglass insulation in largest pieces as practical with edges closely butted. Cut and fit insulation to closely fit intersecting or penetrating surfaces.
 1. Face vapor barrier towards warm side, tape joints with 4" wide vaporproof aluminum tape applied over vapor barrier.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

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SECTION 078100

SPRAYED FIRE-RESISTIVE MATERIALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the sprayed fire-resistive materials as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:
 - 1. Spray on fireproofing for structural steel and metal decking.
 - 2. Seal coat over fireproofing in special areas.
 - 3. Preparation of surfaces.
 - 4. Field quality control.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Structural steel – Section 051200.
- F. Metal decking – Section 053100.
- G. Firestops and smoke seals – Section 078413.

1.4 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).

- c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. Product Data: For each fire-resistive product specified.
- C. Shop Drawings: Submit structural framing plans indicating the following:
 1. Locations and types of surface preparations required before applying sprayed fire-resistive material.
 2. Extent of sprayed fire-resistive material for each construction and fire-resistance rating, including the following:
 - a. Applicable fire-resistive design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - b. Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies.
- D. Product Certificates: Signed by manufacturer of sprayed fire-resistive material certifying that the products furnished comply with requirements.
- E. Qualification Data: For firms specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. If primer is to be used steel and/or metal deck, submit certifications by supplier of primer that primer is compatible with materials, and will not impair the required performance of the installed fireproofing. Such certification shall be accompanied by evidence that the primer was successfully used in conjunction with the fireproofing material in a UL test applicable to the construction. Submit his certification prior to application of primer.
 1. Coordinate with Section 051200 – Structural Steel and 053100 – Metal Deck, and Structural Drawings prior to application of primer.
- G. Product Test Reports: Indicate that physical properties of proposed sprayed fire-resistive materials comply with specified requirements based on comprehensive testing

of current product formulations by a qualified testing and inspecting agency according to requirements specified in "Quality Assurance" Article.

- H. Code Compliance: Proposed product must comply with prevailing Building Code and be approved by those individual having jurisdiction.

1.5 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
 - 1. Materials in this section harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
 - 2. Adhesives or sealants used for work in this section shall meet the requirements of DDC General Conditions, where applicable. As per DDC General Conditions, sealants used as filler shall not exceed 250 grams per liter.
 - 3. Certification of these products shall be in accordance with the Submittal Requirements of this Section.
- C. Installer Qualifications: Engage an experienced installer properly trained, or otherwise qualified by sprayed fire-resistive material manufacturer as having the necessary experience, staff, and training to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its sprayed fire-resistive materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.
- D. Submit data indicating that products containing no detectable asbestos as determined according to the method specified in 40 CFR, Part 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."
- E. Mockups: After processing of initial submittals and before delivery and installation of fireproofing materials, prepare a sample installation of fireproofing work, approximately 100 sq. ft. in area; providing an example of each type required, applied on each different substrate, to produce each different rating as required and reasonably representative of entire sprayed on fireproofing work, for joint approval by representative of fire resistant material manufacturer and City of New York. Work in other areas shall not proceed until mock-up has been completed. Mock-up work which remains in compliance with requirements and is in undamaged and acceptable condition may be retained as final work in place.
- F. Material used in New York City must have BSA approval.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; shelf life, if applicable; and fire-resistance ratings applicable to Project.
- B. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.
- C. Store materials inside, under cover, aboveground, so they are kept dry until ready for use. Remove from Project site and discard materials that have deteriorated.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply sprayed fire-resistive material when ambient or substrate temperatures are 40 deg F. or lower, unless temporary protection and heat is provided to maintain temperatures at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of sprayed fire-resistive material to achieve a minimum of four air changes per hour. Use natural means or, where this is inadequate, forced-air circulation until fire-resistive material dries thoroughly.

1.8 SEQUENCING

- A. Sequence and coordinate application of sprayed fire-resistive materials with other related work specified in other Sections to comply with the following requirements:
 - 1. Provide temporary enclosures for interior applications to prevent deterioration of fire-resistive material due to exposure to unfavorable environmental conditions.
 - 2. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
 - 3. Do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material. Fireproofing shall be considered dry when the moisture content is 6% or less.
 - 4. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
 - 5. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
 - 6. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, tested, and corrections have been made to defective applications.
 - 7. Protect permanently exposed walls, floor or special surfaces.

1.9 WARRANTY

- A. **General Warranty:** The special warranty 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 in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. **Special Warranty:** Submit a written warranty, executed by Contractor and cosigned by Installer, agreeing to repair or replace sprayed fire-resistive materials that fail within the specified warranty period.
 - 1. Failures include, but are not limited to, cracking, flaking, eroding in excess of specified requirements; peeling; and delaminating of sprayed fire-resistive materials from substrates due to defective materials and workmanship within the specified warranty period.
 - 2. Not covered under the warranty are failures due to damage by occupants and City of New York's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
- C. **Warranty Period:** One (1) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

- A. **General:** For concealed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with requirements indicated in this Article for material composition and physical properties representative of installed products.
- B. **Material Composition:** As follows:
 - 1. Cementitious sprayed fire-resistive material consisting of factory-mixed, dry formulation of gypsum or Portland cement binders and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.
- C. **Physical Properties:** Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property listed as follows:
 - 1. **Dry Density:** Minimum 15 lb./cu. ft. for average and individual densities regardless of density indicated in referenced fire-resistive design, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Appendix A, "Alternate Method for Density Determination."
 - 2. **Thickness:** Provide minimum average thickness required for fire-resistive design shown on approved submittals.
 - a. Fireproofing shall be of thicknesses and density to meet the requirements of the New York City Building Code for Type of construction indicated on drawings.

3. Bond Strength: Not less than 200 lbf/sq. ft. per ASTM E 736.
 4. Compressive Strength: 5.21 lbf/sq. in. as determined in the laboratory per ASTM E 761. Minimum thickness of sprayed fire-resistive material tested shall be 0.75 inch and minimum dry density shall be as specified, but not less than 15 lb./cu. ft.
 5. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
 6. Deflection: No cracking, spalling, delamination, or the like per ASTM E 759.
 7. Effect of Impact on Bonding: No cracking, spalling, delamination, or the like per ASTM E 760.
 8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of sprayed fire-resistive material is 0.75 inch, maximum dry density is 15 lb./cu. Ft., test specimens are not prepurged by mechanically induced air velocities, and tests are terminated after 24 hours.
 9. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Flame Spread: 10 or less.
 - b. Smoke Developed: 0.
 10. Fungal Resistance: No observed growth on specimens per ASTM G 21.
- D. Products: Subject to compliance with requirements, provide products by one of the following:
1. Cementitious Sprayed Fire-Resistive Material
 - a. Pyrolite 5GP; Carbolite Co., Fireproofing Products Div.
 - b. Monokote Type MK-6; W.R. Grace & Co. - Conn., Construction Products Div.
 - c. Cafco 300; Isolatek International Corp., Cafco Products.
 - d. Type F3; Promat Firetemp.

2.2 EXPOSED SPRAYED FIRE-RESISTIVE MATERIALS

- A. General: For exposed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with requirements indicated for material composition and for minimum physical properties of each product listed, measured by standard test methods referenced with each property.
- B. Cementitious Sprayed Fire-Resistive Material: Factory-mixed, dry, cement aggregate formulation, chloride-free formulation of gypsum or Portland cement binders, additives, and inorganic aggregates, mixed with water at Project site to form a slurry or mortar for conveyance and application, complying with the following requirements:
 1. Dry Density: Values for average and individual densities as required for fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A,

Appendix A, "Alternate Method for Density Determination," but with an average density of not less than 22 lb./cu. ft.

2. Bond Strength: 500 psf minimum per ASTM E 736.
 3. Compressive Strength: 10,000 psf. per ASTM E 761.
 4. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
 5. Deflection: No cracking, spalling, delamination, or the like per ASTM E 759.
 6. Effect of Impact on Bonding: No cracking, spalling, delamination, or the like per ASTM E 760.
 7. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. per ASTM E 859.
 8. Combustion Characteristics: Passes ASTM E 136.
 9. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Flame Spread: 10 or less.
 - b. Smoke Developed: 0.
 10. Fungal Resistance: No observed growth on specimens per ASTM G 21.
 11. For exterior applications of sprayed fire-resistive material, provide manufacturer's formulation approved for surfaces exposed to the exterior.
- C. Products: Subject to compliance with requirements, provide one of the following:
1. Cement-Aggregate Cementitious Sprayed Fire-Resistive Material:
 - a. Pyrocrete 239; Carbolite Co., Fireproofing Products Div.
 - b. Monokote Type Z106HY; W.R. Grace & Co.--Conn., Construction Products Div.
 - c. F4; Promat Firetemp.
 - d. Cafco 400, Isolatek International Corp; Cafco Products.

2.3 AUXILIARY FIRE-RESISTIVE MATERIALS

- A. General: Provide auxiliary fire-resistive materials that are compatible with sprayed fire-resistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistive designs indicated.
- B. Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of sprayed fire-resistive material, used where required by manufacturer to insure proper bond.
- C. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistive designs indicated and fire-resistive product manufacturer's written recommendations. Include clips, lathing accessories, corner

beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.

- D. Sealer for Sprayed Fire-Resistive Material in Elevator Shafts: Transparent-drying, water-dispersible protective coating by manufacturer of fire-resistive material.
 - 1. Product: Subject to compliance with requirements, provide "Firebond Concentrate" by W.R. Grace, or similar product recommended by the manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, to determine whether they are in satisfactory condition to receive sprayed fire-resistive material. A substrate is in satisfactory condition if it complies with the following:
 - 1. Substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt, or other foreign substances capable of impairing bond of fire-resistive material with substrate under conditions of normal use or fire exposure.
 - 2. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 3. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.
- B. Do not proceed with installation of fire-resistive material until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances that could impair bond of fire-resistive material, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.
- B. For exposed applications, repair substrates to remove any surface imperfections that could affect uniformity of texture and thickness in finished surface of sprayed fire-resistive material. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.
- C. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application. Provide temporary enclosure as required to confine spraying operations, protect the environment, and ensure maintenance of adequate ambient conditions for temperature and ventilation.

3.3 INSTALLATION

- A. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to convey and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- B. Install metal lath, as required, to comply with fire-resistance ratings and fire-resistive material manufacturer's written recommendations for conditions of exposure and

intended use. Securely attach lath to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by fire-resistive material manufacturer. Attach lathing accessories where indicated or required for secure attachment to substrate.

- C. Coat substrates with adhesive before applying fire-resistive material where required to achieve fire-resistance rating or as recommended in writing by fire-resistive material manufacturer for material and application indicated.
- D. Extend fire-resistive material in full thickness over entire area of each substrate to be protected.
- E. Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by method recommended by the manufacturer.
- F. Where sealers are used, apply products that are tinted to differentiate them from the sprayed fire-resistive material over which they are applied.
- G. Maintain ambient conditions during installation and for cure period following installation, as recommended by manufacturer. Provide ventilation and avoid excessive rate of drying.
- H. Fireproofing to the underside of roof deck assemblies shall be done only after roofing application is complete, all roof mounted mechanical equipment is in place, and the roof is watertight.
- I. No fireproofing shall be applied prior to completion of concrete work on steel decking.
- J. Installation Sequence of Fireproofing
 - 1. All patching and repairing of sprayed fireproofing, due to cutting by other trades or testing and inspection, shall be performed under this Section.
- K. Provisions shall be made for ventilation to properly dry the fireproofing after application. In enclosed areas lacking natural ventilation, air circulation and ventilation must be provided.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: City of New York will engage a qualified independent testing and inspecting agency to perform field tests and special inspections and to prepare test reports.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing and inspecting of completed applications of sprayed fire-resistive material will take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of fire-resistive material for the next area until test results for previously completed applications of fire-resistive material show compliance with requirements.

1. For each 1000-sq. ft. area, or partial area, on each floor, testing and inspecting agency will evaluate the following characteristics. Tested values must equal or exceed values indicated and values required for approved fire-resistance design.
 - a. Thickness for Floors, Roofs, and Walls: From the average of 10 measurements from a 144-sq. in. sample area, with sample width of not less than 6 inches per ASTM E 605.
 2. Thickness for Structural Frame Members: From a sample of 25 percent of structural members per floor, taking 9 measurements at a single cross section for structural frame beams or girders, 7 measurements of a single cross section for joists and trusses, and 12 measurements of a single cross section for columns per ASTM E 605.
 3. For each 10,000 sq. ft. area, or partial area, on each floor, testing and inspection agency will evaluate the following characteristics. Tested values must equal or exceed values indicated and values required for approved fire resistance design.
 - a. Bond Strength for Floors, Roofs, Walls, and Structural Framing Members: Cohesion and adhesion at frequency and from sample size indicated for determining thickness of each type of construction, per ASTM E 736.
 4. Density for Floors, Roofs, Walls, and Structural Frame Members: At frequency and from sample size indicated for determining thickness of each type of construction, per ASTM E 605 or AWC Technical Manual 12-A, Appendix A, "Alternate Method for Density Determination."
 5. When testing discovers applications of fire-resistive material not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.
- C. Remove and replace applications of fire-resistive material where test results indicate that they do not comply with specified requirements for cohesion and adhesion or for density, or both.
 - D. Apply additional fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.
 - E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 3.5 CLEANING, PROTECTING, AND REPAIR
- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
 - B. Cure exposed sprayed fire-resistive material according to product manufacturer's written recommendations to prevent premature drying.
 - C. Protect fire-resistive material, according to advice of product manufacturer and installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at the time of Substantial Completion.

- D. Coordinate application of fire-resistive material with other construction to minimize the need to cut or remove fire protection. As installation of other construction proceeds, inspect fire-resistive material and patch any damaged or removed areas.
 - 1. Patch and repair fireproofing where City of New York's Testing Agency has performed tests.
- E. Repair or replace work that has not been successfully protected.

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SECTION 078413

FIRESTOPS AND SMOKESEALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the firestops and smoke seals as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Penetrations through fire-resistance-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 2. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - 4. Sealant joints in fire-resistance-rated construction.
 - 5. Penetrations at each floor level in shafts and/or stairwells.
 - 6. Construction joints, including those between top of fire rated walls and underside of floors above.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Cast-in-place concrete - Section 033000.
- F. Joint sealers - Section 079200.
- G. Drywall - Section 092900.

- H. Piping penetrations - Division 22.
- I. Duct penetrations – Division 23.
- J. Cable and conduit penetrations - Division 26.

1.4 REFERENCES

- A. ASTM E 814 "Standard Method of Fire Tests of Through-Penetration Firestops."
- B. UL 1479, UBC 7-5 (Both are same as A. above).
- C. ASTM E 119 "Standard Method of Fire Tests of Building Construction and Materials."
- D. UL 263, UBC 7-1 (Both are same as C. above).
- E. UL 2079 "Tests For Fire Resistance of Building Joint Systems."
- F. ASTM E 1399 "Test For Dynamic Movement Conditions."
- G. ASTM E 1966 (Same as E. above).
- H. Published Through-Penetration Systems by recognized independent testing agencies.
 - 1. UL Fire Resistance Directory, Volume II of current year.
 - 2. Warnock Hersey Certification Listings, current year.
 - 3. Omega Point Laboratories, current year.
- I. Material must have BSA and/or MEA approval for use in New York City.

1.5 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - a. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - b. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut

sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.

4. **Material Safety Data Sheets**, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. **Submit manufacturer's product literature** for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance, limitation criteria, test data and indication that products comply with specified requirements.
- C. **Submit shop drawings** detailing materials, installation methods, and relationships to adjoining construction for each firestop system, and each kind of construction condition penetrated and kind of penetrating item. Include firestop design designation of qualified testing and inspection agency evidencing compliance with requirements for each condition indicated.
 1. **Submit documentation**, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.
- D. **Material Safety Data Sheets**: Submit MSDS for each firestop product.
- E. **Submit qualifications of firestop installer**, including letter from firestop manufacturer of products proposed to be installed, wherein manufacturer recognizes as trained installer for installation of that manufacturer's products.
- F. **Manufacturer's Letters**: For installations or configurations not covered by a UL or Warnock Hersey design number, a recommendation shall be obtained from the manufacturer, in writing, for the specific application.

1.6 QUALITY ASSURANCE

- A. **The City of New York requires the Contractor to implement practices and procedures** to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. **LEED BUILDING Performance Criteria**: The following criteria are REQUIRED for the products included in this section:
 1. **Materials in this section harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.**

2. Adhesives or sealants used for work in this section shall meet the requirements of DDC General Conditions, where applicable. As per DDC General Conditions, sealants used as filler shall not exceed 250 grams per liter.
 3. Certification of these products shall be in accordance with the Submittal Requirements of this Section.
- C. General: Provide firestopping systems that are produced and installed to resist the spread of fire, and the passage of smoke and other gases.
 - D. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings as required by local building code and as tested by nationally accepted test agencies per ASTM E 814 or UL 1479. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated. T rating, when required by code authority, shall be based on measurement of the temperature rise on the penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.
 - E. Firestopping products shall be asbestos free and free of any PCBs.
 - F. Do not use any product containing solvents or that requires hazardous waste disposal.
 - G. Do not use firestop products which after curing, dissolve in water.
 - H. Do not use firestop products that contain ceramic fibers.
 - I. Firestopping Installer Qualifications: Firestop application shall be performed by a single firestopping contractor who specializes in the installation of firestop systems, whose personnel to be utilized have received specific training from the proposed respective firestop manufacturer, and firestop installer shall have a minimum of three years experience (under present company name) installing firestop systems of the type herein specified.
 - J. Mock-Up: Prepare job site mock-ups of each typical Firestop System proposed for use in the project. Approved mock-ups will be left in place as part of the finished project and will constitute the quality standard for the remaining work.
 - K. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 2. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original unopened containers with manufacturer's name, product identification, lot numbers, UL or Warnock Hersey labels, and mixing and installation instructions, as applicable.
- B. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturer.
- C. All firestop materials shall be installed prior to expiration of shelf life.

1.8 PROJECT CONDITIONS

- A. Verify existing conditions and substrates before starting work
- B. Do not use materials that contain solvents, show sign of damage or are beyond their shelf life.
- C. During installation, provide masking and drop cloths as needed to prevent firestopping products from contaminating any adjacent surfaces.
- D. Conform to ventilation requirements if required by manufacturer's installation instructions or Material Safety Data Sheet.
- E. Weather Conditions: Do not proceed with installation of firestop products when temperatures are in excess or below the manufacturer's recommendations.
- F. Schedule installation of firestop products after completion of penetrating item installation but prior to covering or concealing of openings.
- G. Coordinate this work as required with work of other trades.

1.9 SEQUENCING AND SCHEDULING

- A. Pre-Installation Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
- B. Sequence: Perform work of this and other sections in proper sequence to prevent damage to the firestop systems and to ensure that their installation will occur prior to enclosing or concealing work.
- C. Install all firestop systems after voids and joints are prepared sufficiently to accept the applicable firestop system.
- D. Do not cover firestop systems until they have been properly inspected and accepted by the authority having jurisdiction.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following manufacturers:

1. Tremco
2. Bio-Fireshield
3. 3M
4. Specified Technologies Inc.
5. U.S. Gypsum Co.
6. Nelson
7. Hilti, Inc.
8. Grace Flame Safe

2.2 FIRESTOPPING, GENERAL

- A. **Compatibility:** Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.
- B. **Accessories:** Provide components for each firestopping system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:
 1. Permanent forming/damming/backing materials including the following:
 - a. Semirefractory fiber (mineral wool) insulation.
 - b. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Joint fillers for joint sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.
- C. **Applications:** Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.
- D. Smoke seals at top of partitions shall be flexible to allow for partition deflection.

2.3 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

- A. **Endothermic, Latex Compound Sealant:** Single-component, endothermic, latex formulation.

- B. Intumescent, Latex Sealant: Single-component, Intumescent, latex formulation.
- C. Intumescent Putty: Non-hardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
- D. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum or polyethylene foil on one side.
- E. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.
- F. Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- G. Pillows/Bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- H. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, non-shrinking foam.
- I. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and non-sag formulation for openings in vertical and other surfaces requiring a non-slumping/gunnable sealant, unless firestop system limits use to non-sag grade for both opening conditions.

2.4 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated that complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.
 - 1. Sealant Colors: Color of exposed joint sealants as selected by the Commissioner.
- B. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.
 - 1. Additional Movement Capability: Provide sealant with the capability to withstand 33 percent movement in both extension and compression for a total of 66 percent movement.
- C. Multi-Component, Non-Sag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.
 - 1. Additional Movement Capability: Provide sealant with the capability to withstand 40 percent movement in extension and 25 percent in compression for a total of 65

percent movement in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, and remain in compliance with other requirements of ASTM C 920 for uses indicated.

- D. Single-Component, Non-Sag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.

2.5 MINERAL FIBER/CERAMIC WOOL NON-COMBUSTIBLE INSULATION (FIRE SAFING)

- A. Provide min. 4 pcf Thermafiber as manufactured by Thermafiber Co., min. 4 pcf FBX Safing Insulation as manufactured by Fibrex, or approved equal to suit conditions and to comply with fire resistance and firestop manufacturer's requirements.
- B. Material shall be classified non-combustible per ASTM E 119.

2.6 MIXING

- A. For those products requiring mixing prior to application, comply with firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Installer present, for compliance with requirements for opening configuration, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be

permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 CONDITIONS REQUIRING FIRESTOPPING

A. Interior Walls and Partitions

1. Construction joints between top of fire rated walls and underside of floors above, shall be firestopped.
2. Firestop system installed shall have been tested by either UL or Omega Point, including exposure to hose stream test and including for use with steel fluted deck floor assemblies.
3. Firestop system used shall allow for deflection of floor above.

B. Penetrations

1. Penetrations include conduit, cable, wire, pipe, duct, or other elements which pass through one or both outer surfaces of a fire rated floor, wall, or partition.
2. Except for floors on grade, where a penetration occurs through a structural floor or roof and a space would otherwise remain open between the surfaces of the penetration and the edge of the adjoining structural floor or roof, provide firestopping to fill such spaces in accordance with ASTM E 814.
3. These requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall of opening.

- C. Provide firestopping to fill miscellaneous voids and openings in fire rated construction in a manner essentially the same as specified herein before.

3.4 INSTALLING THROUGH PENETRATION FIRESTOPS

- A. General: Comply with the through penetrations firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

- B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

- C. Install fill materials for through penetration firestop systems by proven techniques to produce the following results:

1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 INSTALLING FIRE RESISTIVE JOINT SEALANTS

- A. General: Comply with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool no sag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.6 INSTALLING FIRESAFING INSULATION

- A. Install fire safing insulation utilizing welded or screw applied galvanized steel impaling pins and retaining clips; space clips or pins 24" o.c. maximum.
- B. Completely fill voids in areas where safing insulation is required. At spandrel conditions/floor edges, depth of insulation top to bottom shall be at least four (4) inches.
- C. Cover top of all safing insulation with firestop sealant or spray.

3.7 FIELD QUALITY CONTROL

- A. Special inspecting agency employed and paid by the City of New York will examine completed firestopping to determine, in general, if it is being installed in compliance with requirements.
- B. Special inspecting agency will report observations promptly and in writing to Contractor, City of New York and Commissioner.
- C. Do not proceed to enclose firestopping with other construction until reports of examinations are issued.
- D. Where deficiencies are found, Contractor must repair or replace firestopping so that it complies with requirements.

3.8 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to product firestopping complying with specified requirements.

END OF SECTION

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SECTION 079200

JOINT SEALERS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the joint sealers work as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
 1. Flashing reglets and retainers.
 2. Coping joints.
 3. Exterior wall joints not specified to be sealed in other Sections of work.
 4. Interior wall joints not specified to be sealed in other Sections of work, including caulking to fill between architectural woodwork and any wall, floor and/or ceiling imperfections.
 5. Acoustical sealant.
 6. Control and expansion joints in walls.
 7. Joints at wall penetrations.
 8. Joints between items of equipment and other construction.
 9. All other joints required to be sealed to provide a positive barrier against penetration of air and moisture.
 10. Non hardening acoustical sealant.
 11. Perimeter isolation boards.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Firestop sealants – Section 078413.

- F. Sealant within drywall construction - Section 092900.
- G. Sealant at tile work - Section 093013.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
 - 1. Materials in this section harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
 - 2. Adhesives or sealants used for work in this section shall meet the requirements of DDC General Conditions, where applicable. As per DDC General Conditions, sealants used as filler shall not exceed 250 grams per liter.
 - 3. Certification of these products shall be in accordance with the Submittal Requirements of this Section.
- C. Qualification of Installers: Use only personnel who are thoroughly familiar, skilled and specially trained in the techniques of sealant work, and who are completely familiar with the published recommendations of the sealant manufacturer.
- D. Pre-Construction Field Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to project joint substrates according to the method in ASTM C 794 and C 1521 that is appropriate for the types of Project joints.
- E. Perform testing per ASTM C 1248 on interior and exterior sealants to determine if sealants or primers will stain adjacent surfaces. No sealant work shall start until results of these tests have been submitted to the Commissioner and he has given his written approval to proceed with the work.

1.5 ENVIRONMENTALLY-PREFERABLE PRODUCT CRITERIA:

- A. VOC Content
 - 1. 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.

Sealants:
Architectural..... 250

Sealant Primers:
Architectural (Non-porous installation)..... 250
Architectural (Porous installation)..... 775

Sealants, primers, and cleaners required for sealant installation must also comply with all local regulations controlling VOC content.

1.6 SUBMITTALS

- A. **LEED BUILDING Submittal Requirements:** The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. A completed **ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM**, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. **Shop Drawings:** Submit shop drawings showing all joint conditions, indicating relation of adjacent materials, all sealant materials (sealant, bond breakers, backing, primers, etc.), and method of installation.
1. Submit joint sizing calculations certifying that movement capability of sealant is not being exceeded.
- C. **Samples:** Submit the following:
1. Color samples of sealants; submit physical samples (not color chart).
 2. Sealant bond breaker and joint backing.

- D. Product Data: Submit manufacturer's technical information and installation instructions for the following:
 - 1. Sealant materials, indicating that material meets standards specified herein.
 - 2. Backing rods.
- E. Submit manufacturer's certification as required by Article 1.6 herein.
- F. Submit results of testing required in Article 1.4 herein.
- G. Submit sealant schedule indicating location, color and type of each sealant for Commissioner's review. Only use silicone, not latex. Color shall match adjacent surfaces.

1.7 MANUFACTURER'S RESPONSIBILITY AND CERTIFICATION

- A. Contractor shall require sealant manufacturer to review the Project joint conditions and details for this Section of the work. Contractor shall submit to the Commissioner written certification from the sealant manufacturer that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vaportight seals (as applicable), and that materials supplied meet specified performance requirements.

1.8 ENVIRONMENTAL CONDITIONS

- A. Temperature: Install all work of this Section when air temperature is above forty (40) degrees F. and below eighty (80) degrees F., unless manufacturer submits written instructions permitting sealant use outside of this temperature range.
- B. Moisture: Do not apply work of this Section on surfaces which are wet, damp, or have frost.

1.9 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section, before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.
- C. Storage
 - 1. Store sealant materials and equipment under conditions recommended by their manufacturer.
 - 2. Do not use materials stored for a period of time exceeding the maximum recommended shelf life of the material.
 - 3. Material shall be stored in unopened containers with manufacturers' name, batch number and date when shelf life expires.

1.10 GUARANTEE

- A. Provide a written, notarized guarantee from the manufacturer stating that the applied sealants shall show no material failure for a period of ten (10) years.
- B. Contractor to provide a written, notarized, guarantee stating that the applied sealants shall show no failure due to improper installation for a period of two (2) years.
- C. Guarantee shall be in a form acceptable to the City of New York and executed by an authorized individual.
- D. Include in guarantee provision, agreement to repair and/or replace, at Contractor's expense, sealant defects that develop during guarantee period, because of faulty labor and/or materials.

PART 2 PRODUCTS

2.1 SEALANT MATERIALS

- A. Exterior Wall Sealant: Provide one (1) part non-sag sealant equal to No. 790 or 795 made by Dow Corning, "Silpruf SCS 2000" or "LM SCS 2700" made by G.E. or "Spectrem 1" or "Spectrem 3" made by Tremco or "Sonolastic 150" by Sonneborn conforming to the minimum standards of ASTM C 920, Type S, Grade NS, Class 50.
- B. Interior Sealant: Provide a one (1) part acrylic based sealant conforming to ASTM C 834, equal to "AC-20+ Silicone" made by Pecora or equal made by Tremco.
- C. Acoustical Sealant: For non-fire-rated application use Acoustical Sealant from U.S. Gypsum or CC-75 Acoustical Caulking from Mason Industries. For fire-rated applications use CP 25 from 3M Corporation, Acoustical Sealant from Specified Technologies, or FS 1900 from International Protective Coatings. In either non-fire-rated and fire-rate applications, approved equals from Tremco, Pecora or Hilti may be substituted. Spray sealants are acceptable in lieu of caulk-gun-applied sealants provided that such spray sealants are specifically intended for acoustical applications.
- D. Colors: Custom colors of sealants as selected by the Commissioner.

2.2 MISCELLANEOUS MATERIALS

- A. Back-Up Materials: Provide back-up materials and preformed joint fillers, non-staining, non-absorbent, compatible with sealant and primer, and of a resilient nature, equal to "BHR" made by Nomaco Inc. or approved equal, twenty-five (25) percent wider than joint width. Materials impregnated with oil, bitumen or similar materials shall not be used. Provide back-up materials only as recommended by sealant manufacturer in writing.
- B. Provide bond breakers, where required, of polyethylene tape as recommended by manufacturer of sealant.
- C. Provide primers recommended by the sealant manufacturer for each material to receive sealant. Note that each exterior joint must be primed prior to sealing.
- D. Provide solvent, cleaning agents and other accessory materials as recommended by the sealant manufacturer.

E. Perimeter Isolation Board

1. Perimeter isolation board shall be a 1/2" to 3/4" thick PVC closed-cell foam (7 lb/ft³ average density) or neoprene sponge rubber (conforming to ASTM-D01056, Grade SCE 41), inserted between the floating floor and the wall. No rigid material shall be allowed to pass across the isolation layer, thereby short circuiting the isolation. Height of board shall be full depth of finished floor plus 1 to 2 inches.
2. The following are acceptable, subject to the above:
 - a. Type P7 PVC Closed-Cell Foam by Mason Industries, Inc.
 - b. Type PIB by Kinetics Noise Control, Inc.
 - c. or approved equal.

- F. Materials shall be delivered to the job in sealed containers with manufacturer's original labels attached. Materials shall be used per manufacturer's printed instructions.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where joint sealers are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. 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%; and 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. Sealant Installation Standard: Comply with instructions and recommendations of the manufacturer and in accordance with ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions required by this Project where more stringent installation requirements are specified herein, such requirements shall apply.
- D. Sample Section of Sealant
1. During sealant installation work in exterior wall, the manufacturer of sealant shall send his representative to the site, under whose supervision a section of the wall (used as "control section") shall be completed for purposes of determining performance characteristics of sealant in joints. Commissioner shall be informed of time and place of such installation of control section.

2. Control section shall be installed according to specification given herein and shall not be considered as acceptable until written acceptance is provided by the Commissioner.
 3. Accepted control section shall be standard to which all other sealant work must conform.
- E. Supervision: The Contractor shall submit to the Commissioner written certification from the sealant manufacturer that the applicators have been instructed in the proper application of their materials. The Contractor shall use only skilled and experienced workmen for installation of sealant.
- F. Apply sealant under pressure with a hand or power actuated gun or other appropriate means. Gun shall have nozzle of proper size and provide sufficient pressure to completely fill joints as detailed. Neatly point or tool joint to provide the contour as indicated on the drawings.
- G. Preparation and Application
1. Thoroughly clean all joints, removing all foreign matter such as dust, oil, grease, water, surface dirt and frost. Sealant must be applied to the base surface. Previously applied film must be entirely removed.
 2. Stone, masonry and concrete surfaces to receive sealant shall be cleaned where necessary by grinding, water blast cleaning, mechanical abrading, or combination of these methods as required to provide a clean, sound base surface for sealant adhesion.
 - a. Do not use any acid or other material which might stain surfaces.
 - b. Remove laitance by grinding or mechanical abrading.
 - c. Remove loose particles present or resulting from grinding, abrading, or blast cleaning by blowing out joints with compressed air, oil and water free, or vacuuming joints prior to application of primer or sealant.
 3. Clean non-porous surfaces such as metal and glass chemically. Remove protective coatings on metallic surfaces by solvent that leaves no residue and is compatible with sealant. Use solvent and wipe dry with clean, dry lint free paper towels. Do not allow solvent to air dry without wiping. Clean joint areas protected with masking tape or strippable films as above after removal of tape film.
 4. Do not seal joints until they are in compliance with drawings, or meet with the control section standard.
 5. Joint Size and Sealant Size: Joints to receive sealant shall be at least 1/4" wide. In joint 1/4" to 3/8" wide, sealant shall be 1/4" deep. In joints wider than 3/8" and up to 1" wide, sealant depth shall be one half the joint width. For joints wider than 1", sealant depth shall be as recommended by the sealant manufacturer. Depth of joint is defined as distance from outside face of joint to closest point of the filler.
 6. Primer: Thoroughly clean joints and apply primer to all surfaces that will receive sealant. Apply primer on clean, dry surfaces, and prior to installation of joint backing. Completely wet both inner faces of the joint with primer. Mask adjacent surfaces of joint with non-staining masking tape prior to priming. Apply primer with clean brush and only when temperature is above 45 deg. F.

7. **Joint Backing:** In joints where depth of joint exceeds required depth of sealant, install joint backing (after primer is dry) in joints to provide backing and proper joint shape for sealant. Proper shape for sealant is a very slight "hourglass" shape, with back and front face having slight concave curvature. Use special blunt T-shaped tool or roller to install joint backing to the proper and uniform depth required for the sealant. Joint backing shall be installed with approximately twenty-five (25) percent compressions. Do not stretch, twist, braid, puncture, or tear joint backing. Butt joint backing at intersections.
8. **Bond Breaker:** Install bond breaker smoothly over joint backing so that sealant adheres only to the sides of the joint and not backing.
9. **Sealant Application:** Apply sealant in accordance with the manufacturer's application manual and manufacturer's instructions, using hand guns or pressure equipment, on clean, dry, properly prepared substrates, completely filling joints to eliminate air pockets and voids. Mask adjacent surfaces of joint with non-staining masking tape. Force sealant into joint in front of the tip of the "caulking gun" (not pulled after it) and force sealant against sides to make uniform contact with sides of joint and to prevent entrapped air or pulling of sealant off of sides. Fill sealant space solid with sealant.
10. **Tooling:** Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 4A in ASTM C 1193. Finished joints shall be straight, uniform, smooth and neatly finished. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Neatly remove any excess sealant from adjacent surfaces of joint, leaving the work in a neat, clean condition.
11. Replace sealant that is damaged during construction process.

END OF SECTION

SECTION 081113

STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the steel doors and frames work as shown on the drawings and/or specified herein, including, but not limited to, the following:
 1. Interior hollow metal doors and frames for fire rated and unrated door openings.
 2. Trimmed openings.
 3. Interior hollow metal vision panels.
 4. Preparation of metal doors and frames to receive finish hardware, including reinforcements, drilling and tapping necessary.
 5. Furnishing anchors for building into masonry and drywall.
 6. Factory prime painting of work of this Section.

1.3 RELATED SECTIONS

- A. Installation of doors and frames - Section 062000.
- B. Wood Doors - Section 081416.
- C. Finish hardware - Section 087100.
- D. Glass and glazing - Section 088000.
- E. Gypsum drywall - Section 092900.
- F. Painting - Section 099000.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, compliance with standards referenced herein, sound and fire resistance ratings, and finishes for each type of door and frame specified.
- B. Shop Drawings: Show fabrication and installation of doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, reinforcement for surface applied hardware, dimensions of profiles and hardware preparation, location and installation requirements of door and frame

hardware and reinforcements, and details of joints and connections. Show anchorage and accessories.

- C. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Drawings.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing custom steel doors and frames similar to those indicated for this Project and with a record of successful in service performance, as well as sufficient production capacity to produce required units.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM E329 for testing indicated, as documented according to ASTM E 548.
- C. Source Limitations: Obtain custom steel doors and frames through one source from a single manufacturer.
- D. Fire-Rated Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.
 - 1. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40" or less above the sill.
 - 2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-protection-rated door assemblies except for size.
 - 3. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 250 deg. F. (or greater if required by Code) maximum in 30 minutes of fire exposure.
- E. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palleted, wrapped, or crated to provide protection during transit and Project site storage. Do not use nonvented plastic.
- B. Inspect doors and frames, on delivery, for damage. Minor damage may be repaired provided refinished items match new work and are approved by Commissioner; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames under cover at building site. Conform to the requirements of ANSI A 250-11-2001 for site storage unless more stringent requirements are noted herein. Place units on minimum 4-inch high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 FABRICATION – GENERAL

- A. Fabricate hollow metal units to be rigid, neat in appearance and free from defects, warp or buckle. Accurately form metal to required sizes and profiles. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible. Metallic filler to conceal manufacturing defects is not acceptable.
- B. Unless otherwise indicated, provide countersunk flat Phillips or Jackson heads for exposed screws and bolts.
- C. Prepare hollow metal units to receive finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with Finish Hardware Schedule and templates provided by hardware suppliers. Comply with applicable requirements of ANSI A115 "Specifications for Door and Frame Preparation for Hardware." Hardware to be shop prepared for field installation. NO field preparation is acceptable.
- D. Locate finish hardware as shown on final shop drawings in accordance with locations noted herein.

2.2 MANUFACTURERS

- A. Provide products manufactured by Steelcraft, Curries, Ceco Door Products, or approved equal meeting these specifications.

2.3 FRAMES

A. Materials

- 1. Frames for interior openings shall be either commercial grade cold-rolled steel conforming to ASTM A 1008, Type B or commercial grade hot-rolled steel conforming to ASTM A 1011, Commercial Steel, Type B. Metal thickness shall be not less than sixteen (16) ga. for frames in openings 4'-0" or less in width; not less than fourteen (14) ga. for frames in openings over 4'-0" in width.
- 2. Frames for Gasketed Doors: Frames for gasketed doors shall be continuously grout-filled when installed in masonry or concrete partition openings, or packed tightly with glass-fiber safing insulation and caulked with acoustical sealant around the perimeter of both sides of the frame when applied to drywall and stud partition openings.

B. Design and Construction

- 1. All frames shall be welded units with integral trim, of the sizes and shapes shown on approved shop drawings. Unless otherwise noted, knocked-down frames will not be permitted.
- 2. Frames shall have 1-1/4" exposed sightlines.
- 3. All finished work shall be strong and rigid, neat in appearance, square, true and free of defects, warp or buckle. Molded members shall be clean cut, straight and of uniform profile throughout their lengths.
- 4. Jamb depths, trim, profile and backbends shall be as shown on drawings.
 - a. Frames at drywall partitions shall be formed with double return backbends to prevent cutting into drywall surface.

5. Welded frames shall have corners mitered and reinforced and faces of welded frames shall be continuously back welded full depth and width of frame conforming to NAAMM Standard HMMA-820; face joints shall be hairline.
6. Minimum depth of stops shall be 5/8".
7. Frames for multiple or special openings shall have mullion and/or rail members which are closed tubular shapes having no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth.
8. Mullions shall have 16 ga. internal steel stiffeners welded not less than 4" o.c.
9. Hardware Reinforcements
 - a. Frames shall be mortised, reinforced, drilled and tapped at the factory for fully-templated mortised hardware only, in accordance with approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware is to be applied, frames shall have reinforcing plates.
 - b. Minimum thickness of hardware reinforcing plates shall be as follows:
 - 1) Hinge and pivot reinforcements - seven (7) ga., 1-1/4" x 10" minimum size.
 - 2) Strike reinforcements - twelve (12) gauge
 - 3) Flush bolt reinforcements - twelve (12) gauge
 - 4) Closer reinforcements - twelve (12) gauge
 - 5) Reinforcements for surface mounted hardware - twelve (12) gauge.
 - 6) Floor Anchors
 - a) Provide adjustable floor anchors, providing not less than two (2) inch height adjustment.
 - b) Minimum thickness of floor anchors shall be fourteen (14) gauge.
10. Jamb Anchors
 - a. Frames for installation in stud partitions shall be provided with steel anchors of suitable design, not less than eighteen (18) gauge thickness, securely welded inside each jamb as follows:
 - 1) Frames up to 7'-6" height - four (4) anchors.
 - 2) Frames 7'-6" to 8'-0" height - five (5) anchors.
 - 3) Frames over 8'-0" height - five (5) anchors plus one additional for each 2'-0" or fraction thereof over 8'-0".
 - b. Frames to be anchored to previously placed concrete or masonry shall be provided with minimum 3/8" concealed bolts set into expansion shields or inserts at six (6) inches from top and bottom and twenty-four (24) inches o.c. Reinforce frames at anchor locations with sixteen (16) gauge sheet steel stiffeners welded to frame at each anchor.
11. Anchors in exterior frames and in masonry walls shall be hot dip galvanized per ASTM A 153.
12. Frames for installation in masonry wall openings more than 4'-0" in width shall have an angle or channel stiffener factory welded into the head. Such stiffeners shall be not less than twelve (12) gauge steel and not longer than the opening width, and shall not be used as lintels or load bearing members.
13. Dust cover boxes (or mortar guards) of not thinner than twenty-six (26) gauge steel shall be provided at all hardware mortises on frames to be set in masonry or plaster partitions.
14. Ceiling Struts: Minimum 3/8" thick x 2" wide steel.
15. All frames shall be provided with a steel spreader temporarily attached to the feet of both jambs to serve as a brace during shipping and handling.
16. Loose glazing stops shall be of cold rolled steel, not less than twenty (20) gauge thickness, butted at corner joints and secured to the frame with countersunk

cadmium-or zinc-plated screws. Interior frames may be provided with snap-on glazing stops.

17. Drill stops to receive three (3) silencers on strike jambs of single door frames and two (2) silencers on heads of double-door frames.
- C. Finish: After fabrication, all tool marks and surface imperfections shall be removed, and exposed faces of all welded joints shall be dressed smooth. Frames shall then be chemically treated to insure maximum paint adhesion and shall be coated on all surfaces with one coat of rust-inhibitive baked-on alkyd primer standard with the manufacturer which is fully cured before shipment to a dry film thickness of 2.0 mils.
1. Frames set in masonry walls shall be grouted in as described in Section 042000 – Unit Masonry. These frames shall have surfaces in contact with grout shop coated with epoxy coating equal to Series 27 FC Typoxy made by Tnemec or approved equal spray applied at 4 to 6 mils, passing NFPA 101, Class A for smoke and flame spread, tested per ASTM E 84.

2.4 HOLLOW METAL DOORS

- A. Materials: Doors shall be made of commercial quality, level, cold rolled steel conforming to ASTM A 1008, Commercial Steel, Type B and free of scale, pitting or other surface defects. Face sheets for interior doors shall be not less than eighteen (18) gauge.
- B. Gasketed Doors: For hollow metal doors with acoustical gaskets, the door leaf shall be solid core steel, 1-3/4" thick flush construction with minimum face density of 5 lb/ft². Steel door leaf shall be constructed from welded 18 gauge seamless cold-rolled steel sheets with a solid core of fiber board or other material providing the required 5 lb/ft² density.
- C. Design and Construction
1. All doors shall be of the types and sizes shown on the approved shop drawings, and shall be fully welded seamless construction with no visible seams or joints on their faces or vertical edges. Minimum door thickness shall be 1-3/4".
 2. All doors shall be strong, rigid and neat in appearance, free from warpage or buckles. Corner bends shall be true and straight and of minimum radius for the gauge of metal used.
 3. Face sheets shall be stiffened by continuous vertical formed steel sections spanning the full thickness of the interior space between door faces. These stiffeners shall be not less than twenty two (22) gauge spaced not more than six (6) inches apart and securely attached to face sheets by spot welds not more than five (5) inches o.c. Spaces between stiffeners shall be sound deadened and thermal insulated the full height of the door with an inorganic non-combustible batt type material.
 4. Provide insulated door assemblies at all hollow metal doors noted for full perimeter gaskets.
 5. Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door. All such welds shall be ground, filled and dressed smooth to make them invisible and provide a smooth flush surface.
 6. Top and bottom edges of all doors shall be closed with a continuous recessed steel channel not less than fourteen (14) gauge, extending the full width of the door and spot welded to both faces. Openings shall be provided in the bottom closure of exterior doors to permit the escape of entrapped moisture.
 7. Edge profiles shall be provided on both vertical edges of doors as follows:

- a. Single-acting swing doors - beveled 1/8" in two (2) inches.
 - b. Double acting swing doors - rounded on 2-1/8" radius.
 - c. No square edge doors permitted.
8. Hardware Reinforcements
- a. Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only in accord with the approved hardware schedule and templates provided by the hardware supplier. Where surface-mounted hardware (or hardware, the interrelation of which is to be adjusted upon installation - such as top and bottom pivots, floor closers, etc.) is to be applied, doors shall have reinforcing plates.
 - b. Minimum gauges for hardware reinforcing plates shall be as follows:
 - 1) Hinge and pivot reinforcement - seven (7) gauge.
 - 2) Reinforcement for lock face, flush bolts, concealed holders, concealed or surface mounted closers - twelve (12) gauge.
 - 3) Reinforcements for all other surface mounted hardware - sixteen (16) gauge.
9. Glass Moldings and Stops
- a. Where specified or scheduled, doors shall be provided with hollow metal moldings to secure glazing by others in accordance with glass opening sizes shown on drawings.
 - b. Fixed moldings shall be securely welded to the door on the security side.
 - c. Loose stops shall be not less than twenty (20) gauge steel, with mitered corner joints, secured to the framed opening by cadmium or zinc-coated countersunk screws spaced eight (8) inches o.c. Snap-on attachments will not be permitted. Stops shall be flush with face of door.
- D. Finish: After fabrication, all tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities. Doors shall then be chemically treated to insure maximum paint adhesion and shall be coated, on all exposed surfaces, with manufacturer's standard rust-inhibitive alkyd primer as specified for frames which shall be fully cured before shipment.
- E. Flatness: Doors shall maintain a flatness tolerance of 1/16" maximum, in any direction, including in a diagonal direction.

2.5 LABELED DOORS AND FRAMES

- A. Labeled doors and frames shall be provided for those openings requiring fire protection ratings as scheduled on drawings. Such doors and frames shall be labeled by Underwriters' Laboratories or other nationally recognized agency having a factory inspection service.
- B. If any door or frame specified by the Commissioner to be fire-rated cannot qualify for appropriate labeling because of its design, size, hardware or any other reason, the Commissioner shall be so advised before fabricating work on that item is started.

2.6 HARDWARE LOCATIONS

- A. The location of hardware on doors and frames shall be as noted in "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames" of the Door Hardware Institute unless otherwise required by prevailing Handicap Codes.

2.7 CLEARANCES

- A. Fabricate doors and frames to meet edge clearances as follows:
 - 1. Jamb and Head: 1/8" plus or minus 1/16".
 - 2. Meeting Edges, Pairs of Doors: 1/8" Plus or minus 1/16".
 - 3. Bottom: 3/8", if no threshold.
 - 4. Bottom: 3/8", at threshold.
- B. Fire rated doors shall have clearances as required by NFPA 80.

2.8 MANUFACTURING TOLERANCES

- A. Manufacturing tolerance shall be maintained within the limits given in HMMA 841 of ANSI/NAAMM, current edition.

2.9 PREPARATION FOR FINISH HARDWARE

- A. Prepare door and frames to receive hardware:
 - 1. Hardware supplier shall furnish hollow metal manufacturer approved hardware schedule, hardware templates, and samples of physical hardware where necessary to insure correct fitting and installation.
 - 2. Preparation includes sinkages and cut-outs for mortise and concealed hardware.
- B. Provide reinforcements for both concealed and surface applied hardware:
 - 1. Drill and tap mortise reinforcements at factory, using templates.
 - 2. Install reinforcements with concealed connections designed to develop full strength of reinforcements.

2.10 REJECTION

- A. Hollow metal frames or doors which are defective, have hardware cutouts of improper size or location, or which prevent proper installation of doors, hardware or work of other trades, shall be removed and replaced with new at no cost.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where steel doors and frames are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Refer to Section 062000 for installation procedures for all work of this Section.

END OF SECTION

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SECTION 081416

WOOD DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the wood doors as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Solid core flush wood doors.
 - 2. Honeycomb core flush wood doors.
 - 3. Fire rated door, including jambs.

1.3 RELATED SECTIONS

- A. Waste Management Requirements – Section 017419.
- B. Sustainable Design Requirements – Section 018113.
- C. VOC Limits for Adhesives, Sealants and Architectural Coatings – Section 018114.
- D. Indoor Air Quality Requirements – Section 018119.
- E. Installation of wood doors - Section 062000.
- F. Hollow metal frames - Section 081113.
- G. Finish hardware - Section 087100.
- H. Glass and glazing – Section 088000.

1.4 SUBMITTALS

A. LEED BUILDING SUBMITTAL REQUIREMENTS

- 1. The Contractor and their sub-contractors shall submit the LEED BUILDING Certification items listed herein. LEED BUILDING Submittals shall include the following:
 - a. For all installed products and materials of this Section, complete the ENVIRONMENTAL MATERIALS REPORTING FORM (blank copy attached at end of Section 018113 "Sustainable Design Requirements"). Information to be supplied for this Form shall include:

- 1). Cost breakdowns for the materials included in the Contractor or sub-contractor's work. Cost breakdowns shall include total installed cost and material-only cost.
 - 2). The percentages (by weight) of post-consumer and/or post-industrial recycled content in the supplied product(s).
 - 3). Indication (Y/N) of whether the raw materials have been extracted, harvested or recovered, as well as the final product has been manufactured (location of final assembly), within 500 miles of the project site.
 - 4). For all field-applied interior adhesives, sealants, and paints relating to work of this Section, provide the Volatile Organic Compound (VOC) content in grams/liter or lbs./gallon.
- b. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the product information supplied for the ENVIRONMENTAL MATERIALS CERTIFICATION FORM.
- B. Product Data: Submit door manufacturer's product data, specifications and installation instructions for each type of wood door.
1. Include details of core and edge construction and trim for openings.
 2. Include factory finish specifications.
 3. Include certifications to show compliance with specifications.
 4. Include certification to show compliance with AWI and WDMA requirements specified herein.
- C. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for finishing and other pertinent data.
1. Include requirements for veneer matching.
- D. Samples: Submit factory finishes applied to actual door face materials, approximately 8 by 10 inches for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
- 1.5 QUALITY ASSURANCE
- A. LEED BUILDING PERFORMANCE CRITERIA: Products of this Section shall meet the following requirements and shall be documented in accordance with the LEED BUILDING SUBMITTAL REQUIREMENTS of this Section:
1. Products of this Section which have been extracted, harvested or recovered, as well as manufactured (location of final assembly), within 500 miles of the project site shall be identified and documented.

2. Field-applied interior adhesives, sealants, and paints relating to work of this Section shall meet the requirements of Section 018114 "VOC Limits for Adhesives, Sealants and Architectural Coatings," and shall be identified and documented.
 3. Certification of criteria shall be in accordance with the Submittal Requirements of this section.
 4. Wood shall meet FSC and LEED standards noted in Section 064023.
- B. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- C. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated"; latest edition "Premium" grade and WDMA "Extra Heavy Duty" Performance Level.
1. Only manufacturers that are certified and listed by AWI to be QCP qualified are acceptable for this project.
 2. Provide letter of licensing for Project indicating that doors comply with requirements of grade specified.
- D. Fire Rated Wood Doors: Doors complying with Category A, Positive Pressure or Neutral Pressure testing standards per UBC 7-2-1997 and UL 10-C (UBC 7-2-1994 and UL 10B) that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated on Door Schedule, based on testing according to NFPA 252.
1. Conform to prevailing Code requirements to determine which pressure standard (Positive or Neutral) is required.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Comply with requirements of referenced standard and manufacturer's written instructions.
 - B. Package doors individually in plastic bags or cardboard cartons.
 - C. Mark each door on top and bottom rail with opening number used on Shop Drawings.
- 1.7 PROJECT CONDITIONS
- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- 1.8 WARRANTY
- A. Special Warranty: Manufacturer's standard form, signed by manufacturer in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) in excess of permitted standard noted in Article 2.5 herein, or show telegraphing of core construction in face veneers.
 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

2. Warranty shall be in effect during the following period of time from date of Substantial Completion:

a. Solid Core Flush Wood Doors: Life of installation.

PART 2 PRODUCTS

2.1 SOLID CORE FLUSH WOOD DOORS

- A. Provide AWI PC-5 Premium Grade hot pressed 5-ply solid core particleboard doors, 1-3/4" and 2-1/4" thick, conforming to standards specified herein. Subject to meeting standards specified herein, the following manufacturers are acceptable: Marshfield Door Systems, Inc., Algoma Hardwoods Inc., or Eggers Hardwood Products Corp.
1. Core shall consist of a formed flat panel consisting of wood particles bonded together with synthetic resins or other added binder, with an average density of 30 to 32 lbs. per cubic foot. The material shall meet or exceed the requirements of ANSI A208.1, Grade 1-LD-2 covering mat formed particleboard with face screw holding of 124 lbs., modulus of rupture of minimum 700 psi and modulus of elasticity of not less than 148,000 psi.
 2. Core shall be capable of satisfying this WDMA TM-7 cycle slam test for 1 million slams for surface mounted hardware. Where the manufacturer's core does not meet this criteria, stiles and rails must measure a minimum of 5-1/2" and must be fabricated of hardwood.
 - a. Surface mounted hardware must be installed with minimum 1-1/4" screw penetrations using threaded to the head screws; coordinate with Section 087100.
- B. Cross Bands: Shall be 1/16" thick hardwood extending full width of door and laid with grain at right angles to face veneers. Cross bands and faces shall be laminated to the core with Type I MF or PVA glue.
- C. Stiles, Rails: Stile and rail shall be a minimum of 1-3/8" solid hardwood or structural composite lumber (after trimming) laminated to the core. Stiles and rails must be securely glued to the core with no voids allowed. Stiles and rails must be capable of screw holding of 550 lbs. per WDMA TM-10.
- D. Vertical door edge must be capable of screw holding of 550 lbs. per WDMA TM-10; horizontal door edge must be capable of screw holding of 400 lbs. per WDMA TM-10.
- E. Doors to be field painted shall have MDO or hardboard face.
- F. Doors shall have hinge loading capacity of 500 lbs. per WDMA TM-8.
- G. Gasketed Doors: For wood doors with acoustical gaskets, the door leaf shall be solid core wood throughout (honeycomb cores are not acceptable), with a minimum face density of 5 lb/ft². The surface weight of wood doors that require fire ratings shall be established by the door manufacturer.

- H. Where glass lites are noted, factory cut openings. Trim openings with solid hardwood moldings of same type of wood as face veneer. Lite openings in 20 minute rated doors shall have manufacturer's 20 minute approved hardwood system.
- I. Doors with transparent finish to have center balanced, slip matched, quarter sliced, Select Vertical Grain Douglas Fir veneer. Veneer to conform to AWI, "AA" grade veneer with 3" wide leaf. Minimum veneer thickness shall be not less than 1/50" after sanding.
 - 1. Veneers shall be continuous or end matched at transoms.

2.2 HONEYCOMB CORE FLUSH WOOD DOORS

- A. Provide honeycomb core flush wood door with fir CVG finish.

2.3 FIRE RATED WOOD DOORS ("B" LABEL) AND FRAMES

- A. Provide mineral core 1-3/4" thick solid core wood doors conforming to standards specified herein, manufactured by one of the manufacturers noted above. Stile construction on both stiles shall conform to the following:
 - 1. Stile edge screw withdrawals when tested in accordance with ASTM D 1037-78 shall exceed 650 lbs. This applies to both stiles.
 - 2. Stile edge split resistance when tested in accordance with ASTM D 143-52 (78) Modified must exceed 950 lbs. This applies to both stiles.
- B. Door to have face finish as specified above in Article 2.1.
 - 1. Where the core is free of urea formaldehyde, provide a layer of veneer over the substrate prior to application of finish veneer to prevent telegraphing of patterns from the adhesive.
- C. Blocking: For surface mounted hardware only, provide composite blocking designed to maintain fire resistance of door but with improved screw-holding capability of same thickness as core and with minimum dimensions as follows:
 - 1. 5-inch top rail blocking.
 - 2. 5-inch bottom rail blocking.
 - 3. 1 – 5" x 18" lock block at cylinder or mortise locksets.
 - 4. 2 – 5" x 18" lock blocks at exit devices.
- D. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.
- E. Frames shall be provided by door manufacturer as a fully finished system.

2.4 SHOP FINISH

- A. Transparent Finish: Finish in the shop with clear satin catalyzed polyurethane finish conforming to AWI System "Catalyzed Polyurethane Transparent".

- B. Opaque Finish: For doors to be field painted, shop prime on all surfaces with one coat of alkyl wood primer applied to a dry film thickness of 1.5 mils.

2.5 FABRICATION

- A. Prefit and premachine wood doors at the factory.
- B. Comply with the tolerance requirements specified herein. Machine doors for hardware requiring cutting of doors. Comply with final hardware scheduled and door frame shop drawings, and with hardware templates and other essential information required to ensure proper fit of doors and hardware.
- C. Take accurate field measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with machining in the factory.
- D. Doors shall be factory sized to door opening so that trimming and fitting are not required in the field.
- E. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances unless otherwise indicated.
 - 1. Three degree bevel or bevel to suit frame sizes indicated, with 3/16" prefit in width, +0/-1/32" tolerances. Prefit top of door 1/8" + 1/16"/-0" and undercut as required by floor condition. Undercut shall not exceed 1/8" from bottom of door to top of finished floor; where threshold occurs undercut shall not exceed 1/8" from bottom of door to top of threshold.
 - 2. Comply with requirements in NFPA 80 for fire-rated doors.
- F. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3 unless otherwise noted. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Provide concealed intumescent seals at fire-rated pairs of doors meeting the requirements of U.L. 10 C.
- G. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kinds of doors required.

2.6 SOURCE QUALITY CONTROL

- A. Once installed, maximum allowable warp, bow, cut or twist in doors shall be 1/16" as measured by the 1/16 inch feeler gauge and a straight-edge extending from corner to corner of the door face at stiles, top and bottom rails and along both diagonals.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Refer to Section 062000 for installation of wood doors.

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SECTION 083113

ACCESS DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the access doors as indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. GFRG access panels at drywall.
 - 2. Steel access panels for non front of house spaces.
 - 3. Provide access doors and frames for access from occupied spaces to the following, where indicated or required, and as directed by the trades of Divisions 22, 23 and 26.
 - a. All shutoff or balancing valves.
 - b. Fire dampers, as required.
 - c. Points of duct access.
 - d. Pull boxes.
 - e. Controls of mechanical and electrical items.
 - f. Pipe spaces, if required.
 - g. Inlets of fans.
 - h. Fusible link and splitter damper at filter bank.
 - i. Automatic damper and motor.
 - j. Equipment not otherwise accessible.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings - Section 018419.
- B. Environmental Practices (LEED Building) - Section 018116.
- C. Construction waste requirements - Section 017419.
- D. Construction IAQ requirements - Section 018119.
- E. Drywall - Section 092900.
- F. Valves and connections - Division 22.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
 - 1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- C. For actual installation of the work of this Section, use only personnel who are thoroughly familiar with the manufacturer's recommended methods of installation and who are completely trained in the skills required.
- D. Fire-Resistance Ratings: Wherever a fire-resistance classification is shown, or for construction where access doors are installed, provide required access door assembly with panel door, frame, hinge and latch from manufacturers listed in Underwriters' Laboratories, Inc. "Classified Building Materials Index" for the rating shown.
 - 1. Provide UL label on each access panel.
 - 2. Provide flush, key operated cylinder lock.
- E. Size Variations: Obtain Commissioner's acceptance of manufacturer's standard size units that may vary slightly from sizes shown or scheduled.

1.5 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:

- a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the products.
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
- 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 - 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. Before any materials of this Section are delivered to the job site, submit complete manufacturer's literature to the Commissioner. Submit plans and schedules showing size and location of each and every access door for Commissioner's acceptance prior to installation.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 GFRG ACCESS PANELS

- A. Provide access panels made from glass fiber reinforced gypsum (GFRG); Milcor DWR or approved equal.
 - 1. Provide access panels architecturally designed to blend seamlessly with drywall ceiling and wall construction. Coordinate work with Section 092900, "Gypsum Drywall."
 - 2. Panels shall be Class A rated, with a flame spread and smoke developed index of 0 in accordance with ASTM E 84.
 - 3. Size: 24 x 24 unless otherwise specified.

2.2 STEEL ACCESS PANELS

- A. Provide access door assembly manufactured by Milcor Inc, or equal made by Nystrom Inc., Karp Associates, Inc. or approved equal. Assembly shall be an integral unit complete with all parts and ready for installation.
- B. Fabricate units of continuous welded steel construction. Grind welds smooth and flush with adjacent surfaces. Provide attachment devices and fasteners of the type required to secure access panels to the types of supports shown.
- C. Frames for Masonry and Tile Wall Only (Flush Panel Units)
 - 1. Fabricate frame from sixteen (16) gauge steel. Provide frame with exposed flange not less than one (1) inch wide around perimeter of frame for the following construction:
 - a. Exposed masonry.
 - b. Tile finish.
 - 2. For installation in masonry construction, provide frames with adjustable metal masonry anchors.
- D. Frameless Units for Drywall Surfaces (Recessed Panel Units): Provide access doors without exposed frames for drywall adhered to recessed panel.
- E. Panels: Fabricate from fourteen (14) gauge steel, with concealed spring hinges set to open to 175 degrees. Provide removable pin type hinges of the quantity required to support the access panel sizes used in the work. Finish with manufacturer's factory applied baked enamel prime coat applied over phosphate protective coating on steel.
- F. Locking Devices
 - 1. For non-rated access doors, provide flush, screwdriver operated cam locks of number required to hold door in flush, smooth plane when closed.
 - 2. For fire rated doors, provide locks as described in paragraph 1.4, D. herein.
- G. Inserts and Anchorage: Furnish inserts and anchoring devices which must be built into masonry for the installation of access panels. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where access doors are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 COORDINATION

- A. Coordinate all work with the mechanical trades to insure proper locations and in a timely manner to permit orderly progress of the total work.
- B. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- C. Adjust hardware and panels after installation for proper operation.
- D. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION

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SECTION 083473

SOUND CONTROL DOOR ASSEMBLIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Acoustical metal door systems, including doors, frames, perimeter seals, cam-lift hinges, metal thresholds and accessories to maintain door operation and the required STC ratings indicated on the Drawings.
 - 1. Acoustical doors with minimum STC of 51.
 - 2. Perimeter seals and all other required hardware for acoustical doors are specified in Section 087100.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Joint Sealers - Section 079200.
- F. Finish Hardware - Section 087100.
- G. Glass and Glazing - Section 088000.

1.4 REFERENCES

- A. ASTM C 423: Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- B. ASTM E 90: Standard Test Method for Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- C. ASTM E 336: Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings.
- D. ASTM E 413: Classification for Rating Sound Insulation.

1.5 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- C. Single Responsibility: Assign undivided responsibility of the sound retardant door work to a single firm specializing in this type of work. The firm and their personnel engaged in the work shall be able to demonstrate successful experience with work of comparable extent, complexity and quality to that shown and specified. Do not engage a firm unacceptable to the manufacturers of the primary materials to be used. The firm shall engage other specialist firms to perform any part of the work which he is not equipped or qualified to perform properly with his own personnel. Include the following major items of work in the scope of work for undivided responsibility:
1. Doors and frames.
 2. Gasketing and sills.
 3. Door hardware.
 4. Glass and glazing.
- D. Qualifications:
1. Provide doors and frames manufactured by a firm specializing in the production of sound control doors.

2. Provide sound control doors for fire rated openings manufactured by a firm whose units are inspected, tested and listed by UL for single point hardware for sizes and profiles shown.
- E. Requirements of Regulatory Agencies: Comply with the label requirements of NFPA and applicable local codes. Fabricate doors and frames which comply with the requirements of NFPA Standard Number 80 for the class of door opening shown and scheduled and which have been tested and rated by a Testing Laboratory accepted by the local building authority.
1. Provide Testing Laboratory's label on each door scheduled or required to be labeled. Include all information required by the New York City Building Code.
 2. Provide anchors for labeled frames as required by the local building authority.
- F. Field Measurements: Take field measurements prior to preparation of shop drawings, and prior to fabrication, where possible, to ensure proper fitting of work. However, allow for trimming and fitting wherever taking of field measurements before fabrication might delay work.
- G. Inserts and Anchorages: Furnish inserts and anchoring devices which must be built into other work. Coordinate delivery with other work to avoid delay.

1.6 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the products.
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

- B. **Manufacturer's Data:** Submit two copies of the manufacturer's detailed technical data for materials, fabrication, and installation. Include catalog cuts of hardware, anchors, fastenings, and accessories.
- C. Provide illustrations and descriptions of all seals and hardware items which will be exposed on doors and frames.
- D. **Shop Drawings:** Submit shop drawings for the fabrication and erection of assemblies which are not fully described by manufacturer's data. Show all anchorage and accessory items and finishes.
 - 1. Submit setting drawings, templates, and instructions for installation of anchorage devices built into other work.
 - 2. Provide installation details applicable to the construction in which the sound control doors and frames will be installed.
 - 3. Indicate construction, sizes, thicknesses, reinforcing, anchoring, and finishes of all materials.
- E. **Samples:** Submit three (3) samples of each color and finish required. Samples will be reviewed for color, texture and surface reflectivity only. Compliance with all other requirements is the exclusive responsibility of the Contractor.
- F. Submit certified test reports indicating that the acoustical performance of the door meets the Sound Transmission Class (STC) performance as indicated in the door schedule. Test data shall be produced from an accredited independent acoustical laboratory which is a member of NVLAP (National Volunteer Laboratory Accreditation Program). Reports shall indicate that the test was performed on the doors and frames of the type to be supplied, in conformance with the requirements of test method ASTM E 90 and ASTM E 413. Earlier test reports will not be acceptable. The test results shall be representative of the performance of the proposed Sound Control Door assembly.
- G. Test reports by an independent Acoustical Engineer certifying a Field Sound Transmission Class (FSTC) or Noise Isolation Class (NIC) in conformance with the requirements of test method ASTM E 336, performance of no more than six points below the laboratory STC performance on similar installations.
- H. Written guarantee that door is constructed in accordance with the laboratory tested door and free of defects in material and workmanship for a period of 1 years after installation.
- I. Fire label as specified in the door schedule.

1.7 PERFORMANCE REQUIREMENTS

- A. Rated doors shall have a Sound Transmission Class (STC) rating of 43 for exterior door and 55 for interior door.
- B. Installed door assemblies shall meet Field Sound Transmission Class (FSTC) values no less than 5 dB points below the specified STC ratings.
- C. Test shall be for proposed door, frame, threshold, seals and hardware. Doors shall be fully operational at the time of the test.

1.8 PRODUCT HANDLING

- A. Upon award of contract, and before commencement of building construction, submit to the Commissioner any special requirements (scheduling, flatness of floor, etc.) which are necessary to assure successful installation.
- B. Protect door systems during transit, handling, and storage to prevent damage, soiling, and deterioration.
- C. Deliver frames to General Contractor with complete installation drawings and instructions for installation by the General Contractor.
- D. Deliver doors to project site only after the building has been closed in. Store doors in the building in a dry location and stack in accordance with the manufacturer's instructions.
- E. Protect door assemblies, especially sound gaskets, from damage before, during and after their installation.

PART 2 PRODUCTS

2.1 DOOR ASSEMBLIES

- A. Manufacturers: Provide door assemblies as scheduled, manufactured by Industrial Acoustics Company, Noise Barriers, LLC, Krieger Steel Products Co., Overly Manufacturing Co., or approved equal.
- B. General: The door assemblies shall be configured as indicated on the Contract Drawings as follows:
 - 1. Doors shall have a minimum STC rating of 51 unless otherwise indicated on Drawings.
 - 2. The door hardware shall be sized to support the weight of the door and provide easy movement by one person.
 - 3. The gasketing system shall provide an airtight seal around the entire perimeter of the door when closed. The force to compress the seal shall not exceed 29(ed.) pounds applied to the lockset.
- C. Provide all door assemblies with complete frame assemblies, including the extended frame(s), thresholds and joint covers required for split wall construction (if any).
- D. Doors shall be of thickness as indicated, or as required to achieve specified STC; flush design of cold-rolled steel construction, 14 gauge minimum thickness, with wood veneer finish. The core shall be acoustically non-coupling and shall be non-combustible. Vision panels, where indicated, shall be of glazing in accordance with the acoustically tested product, and be supplied by the door manufacturer.
 - 1. Wood Veneer: Quarter sawn white oak.
- E. Door and frames shall be factory mortised, reinforced, and fitted for heavy-duty locksets, strikes, and closers. All hardware shall be supplied by the door manufacturer as specified in the hardware schedule.

- F. Frames shall be formed to sizes and shapes indicated and shall have full welded unit-type construction at corners and other joints and packed with glass or mineral fiber. Frames shall be factory-welded and shall be shipped to the site as a single unit. Frames shall be of cold-rolled steel construction. All contact edges shall be closed tight. Welds on corners and exposed surfaces shall be pressed flush and smooth. Steel frame members shall be pre-straightened, free of wind or twist. Frames shall be factory-aligned to a diagonal tolerance of +/- 1/16".
- G. All doors all have cam-lift action hinges, closers, and aluminum thresholds. The cam-lift shall lower the door onto the sill as the door is closed, and provide a tight positive seal with the threshold. When opening, the door shall rise fast enough to minimize drag on the threshold.
 - 1. Surface strap or butt hinges are not acceptable.
- H. The cam-lift seal shall be a full mortised neoprene door bottom and shall close the entire gap between the door and the floor. The cam-lift seal shall ensure a continuous, positive seal at the floor with minimum friction, drag and roll of the assembly on the floor.
- I. All hardware shall be finished as scheduled on the drawings.
- J. Perimeter Treatment
 - 1. Clearance between frame and door shall not exceed 1/8". All sills shall be of aluminum construction to insure a proper bottom seal.
 - 2. All head and jamb seals shall be magnetic or compression stop in a fully adjustable retainer assembly.
 - 3. The door shall be supplied with a bottom closed cell neoprene seal covered in Teflon type material and felt/neoprene compression seal at jambs and head. The seal shall be adjustable with flush Phillips head screws, to conform to job site sill conditions. Automatic drop bottoms will not be permitted. All screws shall be flush with the door leaf; no surface exposed screw heads or bolts are acceptable.
 - 4. Astragal for double-leaf doors shall be rabbeted or beveled and contain neoprene compression and/or magnetic seals for the full height of the door. There shall be no gaps in the seals at the head and sill of the door. There shall be continuous pressure applied to the astragal to compress the seals and prevent the leaves from bowing out and disengaging the astragal seals. Double door acoustic test data shall be submitted. Single leaf test data will not be acceptable for double doors.
 - 5. Door shall have an Underwriters' Laboratory fire label if required (or certificate if the door exceeds the maximum opening size) as called out in the schedule of drawings.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions in which the work of this section is to be installed, including condition of substrate to which the item is to be attached. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Comply with the recommendations of the manufacturer for secure and proper installation in accordance with final shop drawings. Install the work in locations on the drawings, with proper clearances, elevation and anchorage. Provide accessories indicated and anchors, inserts, and other items required for installation of items and attachment to adjoining construction.
- B. Install seals so they are in intimate contact with the entire length of the jambs and head.

3.3 INSTALLATION OF FRAMES

- A. Comply with provisions of SDO-105 "Recommended Erection Instructions for Steel Frames," unless otherwise indicated.
- B. Place all frames for acoustical doors after all walls are set and in place. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set.
- C. In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels.
- D. At in-place concrete, masonry or steel construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices in accordance with all approved shop drawings.
- E. Fill vertical cells of masonry units solid with grout where anchors are to be built-in to masonry construction.
- F. Grouting of frames complete with any rebar reinforcement and installation of insulation in the frame, shall be performed by the installing contractor as part of his work to insure the acoustical and structural integrity of the assembly.
- G. Install fire-rated frames in accordance with NFPA Std. No. 80.
- H. Remove spread bars only after frames have been properly set and secured.

3.4 DOOR INSTALLATION

- A. Fit acoustical doors accurately in frames, within clearances specified in SDI-100 and as herein specified.
- B. Doors must be installed plumb and aligned.
- C. Place fire-rated doors with clearances as specified in NFPA Std. No. 80.
- D. Adjust all automatic or adjustable acoustical perimeter and drop seals to insure a tight fit per manufacturer's recommendation.

3.5 ADJUST AND CLEAN

- A. Final Adjustments: Check and readjust operating finish hardware items and acoustical seals, leaving steel doors and frames undamaged and in complete and proper operation condition. Check for any air, light (and sound) gaps at door jambs, heads and sills, and adjust seals as necessary.
- B. Upon completion of the installation, put each operating component through at least 10 operating cycles. Adjust to achieve optimum operation.

3.6 FIELD SUPERVISION

- A. The door manufacturer shall provide factory trained supervision personnel during installation and final adjustment of sound seals. The manufacturer shall issue a letter of compliance certifying the completion of a successful installation.

3.7 FIELD TESTING

- A. If required, the City of New York will retain the services of an independent acoustical consultant to conduct an acoustical test at any designated door locations where noise transmission is suspected of being below the set criteria. The test shall consist of a Field Sound Transmission Class (FSTC) or Noise Isolation Class (NIC) test per ASTM E 336. If such results indicate non-conformance with the established FSTC or NIC requirements, it shall be the responsibility of the Contractor and manufacturer to correct, at their expense, such deficiencies by methods that shall be approved by the Commissioner and City of New York prior to incorporation. Acoustical tests shall be repeated and corrective measures devised and incorporated until the set criteria and performance standards are met. If the Commissioner determines that the materials are not as specified herein, all costs for the initial acoustical test as well as the cost of all retesting shall be borne by the Contractor and the Manufacturer.

END OF SECTION

SECTION 084313

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the aluminum entrances and storefronts as indicated on the drawings and/or specified herein including the following:
 - 1. Exterior entrance systems.
 - 2. Exterior storefront systems.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Sealants - Section 079200.
- F. Finish hardware - Section 087100.
- G. Glass and glazing - Section 088000.

1.4 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the products.
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- C. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for work installed by others. Show interfaces and relationships to work of other trades.
- D. Field Measurements: Take necessary field measurements before preparation of shop drawings and fabrication. Do not delay progress of job. If field measurements are not possible prior to fabrication, allow for field cutting and fitting.
- E. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.
- F. Verification Samples: Submit representative samples of each material that is to be exposed in completed work. Show full color ranges and finish variations expected. Provide samples having minimum size of 144 sq. in.
- G. Calculations: Provide professionally prepared calculations and certification of performance of this work. Indicate how design requirements for loading and other performance criteria have been satisfied; refer to Article 1.6, para. D for further description.
- H. Test Reports: Provide certified test reports for specified tests.

1.5 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions,

or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.

- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
 - 1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- C. Source: For each material type required for work of this Section, provide primary materials which are products of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.
- D. Installer: A firm with a minimum of three years experience in type of work required by this Section and which is properly trained by manufacturers of primary materials.
- E. Engineering Criteria: Drawings indicate sizes, member spacings, profiles, and dimensional requirements of work of this Section. Minor deviations will be accepted in order to utilize manufacturer's standard products when, in the Commissioner's sole judgment, such deviations do not materially detract from the engineering concept or intended performances.
- F. Engineering: Provide services of a Professional Engineer, registered in the jurisdiction in which the Project will be built, to design and certify that work of this Section meets or exceeds performance requirements specified.

1.6 TESTS AND PERFORMANCE REQUIREMENTS

- A. Manufacturer's Standard Tests: Provide manufacturer's standard test data showing compliance with specified requirements.
- B. Testing and performance data applies to exterior assemblies.
- C. Test Sequence: Test sequence is optional, except that air infiltration tests shall precede water resistance tests.
- D. Air Infiltration Test: Test unit in accordance with ASTM E 283, as follows:
 - 1. Static Air Pressure Difference: 6.24 psf for fixed storefront units, and 1.567 psf for doors.
 - 2. Performance: Maximum air leakage shall not exceed the following:

- a. Fixed Storefront Units: 0.06 cfm per sq. ft. of window area.
 - b. Door Units: 0.50 cfm per sq. ft. of single doors, 1.00 cfm per sq. ft. for doors hinged in pairs.
 - E. Water Leakage Test: Test fixed framing system in accordance with ASTM E 331.
 - 1. Test Pressure: 6.24 psf.
 - 2. Performance: No leakage as defined in test method at specified test pressure.
 - F. Uniform Load Deflection Test: Test units in accordance with ASTM E 330, at following static air pressure difference (Design Wind Pressure), or loads prescribed by code for this project site, whichever is greater. Apply pressure first to exterior side (positive) and then interior side (negative).
 - 1. Design Wind Pressure: 30 pounds per square foot minimum.
 - 2. Test Procedure: Procedure A as specified in ASTM E 330.
 - 3. Performance: Deflection in each member measured at locations of greatest deflection shall not exceed L/175 at specified Design Wind Pressure.
 - G. Uniform Load Structural Test: Test units in accordance with ASTM E 330 at following static air pressure difference. Apply high pressure load first on one side and then on other side. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or activating mechanisms.
 - 1. Static Air Pressure: Minimum 1.5 times the Design Wind Pressure.
 - 2. Permanent Deformation in Any Member: Not to exceed 0.2% of member span.
 - H. Condensation Resistant Factor: Not less than 45 for fixed storefront units, and not less than 48 for doors; per AAMA 1502.7.
 - I. Thermal Movement: Provide storefront systems that allow for expansion and contraction of members throughout an ambient temperature range of 120°F.
 - J. Seismic Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures", Section 9, "Earthquake Loads", whichever are more stringent.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Store under cover and protect from weather damage.
 - B. Sequence deliveries to avoid delays, but minimize on-site storage.
- 1.8 WARRANTIES
- A. Provide written warranty, signed by manufacturer, agreeing to repair or replace work that exhibits defects in materials or workmanship. "Defects" is defined to include, but not limited to, leakage of water, abnormal aging or deterioration, abnormal deterioration

or fading of finishes, and failure to perform as required. Include requirement for removal and replacement of covering and connected adjacent work.

1. Warranty Period: Three (3) years from date of Substantial Completion; except finish shall be warranted for a period of fifteen (15) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/PRODUCTS

- A. Provide storefronts and entrance systems of one of the following manufacturers that meet or exceed requirements of these specifications:
 1. Leed Himmel Industries, Inc.
 2. Kawneer Company, Inc.
 3. Wausau Metals Corporation.
 4. EFCO.
 5. Vistawall.
- B. Basis of Design Product: Series 1500 Flush Glaze Framing and Door and Frame Systems by Leed Himmel Industries, Inc..

2.2 MATERIALS AND ACCESSORIES

- A. Aluminum Members: Provide 6063-T5 alloy and temper as recommended by manufacturer for strength, corrosion resistance, and application of required finish. Comply with ASTM B 221 for extrusions, and ASTM B 209 for sheet/plate. Provide 0.125 in. thick extrusions for door stiles and storefront framing. Provide 0.050 in. thick aluminum for glazing moldings.
 1. Structural aluminum shapes shall conform to ASTM B 308.
- B. Fasteners: Provide non-magnetic stainless steel fasteners, warranted by manufacturer to be non-corrosive and compatible with aluminum components.
- C. Concealed Flashing: Dead-soft stainless steel, 26 gage minimum, or extruded aluminum 0.062 in. minimum, of an alloy and type selected by manufacturer for compatibility with other components.
- D. Brackets and Reinforcements: Non-magnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- E. Concrete/Masonry Inserts: Cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.
- F. Bituminous Coatings: Cold-applied asphalt mastic compounded for 30-mil thickness per coat.

- G. Compression Weatherstripping: Manufacturer's standard replaceable stripping of molded neoprene or PVC gaskets complying with ASTM D 2287.
- H. Sliding Weatherstripping: Manufacturer's standard replaceable stripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing.
- I. Glazing: Storefront glazing will be provided to Contractor, as drawn, for contractor setting and installation. Contractor to provide anticipated schedule and confirmation of all final glazing sizes, including thickness, no less than 16 weeks prior to required receipt.

2.3 HARDWARE

- A. Provide hardware units as indicated, scheduled, or required for operation of each door. Refer to Section 087100, Finish Hardware for hardware description.

2.4 FABRICATION

- A. Sizes and Profiles: Required sizes for door and frame units, including profile requirements, are indicated on Drawings. Any variable dimensions are indicated, together with maximum and minimum dimensions required to achieve design requirements and coordination with other work.
- B. Prefabrication: To greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.
 - 1. Preglaze door and frame units to greatest extent possible, in coordination with installation and hardware requirements.
 - 2. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
 - 3. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
- C. Welding: Comply with recommendations of American Welding Society to avoid discoloration; grind exposed welds smooth and restore mechanical finish.
- D. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator to prevent corrosion.
- E. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- F. Fasteners: Conceal fasteners.
- G. Provide EPDM/vinyl blade gasket weatherstripping in bottom exterior door rail, adjustable for contact with threshold.
- H. At interior doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.

- I. Provisions shall be made in the framing for minimum edge clearance, nominal edge cover, and nominal pocket width for the thickness and type of glazing installed, and shall be in accordance with the FGMA Glazing Manual.
- J. Pocket glazed framing shall provide:

	<u>Single Glass</u>	<u>Insulating Glass</u>
1. Nominal edge cover (or bite) framing only	5/16"	1/2"
2. Min. nominal edge clearance	1/8"	1/4"
3. Min. face clearance	1/8"	5/32"

2.5 STOREFRONT FRAMING

- A. General: Provide inside-outside matched resilient flush glazed system with provisions for glass replacement. Shop fabricate and preassemble frame components where possible.
- B. Thermal-Break Construction: Fabricate exterior aluminum storefront framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members, in manner which eliminates direct metal-to-metal contact. Provide manufacturer's standard construction which has been in use for similar projects for at least three years.
- C. For glass and glazing, refer to Section 088000.

2.6 ALUMINUM DOORS

- A. Aluminum entrance doors shall be narrow stile factory-glazed aluminum doors, manufactured by same manufacturer as storefront framing.
- B. Aluminum entrance doors shall be stile and rail type swing doors. Aluminum shall be extruded aluminum conforming to ASTM B 221, 0.125 in. thick for door stiles and 0.050 in. thick for glazing molding.
 - 1. Sections shall be of sizes and profiles indicated; shall present straight, sharply defined lines and arrises; and shall be free from defects impairing strength, durability, and appearance.
 - 2. Fasteners where exposed shall be aluminum stainless steel or plated steel conforming to ASTM A 164.
- C. Each door shall be factory glazed set in neoprene glazing gasket, refer to Section 088000 for glass.
- D. Doors shall meet the following resistance to corner racking when tested by the Dual Moment Load Test.
 - 1. Test section shall consist of a standard top door corner assembly. Side rail section shall be 24" long and top rail section shall be 12" long.
 - 2. Anchor "top rail" positively to test bench so that corner protrudes 3" beyond bench edge.

3. Anchor a lever arm positively to "side rail" at a point 19" from inside edge of "top rail". Attach weight support pad at a point 19" from inner edge of "side rail".
 4. Test section shall withstand a load of 235 lbs. On the lever arm before reaching the point of failure, which shall be considered a rotation of the lever arm in excess of 45 deg.
- E. Air Infiltration (applies only to single acting offset pivot or butt hung entrances): Air infiltration shall be tested in accordance with ASTM E 283, at a pressure differential of 1.567 psf. A single 3'-0" x 7'-0" entrance door and frame shall not exceed .50 cfm per linear foot of perimeter crack. A pair of 6'-0" x 7'-0" entrance doors and frame shall not exceed 1.0 cfm per linear foot of perimeter crack.
 - F. For door hardware, refer to Section 087100.
 - G. Door bottom rail of exterior doors shall have an EPDM blade gasket sweep strip applied with concealed fasteners.
 - H. Corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and fillet welds. Glazing stops shall be hook-in type with EPDM glazing gaskets.
 - I. The door weatherstripping on a single acting offset pivot or butt hung exterior door and frame (single or pairs) shall be thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
 - J. The door weatherstripping on a double acting, center pivoted door and frame (single or pairs) shall be pile cloth. The door bottom rail shall be weathered with an EPDM blade gasket sweep strip applied with concealed fasteners.
 - K. The meeting stiles on pairs of doors shall be equipped with an adjustable astragal.

2.7 FINISH

- A. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 1. Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605-98.
 2. Color: Duranar XL Exotic Seafoam Green (#UC52059XL), where scheduled, or equivalent of Kynar, Tnemec, or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where aluminum entrances and storefronts are to be installed and correct any conditions detrimental to the proper and timely completion of

the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install aluminum entrance doors and storefront framing in openings prepared under other Sections plumb, square, level, in exact alignment with surrounding work, with proper clearances, and securely and positively anchored to building structure, to meet performance requirements specified herein, in accordance with manufacturer's published instructions and approved submittals.
- B. Use only skilled mechanics for erection, under supervision of manufacturer's representative.
- C. Provide protection against galvanic action. Isolate dissimilar materials with bituminous coating or non-absorptive dielectric tape.
- D. Install aluminum entrance doors, storefront frame, and finish hardware. Carefully fit and adjust doors and hardware to frames and weatherstripping. After erection check and adjust operating hardware for smooth and proper operation.
- E. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Section 079200.
- F. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances.
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8" in 12'; 1/4" over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16". Where surfaces meet at corners, limit offset from true alignment to 1/32".
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8".

3.3 PROTECTION AND CLEANING OF ALUMINUM

- A. Protect finished metal surfaces from damage during fabrication, shipping, storage, and erection until acceptance by City of New York.
- B. Clean metal surfaces promptly after installation, exercising care to avoid damage. Remove excess sealant, dirt, and other substances. Lubricate hardware and other moving parts.

3.4 PROTECTION AND CLEANING OF GLASS

- A. Replace glass that is broken, cracked or chipped prior to time of final acceptance of Project by City of New York.
- B. Clean glass surfaces promptly after installation, exercising care to avoid damage to same.

END OF SECTION

SECTION 087100
DOOR HARDWARE

PART 1 GENERAL:

1.01 GENERAL REQUIREMENTS:

- A. Work of this section, as shown or specified shall be in accordance with the contract documents.

1.02 WORK INCLUDES:

- A. Work of this Section includes all labor, materials, equipment and services necessary to furnish all the finish hardware as shown on the drawings and specified herein.

1.03 RELATED WORK:

- A. General Conditions.
- B. Supplementary Conditions.
- C. Division 1.
- D. Hollow Metal Doors and Frames – Section 08 11 13
- E. Wood doors – Section 08 14 16

1.04 REFERENCES:

- A. American National Standards Institute - ANSI 156.18 - Materials and Finishes.
- B. ANSI A117.1 - Specifications for making buildings and facilities usable by physically handicapped people.
- C. BHMA - Builders Hardware Manufacturers Association.
- D. NFPA - National Fire Protection Association
- E. NFPA 105 - Smoke and Draft Control Door Assemblies.
- F. New York City Building Code.
- G. SDI - Steel Door Institute.
- H. WDI - Wood Door Institute.
- I. AWI - Architectural Woodwork Institute.
- J. NAAM - National Association of Architectural Metal Manufacturers.

1.05 QUALITY ASSURANCE:

- A. Hardware: shall be suitable and adapted for its required use and shall fit its designated location. Should any hardware as shown, specified or required fail to meet the intended requirements or require modification to suit or fit the designated location, determine the

correction or modification necessary and notify the Architect in ample time to avoid delay in the manufacture and delivery of hardware.

- B. Fire rated openings: provide hardware complying with NFPA Standard No. 80 requirements of authorities having jurisdiction.
- C. Hardware Supplier Qualifications: The Hardware Supplier shall have been regularly engaged in the sale and distribution of Finish Hardware for projects of comparable scope and size for a minimum of three (3) years, or seek SER approval. The Hardware Supplier shall have an AHC of the Door and Hardware Institute on staff who will be responsible for overseeing the scheduling, detailing, ordering, and coordinating of Finish Hardware, and shall be available for consultation with the Architect, at no additional cost to the City of New York, during progress of construction. The Hardware Supplier shall be a direct factory authorized distributor for all Finish Hardware items being furnished in accordance with this Specification.

1.06 SUBMITTALS:

- A. Submittals: shall be in accordance with Conditions of the Contract, Division 1, and Specification sections.
- B. Hardware submission: Submit hardware schedule in vertical format as illustrated by the "Sequence and Format for Hardware Schedule" pamphlet published by the Door and Hardware Institute. Schedules which do not comply will be returned for correction before checking.
- C. Hardware schedule shall clearly indicate architect's hardware set and manufacturer of each item proposed.
- D. Hardware Supplier shall provide all product information, wiring diagrams, and electrical data to the Electrical Contractor.
- E. Samples: Submit samples as requested by Architect. Do not proceed with installation until samples have been approved. Approved samples may be installed in the work after substantial completion of work.

1.07 PRODUCT HANDLING:

- A. Pack finish hardware in manufacturer's containers, complete with trimmings, bolts, screws, washers, etc., as required for application. Each container shall bear a suitable label which shall state the quantity and kind of contents of said container, as well as identifying marks relating to the approved Hardware Schedule and its location in the project.
 - 1. Knobs, handles, pulls and other items of finish hardware with easily damaged finishes shall be individually wrapped before placing in containers and with sufficient sheet cloth or cotton-backed paper which shall be adequately secured all as necessary to protect the finishes.
 - 2. Finish hardware shall be delivered, as directed, to the building site or the factories of the various fabricators of metal or wood work to which such hardware is to be applied. Deliver hardware in the order required and in ample time to permit

application at the building, or fabricators' shops, within the time required for the completion of the building.

1.08 JOB CONDITIONS:

- A. Field Service: The hardware supplier shall assign a competent representative, acceptable to the Architect, to be at the job site each time a major shipment of finish hardware is received. Such representative shall assist in "checking in" these shipments and shall secure a receipt covering the contents of each shipment. In addition, such representative shall be available for immediate call to the job site when, in the opinion of the Architect, his presence is necessary.
- B. Templates: Promptly following approval of the Hardware Schedule by the Architect, furnish and deliver template information, to the fabricators, of items to which finish hardware is to be applied.
 - 1. Such deliveries shall be made in ample time to avoid delays in such work of said fabricators. Provide drawings, schedules and detailed information to other trades as necessary for them to accommodate and prepare their work to receive the finish hardware.
- C. Cooperation and Coordination: Prior to the installation of any finish hardware, all parties and trades having responsibility to any of all of the openings for the job, shall meet in a pre-construction meeting, for instruction on the proper installation of finish hardware with the manufacturers representative.
 - 1. Cooperate and coordinate work with that of other trades supplying materials or performing work in contact with, connecting to, underlying, or overlaying the work of this Section.
 - 2. Provide complete data of requirements for work of this Section to those other trades whose work is affected by or dependent upon the work of this Section.
 - 3. Furnish all items to be built into other work in ample time to avoid delaying the progress of such work.
 - 4. Examine all drawings covering the work of this Section and refer to all other drawings, including mechanical and electrical drawings, which may affect the work of this Section or require coordination by this trade.
- D. Existing Conditions: Verify all existing conditions in the field to ensure compatibility with hardware specified in the Hardware Sets herein. Any discrepancies between the existing field conditions and hardware specified shall be brought to the attention of the Architect immediately. Hardware Supplier shall not order any hardware until all discrepancies are rectified and the Architect grants written approval.

PART 2 PRODUCTS:

2.01 GENERAL:

- A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware are indicated herein. Products are identified by using appropriate hardware designation numbers.

2.02 MANUFACTURERS:

- A. Provide hardware as indicated in hardware sets. Products other than those listed in the sets may be considered, provided that they are proven to be of equal quality and have equal performance to those products specified. See product description for each type of product for details on performance and quality requirements. The architect reserves the right to review and approve all proposed equivalents.

2.03 HANGING MEANS:

A. Hinges:

1. In general, where new hinges are to be provided at existing frames, existing condition must be verified before determining which hinge shall be provided so that new hinges will fit existing frame cut out size and locations.
2. Doors up to 60" in height shall be furnished with two hinges. Furnish one additional hinge for each 30" of door height or fraction thereafter.
3. Hinges shall be of types, sizes and materials as required to suit door weights thickness and fire ratings.
4. Unless otherwise specified, hinges shall be heavy weight. Doors over 3'-4" in width shall receive 5 x 4½ .190 gauge hinges.
5. Hinge sizes shall be detailed so that the least amount of projection shall be visible from the frame.
6. Unless otherwise specified, hinges shall have concealed ball bearings (combination anti-friction or oil impregnated) and five (5) knuckles.
7. All hinges shall have non-rising pins.
8. All keyed reverse bevel doors shall be furnished with non-removable pins.
9. Hinge Series: Ives BB1HW series, Stanley or Hager. See hardware sets for sizes.

2.04 MORTISE LOCKSETS AND LATCHSETS:

A. Mortise Locksets:

1. Lock cases to be constructed with a protected leading edge and screw configuration

that limits access to operating parts.

2. Lock cases are to be multi-functional that transform into different functions without opening the lock case.
 3. Lock components to be manufactured of zinc dichromate plated steel. Manufacturers utilizing plastic parts, spacers and/or bushings are not acceptable.
 4. Lock components to incorporate a spring loaded fusible link for Fire/Life Safety. Manufacturers utilizing gravity, fusible link are acceptable.
 5. Latchbolts to have a standard 2 ¾" backset with a full ¾" throw.
 6. Latchbolts to be non-handed, field reversible without opening the lock case.
 7. Latchbolts to be 2-piece anti-friction, manufactured from stainless steel. Solid latchbolts and/or plastic anti-friction devices are not acceptable.
 8. Cylinders to be secured by a cast stainless steel, dual retainer. Manufacturers utilizing screws and/or stamped retainers are not acceptable.
 9. Manufacturers utilizing an exposed toggle on edge of door as "locked indicator" are not acceptable.
- B. Lever Trim:
1. Lever assembly (external) to be one-piece design attached by threaded bushing. Lever assembly (internal) shall be attached by screwless shank. Lever attachment by common tools (allen nuts and/or set screws) are not acceptable.
 2. Thru-bolt lever assemblies through the door for positive interlock. Manufacturers utilizing a through the door spindle for attachment are not acceptable.
 3. Levers to have independent rotation in both directions.
 4. Spring cages are to be incorporated into the lever assemblies.
 5. Hub blocking plate to be solid, cast stainless steel. Manufacturers utilizing open hub designs are not acceptable.
 6. Spindles to be independent, designed to "break-away" at a maximum of 75psi torque.
- C. Thumbturns:
1. Thumbturn and back-plate to be manufactured from castings and comply with ANSI 117 accessibility standard.
- D. Deadbolts:
1. Deadbolts to be 1 ¾" total length; have standard 1" throw with a minimum ¾" internal engagement when fully extended.
 2. Deadbolts to be constructed of stainless steel, incorporating a security roller pin with a minimum Rc60 rating for surface hardness.

E. Strikes:

1. Strikes to be non-handed and bridged to ensure dead latching. Manufactures utilizing fillers of any kind for deadlatch engagement are not acceptable.
2. Mounting tabs are to be automatic self adjusting, vertically and horizontally for door bevel and strike alignment.

F. Lock Series & Design: Schlage L Series Heavy Duty Mortise Locks, lever trim as specified in hardware sets.

G. Approved Equals: Falcon MA Series , Sargent 8200 Series.

H. Certifications:

1. Provide mortise locksets that comply with ANSI A156.13, Series 1000, Operational Grade 1 and Security Grade 1 with all standard trims.
2. Provide mortise locksets that comply with UL10C and UBC 7-2 positive pressure requirements.
3. Provide mortise locksets that comply with ANSI/ASTM F476-76 Grade 40, UL Listed for locksets utilizing concealed cylinders.

2.05 EXIT DEVICES:

A. Exit Devices shall be touch bar type, as specified in hardware sets.

1. Furnish stainless steel touch bars on all exit devices
2. Touch bar and touch bar end caps shall overlap the mechanism case.
3. Touch bar sub assembly shall be minimum .160" thick, with minimum .060 supports.
4. Touch bar surface shall be minimum 2-1/4" high x 18" long for 36" doors, and minimum 2-1/4" high x 24" long for doors wider than 36".
5. Exit device touch bars shall be equipped with a fluid sound dampening feature.

B. Furnish exit devices, less bottom rod, on all cross corridor pairs of doors, where doors are for compartmentalization only

C. Rim and Mortise type devices shall have 3/4" throw latch bolt. Surface and Concealed Vertical Rod devices shall have 5/8" throw latch bolts.

1. Latch bolt security deadlocking shall be standard.

D. All fire doors shall receive devices U.L. listed Fire Exit Hardware

E. Furnish roller strikes, which interlock the door to the frame (499F) for all rim devices and surface vertical rod devices.

F. All internal springs shall be compression type.

G. Where lever trim is specified, levers shall match the balance of the project.

1. Escutcheons of all lever trim shall be forged brass or bronze, with (4) thru-bolts

- anchoring trim assembly to exit device chassis
 - 2. Levers shall be solid forged brass or bronze
 - 3. Lever return springs shall be compression type.
 - 4. Cylinders shall be recessed from face of escutcheon.
- H. Lever trim shall be breakaway type. When rotational force of 35 ft.lbs. is applied, lever trim appears to break. Lever trim can be reset to normal function, without disassembly
- 1. Lever shall be protected by a shear pin, which will withstand a rotational force of 55 ft.lbs. before shearing, to prevent further damage to lever. Lever shall not separate from the escutcheon.
- I. Where electrified latch retraction is specified, provide device with powerful continuous duty solenoid to retract the latch bolt(s) for momentary unlocking or for extended periods of time.
- 1. Provide appropriate power supply and power transfers, as required for the application.
 - 2. Use only on fire exit devices when under the control of an automatic fire alarm system.
 - 3. Coordinate with electrical specifications and drawings, and City of New York.
- J. Where electrified trim is specified, provide device with electrically locking (fail safe) or electrically unlocking (fail secure) trim.
- 1. Provide appropriate power supply & power transfer(s), as required for application.
 - 2. Use only on fire exit devices when under the control of an automatic fire alarm system.
 - 3. Coordinate with electrical specifications and drawings, and City of New York..
- K. Furnish all necessary Glass Bead Kits where exit device may interfere with raised glass beads on doors.
- L. Certifications:
- 1. Cycle Testing: Exit devices shall be certified by an independent testing lab for 1,000,000 cycles.
- M. Exit Device Series & Design: Von Duprin 98/99 series exit devices with outside trim as specified in hardware sets.
- N. Approved Equals: Falcon 25 Series, Precision Apex Series.

2.06 ORNAMENTAL PANIC HARDWARE:

- A. Ornamental Exit Devices and Exterior Pulls: UL listed devices that have been panic load tested for use on all-glass entrance doors and fabricated principally from 1-1/4 inch

diameter satin finished stainless steel tubing. Operation: The top latch bolt of the panic device shall be retracted by pushing the interior "L" shaped crash bar. In addition a built-in dogging device shall be provided which keeps the latch bolt in the retracted position and the crash bar becomes fixed. An exterior key cylinder for entry shall also be provided with each device.

1. Product Reference: Blumcraft; H-100F Panic Device x Full Height F-Handle, Dorma, or PRL on Exterior.

2.07 CLOSERS:

- A. All surface closers shall exceed ANSI A156.4 Grade 1 requirements in all aspects as called for below. All closers shall have certification by an independent testing laboratory of 10,000,000 cycles without failure.
- B. Closer cylinders shall be cast iron. Closer pinions shall be dual heat treated. Pinion and piston shall be steel alloy. Piston diameter shall be minimum 1-1/2".
- C. Closers shall be barrier free with spring tension adjustable from size 1 to size 5.
- D. Closers shall maintain control of the door in all conditions. Closers shall have 3 non critical adjusting valves: latch, main and backcheck. Backcheck shall take affect at 45 (AVB) degrees of opening for parallel arm closers and 70 degrees for regular arm closers. Closers with pressure relief valves are not acceptable.
- E. All closers shall have forged main arms. Forearms of parallel arm closers shall be forged. Parallel arm brackets shall be forged. All parallel arm joints shall have bronze bushings with minimum 5/8" diameter pins. Cylinders, arms, brackets and mounting plates shall be powder coated.
- F. Provide all plates, brackets and special templates when needed for interface with particular header, door and wall conditions and neighboring hardware. Consult factory for special template ("ST" suffix to closer number) pricing.
- G. All closers shall be installed so that closer bodies are positioned on room side of doors to and from corridors. Out-swing doors shall have an extra heavy duty parallel arm (EDA). Parallel arm shall be used on connecting doors between rooms.
- H. All exterior closers shall have all weather fluid that does not require seasonal adjustment to control speed of door, and shall exhibit the same viscosity from -30 ° F to +120° F.
- I. All closers shall have a powder coated aluminum finish on cylinder, arm and accessories. There shall be a full metal, powder coated cover.
- J. Furnish all brackets, drop plates and any other necessary hardware required to insure proper installation.
- K. All Closers shall comply with UL 10C requirements for positive pressure testing.
- L. All closers shall be of one manufacturer's products. All closers shall be inspected after installation by a factory representative to insure proper adjustment and operation.

- M. Closer Series: LCN 4011/4111 series.
- N. Approved Equals: Falcon SC71 Series , Sargent 281 Series

2.08 FLOOR CLOSERS:

- A. Shall be heavy duty model 27 (offset) or model 28 (center hung).
- B. All closers shall be handed.
- C. Choose appropriate functions and strengths to accommodate lead lining, extra high traffic, fire rating, oversized/heavy doors, special application doors.
- D. Closers shall have separate and independent checking valves, to control latch speed, closing speed and adjustable hydraulic backcheck.
- E. All single acting closers shall have a built in dead stop feature.
- F. All closers to have one piece spindle assembly.
- G. Extra heavy duty closers shall have a minimum of two thrust bearings and one needle bearing.
- H. Closers shall not have compression spring.
- I. Approved Equals: Dorma BTS 75 Series, Rixson or LCN.

2.09 DOOR STOPS:

- A. Unless otherwise noted, all door stops shall be wall mounted with concealed fasteners Ives WS407CCV/CVX series. Where wall stops will not function for the application, furnish floor mounted stops Ives FS436/438 series, Rockwood or Burns .

2.10 OVERHEAD STOPS:

- A. Overhead Stops: Stainless steel. Non-plastic mechanisms and finished metal end caps. Provide field-changeable hold-open, friction and stop-only functions. Coordinate templates for door and wall conditions and neighboring hardware. Furnish drop plates at locations where regular arm closer are used in conjunction with overhead stops. See hardware sets for specific model numbers.

2.11 PROTECTION PLATES:

- A. All kick plates and mop plates unless otherwise noted shall be 8" high x 2" less door width (LDW), beveled three sides x .050 thick

2.12 FLUSH BOLTS AND COORDINATORS:

- A. Manual Flush Bolts: Shall be Ives FB458/FB358 series, Rock wood, or Berns, furnished with DP2 dustproof strikes for all bottom bolts. Top bolts shall be furnished with proper extensions to allow for easy operation.
- B. Self Latching Flush Bolts: Shall be Ives FB51P/FB61P series, furnished with DP2 dustproof strikes for all bottom bolts. Furnish wear plates as required.
- C. Automatic Flush Bolts: Shall be Ives FB31P/FB41P series, furnished with DP2 dustproof strikes for all bottom bolts. Furnish wear plates as required.
- D. Coordinators: Shall be Ives COR series, Rock wood or Burns. Furnish all fillers, mounting brackets, carry bars and special cut outs for use with exit devices, as

required. Finish shall be black.

2.13 MAGNETIC HOLDERS:

- A. Magnetic holders to be field selectable for 12VDC 0.03 amps; 24VAC/24DC, 0.02 amps; 120VAC, 0.02 amps.
- B. Housing shall be cast metal. Armature bracket shall be cast metal.
- C. Provide armature extensions and ball coupler assemblies as necessary to suit application.
- D. Holding force shall be 35lbs.

2.14 POWER TRANSFERS:

- A. Provide electric power transfers where power must be transferred from the frame to the door for electrified door hardware.
- B. Units must be completely concealed when the door is in the closed position.
- C. Units must not prohibit door from opening to its maximum potential (up to 180 degrees)
- D. Units must be capable of housing up to 10 24 gauge wires with a rating of 24VDC, 1 ampere.
- E. Approved manufacturer: Von Duprin EPT-10, Falcon, or ABH

2.15 POWER SUPPLIES:

- A. Shall be provided, as necessary, where electrified hardware components are specified.
- B. Units must interface to all designated electrical security components with no additional hardware.
- C. Power supplies shall be Underwriter Laboratories (UL) listed for general purpose use tested to meet UL1012 specifications.
- D. Power supplies shall have 12/24VDC field selectable output voltage, with jumper.
- E. Output current shall be at least 2 AMP at 12VDC and 2 AMP at 24 VDC, or as required for electrified load.
- F. Power supply Optional Control Boards: 2 relay electric latch retraction panic device control board, 4 relay distribution board, 4 relay distribution board with logic, field configurable for time delay function, automatic operators and/or security interlock, 8 fused output distribution board, 8 PTC output distribution board.
- G. Power supply output shall be terminated by interface to an emergency alarm system where specified. Outputs shall be configurable as switched or unswitched when signal is provided.
- H. Power supply voltage shall be filtered and regulated.
- I. The power supply shall be housed in a standard NEMA 1 enclosure with additional space for up to (4) 4 Amp/hour batteries providing battery backup when required.
- J. Approved manufacturer: Schlage Electronics PS900 series, Falcon or Sargent, to suit electrified locking amperage requirements.

2.16 ELECTRIC STRIKES:

- A. Electric strikes shall be non-handed
- B. Provide voltage as required to suit project
- C. All electric strikes shall be provided as "Fail Secure", and shall remain locked upon loss of power.
- D. Electric strikes shall be furnished with two-piece wire plug connectors for easy installation and removal if servicing is required.
- E. Electric strikes shall be constructed of stainless steel and capable of accepting up to a 3/4" throw latch bolt.
- F. Electric strikes shall be UL listed for Burglary-Resistant and Electric Strike for fire doors and frames.
- G. Electric strikes shall meet the requirements of ANSI A156.5, Grade 1, 1992.
- H. Approved manufacturer: Von Duprin 6000 series heavy duty electric strikes, Folger Adem, or HES, to suit locking device. See hardware sets for specific model numbers.

2.17 WEATHER SEALS AND THRESHOLDS:

- A. Weather Seals and Thresholds: Zero, Pemko or Reese as Scheduled.
- B. Perimeter seals: shall be of compressible black Neoprene material. Housing shall be solid alum stock. Furnish seals on three sides of the opening. Coordinate the amount of material is required in each specified opening.
- C. Seals shall be mechanically fastened to door frame.
- D. Door sweeps: shall be extruded aluminum and black neoprene sweep.
 - 1. Fasten door sweeps with wood screws for wood doors and sheet metal screws for hollow metal and fiberglass reinforced doors.
 - 2. Door sweep shall be 1 1/4" in overall height with a 1/2" high neoprene sweep.
 - 3. Mount door sweep on the exterior side of the door, with the neoprene engaged with the threshold or finish floor.
- E. Thresholds: shall be extruded aluminum meeting ADA requirements. They shall not exceed 1/4" in height with a wall thickness of .125" unless specified otherwise. Coordinate templates for any and all hardware, which may require cutouts or slots within the threshold for the proper installation of that hardware.
 - 1. Furnish threshold with non-slip epoxy abrasive bonded within the grooves of the threshold.
 - 2. Thresholds shall extend a minimum of 1" past the exterior face of the door, and have returned closed ends.
 - 3. Set all thresholds in grout, and seal with silicone caulk.

4. Fasten thresholds with expansion shield mounting at masonry sub-straight locations, and wood screws at wood substrate locations.

2.18 KEY REQUIREMENTS:

- A. Final keying: requirements to be determined by the City of New York. A meeting must take place between the City of New York, the end user, the City of New York's representative, and the hardware distributor prior to cylinders being ordered, to establish the keying requirements and required keyway.
- B. Key System: Tie into the existing key system.
- C. Provide Concealed Key Control (CKC) keyset symbol stamping on the side of each master keyed core. Provide visual key control for all operating and master keys.
- D. Construction keying: provide construction master keying.
- E. Provide: Three (3) change keys for each differently keyed lock. Provide (3) control keys for construction cores, and (3) control keys for permanent cores. Provide 10 copies of each level Master Key, Grand Master Key, and/or Great Grand Master Key. Permanent keys and cores: secured shipment direct from point of origination to the City of New York. Provide bitting list, ship direct from point of origin to the City of New York upon project completion.
- F. Provide a key control system including envelopes. Labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150 percent of the number of locks required for the project.
 1. Provide four hinged panel type cabinet for wall mounting.

PART 3 EXECUTION:

3.01 PREPARATION:

- A. Ensure that walls and frames are square and plumb before hardware installation.
- B. The installer shall notify the architect, in writing, of all unacceptable condition that could affect the proper operation of the finish hardware.
- C. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
- D. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
- E. Existing frames and doors scheduled to receive new hardware: carefully remove existing hardware and turn over to City of New York. Patch and fill wood frames and doors with solid wood stock or dowel material before cutting for new hardware. Do not reuse existing screw holes fill and re-pilot.

3.02 INSTALLATION:

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation.
 1. Unless otherwise specified, locate all hardware in accordance with the recommended

locations for builders hardware for standard doors and frames as published by the Door and Hardware Institute.

2. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
3. Unless otherwise specified or detailed, install thresholds with the bevel in vertical alignment with the outside door face. Notch and closely fit thresholds to frame profile. Set thresholds in full bed of sealant.
4. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.
5. Locate floor stops not more than 4 inches from the wall.
6. Drill pilot holes for fasteners in wood doors and/or frames.
7. Shim doors as required to maintain proper operating clearance between door and frame.
8. Use only fasteners supplied by or approved by the manufacturer for each respective item of hardware.
9. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to City of New York items not scheduled for reuse.
10. Where necessary, adjust doors and hardware as required to eliminate binding between strike and latchbolt. Doors should not rattle.
11. Install door closers on corridor side of lobby doors, room side of corridor doors, and stair side of stairways.
12. Adjust spring power of door closers to insure exterior and fire rated doors will consistently close and latch doors under existing conditions. Adjust all other door closers to insure opening force does not to exceed 5 lbs.
13. Adjust "sweep", "latch", & "back check" valves on all door closers to properly control door through out the opening and closing cycle. Adjust total closing speed as required to comply with all applicable state and local building codes.
14. Deliver to the City of New York 1 complete set of installation and adjustment instructions, and tools as furnished with the hardware.

3.03 QUALITY ASSURANCE:

- A. After installation has been completed, the hardware supplier and manufacturers representative for locksets, door closers, exit devices, and overhead stops shall check the project and verify compliance with installation instructions, adjustment of all hardware items, and proper application according to the approved hardware schedule. Hardware supplier shall submit a list of all hardware that has not been installed correctly.

- B. After installation has been completed, the hardware supplier and manufacturers representative shall meet with the City of New York to explain the functions, uses, adjustment, and maintenance of each item of hardware.

3.04 ADJUSTING AND CLEANING:

- A. Adjust and check for proper operation and function. Replace units which cannot be adjusted to operate freely and smoothly.
- B. At final completion, and when H.V.A.C. equipment is in operation, installer shall make final adjustments to and verify proper operation of all door closers and other items of hardware. Lubricate moving parts with type lubrication recommended by the manufacturer.
- C. All hardware shall be left clean and in good operation. Hardware found to be disfigured, defective, or inoperative shall be repaired or replaced.
- D. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of space or area, return to work during week prior to acceptance or occupancy, and make final check and adjustment of hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors.

3.05 DEMONSTRATION:

- A. Demonstrate electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.06 PROTECTION:

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.07 SCHEDULE OF FINISH HARDWARE:

- A. See door schedule in drawings for hardware set assignments for basis of design only.
- B. Hardware Group No. 01 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
2	EA POWER TRANSFER	EPT-10	689	VON
2	EA CONTINUOUS HINGE	112HD EPT	628	IVE
2	EA PANIC HARDWARE	HD-EL-RX-LC-3549A-NL-OP	626	VON
2	EA RIM CYLINDER	20-021	626	SCH
2	EA LONG DOOR PULL	9265F X HEIGHT AS PER ARCHITECTS DETAIL	630	IVE
2	EA AUTO OPERATOR	SW200I SERIES (FURNISHED BY AUTO OPERATOR SUPPLIER	689	MIS
1	EA THRESHOLD	656A	AL	ZER
1	EA POWER SUPPLY	PS914-2RS	GRY	VON
2	EA ACTUATOR, WALL MOUNT	8310-853T		LCN
2	EA FLUSH MOUNT BOX	8310-867F		LCN

1	SET WEATHERSTRIPPING	BY DOOR MANUFACTURER	AL
1	EA CARD READER	BY SECURITY SUPPLIER	
1	EA CUSTOM	WIRING DIAGRAM (GC TO COORDINATE)	

OPERATIONAL DESCRIPTION:

1. DOORS NORMALLY CLOSED AND LOCKED AFTER HOURS. POWER TO EXTERIOR WALL ACTUATOR IS POWERED OFF.
2. DURING DAYTIME HOURS DOORS ARE MANUALLYT DOGGED DOWN ALLOWING DOORS TO OPERATE AS PUSH/PULL. DOOR MAY ALSO BE OPENED AUTOMATICALLY WHEN OUTSIDE WALL ACTUATOR IS DEPRESSED
3. FREE EGRESS AT ALL TIMES VIA THE EXIT DEVICE.
4. WHEN DOORS ARE LOCKED ENTRY IS EITHER BY PROPER CREDENTIAL AT CARD READER WHICH SIGNALS LATCHES OF EXIT DEVICE TO OPEN AND ALLOW ENTRY. THE CARD READER WILL ALSO SIGNAL THE EXTERIOR WALL ACTUATOR TO POWER ON GIVING THE OPTION OF OPENING THE DOOR AUTOMATICALLY BY DEPRESSING THE ACTUATOR BUTTON. DPDT FURNISHED BY SECURITY.
5. AUTO OPERATOR IS TIED INTO THE BUILD SMOKE EVAC SYSTEM, UPON ACTIVATION DOORS WILL "BLOW-OPEN" AND REMAIN OPEN UNTIL SIGNAL IS RESET. COORDINATE WITH SMOKE EVAC SYSTEM AND ELECTRICAL

C. Hardware Group No. 01A Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
2	EA CONTINUOUS HINGE	112HD	628	IVE
2	EA DUMMY TOUCH BAR	330	626	VON
2	EA LONG DOOR PULL	9265F X HEIGHT AS PER ARCHITECTS DETAIL	630	IVE
2	EA AUTO OPERATOR	SW200I SERIES (FURNISHED BY AUTO OPERATOR SUPPLIER	689	MIS
1	EA THRESHOLD	656A	AL	ZER
2	EA ACTUATOR, WALL MOUNT	8310-853T		LCN
2	EA FLUSH MOUNT BOX	8310-867F		LCN
1	SET WEATHERSTRIPPING	BY DOOR MANUFACTURER	AL	
1	EA CUSTOM	WIRING DIAGRAM (GC TO COORDINATE)		

OPERATIONAL DESCRIPTION:

1. DOORS NEVER LOCK OPERATE AS PUSH/PULL.
2. FREEE EGRESS AT ALL TIMES.
3. DOOR MAY EITHER BE OPENED MANUALLY OR AUTOMATICALLY BY DEPRESSING WALL ACTUATORS.
4. AUTO OPERATOR IS TIED INTO THE BUILD SMOKE EVAC SYSTEM, UPON ACTIVATION DOORS WILL "BLOW-OPEN" AND REMAIN OPEN UNTIL SIGNAL IS RESET. COORDINATE WITH SMOKE EVAC SYSTEM AND ELECTRICAL

D. Hardware Group No. 02: - NOT USED

Qty	Description	Model Number	Finish	Mfr
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E. Hardware Group No. 03 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1HW 5 X 4.5 NRP	652	IVE
2	EA FIRE EXIT HARDWARE	9947L-F-LBR:996L- 03 LEVER	626	VON
2	EA RIM CYLINDER	20-021	626	SCH
1	EA ASTRAGAL	555AA X 55AA	AL	ZER
2	EA SURFACE CLOSER	4041XP EDA	689	LCN
2	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
2	SET MOUNTING PLATE	770SPB	AL	ZER
2	EA DOOR BOTTOM	369A	AL	ZER
1	EA THRESHOLD	657A X TYPE 3	AL	ZER

F. Hardware Group No. 03A Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1HW 5 X 4.5 NRP	652	IVE
2	EA POWER TRANSFER	EPT-10	689	VON
2	EA FIRE EXIT HARDWARE	EL-9947L-F-LBR 996L-03 LEVER	626	VON
1	EA MORTISE CYLINDER	20-001 1-1/4" X CAM AS REQUIRED	626	SCH
2	EA RIM CYLINDER	20-021	626	SCH
1	EA ASTRAGAL	555AA X 55AA	AL	ZER
2	EA AUTO OPERATOR	SW2001 SERIES (FURNISHED BY AUTO OPERATOR SUPPLIER	689	MIS
2	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
2	SET MOUNTING PLATE	770SPB	AL	ZER
2	EA DOOR BOTTOM	369A	AL	ZER
1	EA THRESHOLD	657A X TYPE 3	AL	ZER
1	EA POWER SUPPLY	PS914-2RS	GRY	VON
1	EA KEYSWITCH	653-04-L2	630	SCE
2	EA ACTUATOR, WALL MOUNT	8310-853T		LCN
2	EA FLUSH MOUNT BOX	8310-867F		LCN
1	EA CUSTOM	WIRING DIAGRAM (GC TO COORDINATE)		

OPERATIONAL DESCRIPTION:

1. DOORS NORMALLY CLOSED AND LATCHED (THEY MAY ALSO BE LOCKED VIA THE OUTSIDE LEVER HANDLE WITH KEY).
2. FREE EGRESS AT ALL TIMES VIA THE EXIT DEVICE.
3. POWER TO THE OUTSIDE WALL ACTUATOR IS GRANTED BY USE OF KEYSWITCH IN WALL. WHEN ACTUATOR IS POWERED ON THE DOOR MAY ALSO BE OPENED AUTOMATICALLY.
4. AUTO OPERATOR IS TIED INTO THE BUILD SMOKE EVAC SYSTEM, UPON ACTIVATION DOORS WILL "BLOW-OPEN" AND REMAIN OPEN UNTIL SIGNAL IS RESET. COORDINATE WITH SMOKE EVAC SYSTEM AND ELECTRICAL

G. Hardware Group No. 04 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	SET DOOR PULL	RM3300-66" O.A HEIGHT	630	ROC
1	EA ASTRAGAL	557AA X 56AA	AL	IVE
2	EA SURFACE CLOSER	4041XP EDA	689	LCN
2	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
2	SET MOUNTING PLATE	770SPB	AL	ZER
2	EA DOOR BOTTOM	365AA	AL	ZER
1	EA THRESHOLD	657A X TYPE 3	AL	ZER

H. Hardware Group No. 04A Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	SET DOOR PULL	RM3300-66" O.A HEIGHT	630	ROC
1	EA ASTRAGAL	557AA X 56AA	AL	IVE
2	EA AUTO OPERATOR	SW200I SERIES (FURNISHED BY AUTO OPERATOR SUPPLIER)	689	MIS
2	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
2	SET MOUNTING PLATE	770SPB	AL	ZER
2	EA DOOR BOTTOM	365AA	AL	ZER
1	EA THRESHOLD	657A X TYPE 3	AL	ZER
2	EA ACTUATOR, WALL MOUNT	8310-853T		LCN
2	EA FLUSH MOUNT BOX	8310-867F		LCN
1	EA CUSTOM	WIRING DIAGRAM (GC TO COORDINATE)		

OPERATIONAL DESCRIPTION:

1. DOORS ALWAYS ACT AS PUSH/PULL.
2. DOORS MAY BE OPENED MANUALLY OR AUTOMATICALLY WHEN ACTUATOR BUTTONS ARE DEPRESSED.
3. FREE EGRESS AT ALL TIMES.
4. AUTO OPERATOR IS TIED INTO THE BUILD SMOKE EVAC SYSTEM, UPON ACTIVATION DOORS WILL "BLOW-OPEN" AND REMAIN OPEN UNTIL SIGNAL IS RESET. COORDINATE WITH SMOKE EVAC SYSTEM AND ELECTRICAL

I. Hardware Group No. 05 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
8	EA HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA POWER TRANSFER	EPT-10	689	VON

2	EA	PANIC HARDWARE	9947L-LBR 996L- 03 LEVER	626	VON
2	EA	PANIC HARDWARE	EL9947L-LBR 996L-03 LEVER	626	VON
1	EA	MORTISE CYLINDER	20-001 1-1/4" X CAM AS REQUIRED	626	SCH
2	EA	RIM CYLINDER	20-021	626	SCH
1	EA	ASTRAGAL	555AA X 55AA	AL	ZER
2	EA	AUTO OPERATOR	SW200I SERIES (FURNISHED BY AUTO OPERATOR SUPPLIER	689	MIS
2	EA	KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	770SP	AL	ZER
2	EA	AUTO DOOR BOTTOM	366AA	AL	ZER
1	EA	THRESHOLD	564A	AL	ZER
1	EA	POWER SUPPLY	PS914-2RS	GRY	VON
1	EA	KEYSWITCH	653-04-L2	630	SCE
2	EA	ACTUATOR, WALL MOUNT	8310-853T		LCN
2	EA	FLUSH MOUNT BOX	8310-867F		LCN
1	EA	CUSTOM	WIRING DIAGRAM (GC TO COORDINATE)		

OPERATIONAL DESCRIPTION:

1. DOORS NORMALLY CLOSED AND LATCHED (THEY MAY ALSO BE LOCKED VIA THE OUTSIDE LEVER HANDLE WITH KEY).
2. FREE EGRESS AT ALL TIMES VIA THE EXIT DEVICE.
3. POWER TO THE OUTSIDE WALL ACTUATOR IS GRANTED BY USE OF KEYSWITCH IN WALL. WHEN ACTUATOR IS POWERED ON THE DOOR MAY ALSO BE OPENED AUTOMATICALLY.
4. AUTO OPERATOR IS TIED INTO THE BUILD SMOKE EVAC SYSTEM, UPON ACTIVATION DOORS WILL "BLOW-OPEN" AND REMAIN OPEN UNTIL SIGNAL IS RESET. COORDINATE WITH SMOKE EVAC SYSTEM AND ELECTRICAL

J. Hardware Group No. 06 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA FIRE EXIT HARDWARE	9975L-F 996L - 03 LEVER	626	VON
1	EA MORTISE CYLINDER	20-001 1-1/4" X CAM AS REQUIRED	626	SCH
1	EA SURFACE CLOSER	4021 TEMPLATE FOR 180 DEGREES WHERE INDICATED	689	LCN
1	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
1	EA AUTO DOOR BOTTOM	366AA	AL	ZER
1	EA THRESHOLD	564A	AL	ZER

K. Hardware Group No. 07 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA CAM-LIFT HINGES	BY DOOR MANUFACTURER		

2	EA	FIRE EXIT HARDWARE	9927L-F-LBR 996L-03 LEVER	626	VON
2	EA	RIM CYLINDER	20-021	626	SCH
2	EA	KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	EA	THRESHOLD	657A X TYPE 3	AL	ZER

STC 51 DOOR ASSEMBLY
ACOUSTIC SEALS BY ACOUSTICAL DOOR MANUFACTURER

L. Hardware Group No. 08: - NOT USED

Qty	Description	Model Number	Finish	Mfr
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M. Hardware Group No. 09 Provide each SL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
1	SET SLIDING DOOR	1230	AL	GRA
1	EA SLIDING DOOR LOCK	2002 CPDL-3	626	ACC
1	EA MORTISE CYLINDER	20-013	626	SCH
1	EA FLUSH CUP PULL	S2002-C (OUTSIDE)	626	ACC
1	EA FLUSH CUP PULL	S2002-T (INSIDE)	626	ACC
1	EA BUMPER STOP	1213		GRA

N. Hardware Group No. 10 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA FIRE EXIT HARDWARE	99L-F-BE 996L-BE - 03 LEVER	626	VON
1	EA SURFACE CLOSER	4041XP EDA	689	LCN
2	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	188FS	BLK	ZER

GC & HARDWARE SUPPLIER TO COORDINATE EXISTING PREPS IN DOOR AND PROVIDE HARDWARE AS REQUIRED TO SUIT OR RE-WORK DOOR AS REQUIRED AND PATCH AS REQUIRED.

O. Hardware Group No. 11 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA PANIC HARDWARE	9947L-LBR 996L- 03 LEVER	626	VON
2	EA RIM CYLINDER	20-021	626	SCH
2	EA SURFACE CLOSER	4041XP SCUSH	689	LCN

4	EA	KICK PLATE	8400 8" X 1" LDW	630	IVE
1	SET	SEALS	188FS	BLK	ZER
2	EA	DOOR BOTTOM	369A	AL	ZER

DOOR BOTTOMS FOR USE WITH TAG 10BB

P. Hardware Group No. 12 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
1	SET PIVOT SET	7226	626	IVE
1	EA PIVOT	7226 INT	626	IVE
1	SET DOOR PULL	RM3300-66" O.A HEIGHT	630	ROC
1	EA SURFACE CLOSER	4041XP EDA	689	LCN
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
1	EA DOOR BOTTOM	369A	AL	ZER

Q. Hardware Group No. 13 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA AUTO FLUSH BOLT	FB31B	630	IVE
1	EA CLASSROOM LOCK	L9070P 03A	626	SCH
1	EA COORDINATOR	COR X FL	628	IVE
2	EA MOUNTING BRACKET	MB SERIES	600	IVE
2	EA SURFACE CLOSER	4041XP EDA	689	LCN
4	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
2	SET MOUNTING PLATE	770SPB	AL	ZER
2	EA DOOR BOTTOM	365AA	AL	ZER
1	EA THRESHOLD	656A	AL	ZER

R. Hardware Group No. 14 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA CLASSROOM LOCK	L9070P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP	689	LCN
1	EA MOP PLATE	8400 8" X 1" LDW	630	IVE
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	188S	BLK	ZER
1	SET SEALS	770SP	AL	ZER

1. MOP PLATE FOR TAG 111A ONLY (NO KICKPLATE).

2. 770SP FOR USE WITH TAG 111A ONLY.

S. Hardware Group No. 15 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
8	EA HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA MANUAL FLUSH BOLT	FB458	626	IVE
1	EA DUST PROOF STRIKE	DP2	626	IVE
1	EA CLASSROOM LOCK	L9070P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP	689	LCN
2	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	188S	BLK	ZER
2	EA DOOR BOTTOM	365AA	AL	ZER
1	EA SADDLE	AS PER ARCHITECTS DETAIL	AL	

PROVIDE TOP ROD LENGTH AS REQUIRED FOR DOOR HEIGHT

T. Hardware Group No. 16 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA CLASSROOM LOCK	L9070P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP EDA	689	LCN
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	188S	BLK	ZER

U. Hardware Group No. 17 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA FIRE EXIT HARDWARE	9947L-F-LBR 996L- 03 LEVER	626	VON
2	EA RIM CYLINDER	20-021	626	SCH
1	EA ASTRAGAL	555AA X 55AA	AL	ZER
2	EA SURFACE CLOSER	4041XP EDA	689	LCN
2	EA MOP PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
2	EA DOOR BOTTOM	369A	AL	ZER
1	EA THRESHOLD	657A X TYPE 3	AL	ZER

V. Hardware Group No. 18 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA TWO POINT LATCH	237L-BE-F X03 LEVER	626	VON
2	EA SURFACE CLOSER	4041XP SCUSH	689	LCN
2	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
1	SET SEALS	188S	BLK	ZER

W. Hardware Group No. 19 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA PRIVACY LOCK	L9496P 03A L583-363	626	SCH
1	EA MOP PLATE	8400 8" X 1" LDW	630	IVE
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
3	EA SILENCER	SR64	GRY	IVE

X. Hardware Group No. 20 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA OFFICE LOCK	L9050P 03A L583-363	626	SCH
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
3	EA SILENCER	SR64	GRY	IVE

Y. Hardware Group No. 21 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1 4.5 X 4.5	652	IVE
3	EA HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA STOREROOM LOCK	L9080P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP	689	LCN
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
3	EA SILENCER	SR64	GRY	IVE

HEAVYWEIGHT 5 X 4.5 HINGES FOR TAG 118A

Z. Hardware Group No. 22 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
8	EA HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA POWER TRANSFER	EPT-10	689	VON
2	EA FIRE EXIT HARDWARE	EL-9947L-F-LBR 996L-03 LEVER	626	VON
1	EA MORTISE CYLINDER	20-001 1-1/4" X CAM AS REQUIRED	626	SCH
2	EA RIM CYLINDER	20-021	626	SCH
1	EA ASTRAGAL	555AA X 55AA	AL	ZER
2	EA AUTO OPERATOR	SW2001 SERIES (FURNISHED BY AUTO OPERATOR SUPPLIER)	689	MIS
2	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
2	EA DOOR BOTTOM	369A	AL	ZER
1	EA THRESHOLD	657A X TYPE 3	AL	ZER
1	EA POWER SUPPLY	PS914-2RS	GRY	VON
1	EA KEYSWITCH	653-04-L2	630	SCE
2	EA ACTUATOR, WALL MOUNT	8310-853T		LCN

2	EA	FLUSH MOUNT BOX	8310-867F	LCN
1	EA	CUSTOM	WIRING DIAGRAM (GC TO COORDINATE)	

OPERATIONAL DESCRIPTION:

1. DOORS NORMALLY CLOSED AND LATCHED (THEY MAY ALSO BE LOCKED VIA THE OUTSIDE LEVER HANDLE WITH KEY).
2. FREE EGRESS AT ALL TIMES VIA THE EXIT DEVICE.
3. POWER TO THE OUTSIDE WALL ACTUATOR IS GRANTED BY USE OF KEYSWITCH IN WALL. WHEN ACTUATOR IS POWERED ON THE DOOR MAY ALSO BE OPENED AUTOMATICALLY.
4. AUTO OPERATOR IS TIED INTO THE BUILD SMOKE EVAC SYSTEM, UPON ACTIVATION DOORS WILL "BLOW-OPEN" AND REMAIN OPEN UNTIL SIGNAL IS RESET. COORDINATE WITH SMOKE EVAC SYSTEM AND ELECTRICAL

AA. Hardware Group No. 23 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA CLASSROOM LOCK	L9070P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP	689	LCN
1	EA MOP PLATE	8400 8" X 1" LDW	630	IVE
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	188S	BLK	ZER

BB. Hardware Group No. 24 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA STOREROOM LOCK	L9080P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP	689	LCN
1	EA SURFACE CLOSER	4041XP EDA	689	LCN
1	EA MOP PLATE	8400 8" X 1" LDW	630	IVE
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	188S	BLK	ZER
1	EA SADDLE	AS PER ARCHITECTS DETAIL	AL	

1. PROVIDE 4041XP CLOSER AT TAG 127A
2. TAGS 127A & 128B WILL HAVE LESS INSIDE TRIM REFER TO ARCHITECTS DETAIL

CC. Hardware Group No. 25 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA CLASSROOM LOCK	L9070P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP EDA	689	LCN
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE

1	EA	WALL STOP	WS407CCV	630	IVE
1		SET SEALS	770SP	AL	ZER
1	EA	DOOR BOTTOM	369A	AL	ZER
1	EA	THRESHOLD	656A	AL	ZER

DD. Hardware Group No. 26 Provide each SGL door(s) with the following:

Qty		Description	Model Number	Finish	Mfr
1		SET PIVOT SET	7255	626	IVE
1	EA	CASTER	10600	626	RIX
1	EA	MORTISE DEADBOLT	L460P L583-363	626	SCH
2	EA	FLUSH CUP PULL	BF97	630	ROC
1	EA	OVERHEAD HOLDER	100H	630	GLY

PROVIDE CASTER FOR DOORS OVER 4/0 IN WIDTH

EE. Hardware Group No. 27 Provide each PR door(s) with the following:

Qty		Description	Model Number	Finish	Mfr
8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA	FIRE EXIT HARDWARE	9947L-F-LBR 996L- 03 LEVER	626	VON
2	EA	RIM CYLINDER	20-021	626	SCH
1	EA	ASTRAGAL	555AA X 55AA	AL	ZER
2	EA	SURFACE CLOSER	4041XP EDA	689	LCN
2	EA	KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
2		SET SEALS	770SP	AL	ZER
2		SET MOUNTING PLATE	770SPB	AL	ZER
2	EA	DOOR BOTTOM	369A	AL	ZER
1	EA	THRESHOLD	657A X TYPE 3	AL	ZER

FF. Hardware Group No. 28: - NOT USED

Qty		Description	Model Number	Finish	Mfr
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GG. Hardware Group No. 29 Provide each SL door(s) with the following:

Qty		Description	Model Number	Finish	Mfr
1		SET SLIDING DOOR HARDWAR	5300	AL	GRA
1	EA	SLIDING DOOR LOCK	2002 CPDL-3	626	ACC
1	EA	MORTISE CYLINDER	20-001 1-1/4" X CAM AS REQUIRED	626	SCH
1	EA	FLUSH CUP PULL	S2002-C (OUTSIDE)	626	ACC
1	EA	FLUSH CUP PULL	S2002-T (INSIDE)	626	ACC

HH. Hardware Group No. 30 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
2	EA MANUAL FLUSH BOLT	FB458	626	IVE
1	EA DUST PROOF STRIKE	DP2	626	IVE
1	EA STOREROOM LOCK	L9080P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP SCUSH	689	LCN
1	EA WALL STOP	WS407CCV	630	IVE
1	SET SEALS	770SP	AL	ZER
2	EA DOOR BOTTOM	365AA	AL	ZER
1	EA THRESHOLD	656A	AL	ZER

II. Hardware Group No. 31: - NOT USED

Qty	Description	Model Number	Finish	Mfr
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JJ. Hardware Group No. 32 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA CAM-LIFT HINGES	BY DOOR MANUFACTURER		
2	EA MANUAL FLUSH BOLT	FB358	626	IVE
1	EA DUST PROOF STRIKE	DP2	626	IVE
1	EA PASSAGE SET	L9010 03A	626	SCH
2	EA OVERHEAD STOP	100S	630	GLY
2	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
1	EA THRESHOLD	656A	AL	ZER

STC 51 DOOR ASSEMBLY
ACOUSTIC SEALS BY ACOUSTICAL DOOR MANUFACTURER

KK. Hardware Group No. 33 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA FIRE EXIT HARDWARE	99L-BE 996L-BE - 03 LEVER	626	VON
1	EA SURFACE CLOSER	4041XP EDA	689	LCN
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
3	EA SILENCER	SR64	GRY	IVE

LL. Hardware Group No. 34 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
2	SET PIVOTS	BY DOOR MANUFACTURER		
2	EA DBL DUMMY TRIM	L0172 03A	626	SCH
2	EA ROLLER LATCH	RL1152 (TOP MOUNT)	626	IVE
2	EA DOME STOP	FS436	626	IVE

MM. Hardware Group No. 35 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
1	SET PIVOTS	BY DOOR MANUFACTURER		
1	EA OFFICE LOCK	L9050P 03A L583-363	626	SCH
1	EA DOME STOP	FS436	626	IVE

NN. Hardware Group No.36 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
	SET ALL HARDWARE	BY DOOR MANUFACTURER		IVE

OO. Hardware Group No. 37 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA MANUAL FLUSH BOLT	FB458	626	IVE
1	EA DUST PROOF STRIKE	DP2	626	IVE
1	EA CLASSROOM LOCK	L9070P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP	689	LCN
2	EA KICK PLATE	8400 8" X 1" LDW	630	IVE
2	EA WALL STOP	WS407CCV	630	IVE
2	EA SILENCER	SR64	GRY	IVE

PP. Hardware Group No.38 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA STOREROOM LOCK	L9080P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP EDA	689	LCN
1	EA KICK PLATE	8400 8" X 2" LDW	630	IVE
1	EA WALL STOP	WS407CCV	630	IVE
3	EA SILENCER	SR64	GRY	IVE

QQ. Hardware Group No. 39 Provide each SGL door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
3	EA HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA STOREROOM LOCK	L9080P 03A	626	SCH
1	EA SURFACE CLOSER	4041XP EDA	689	LCN
1	EA WALL STOP	WS407CCV	630	IVE
3	EA SILENCER	SR64	GRY	IVE

RR. Hardware Group No. 40 Provide each PR door(s) with the following:

Qty	Description	Model Number	Finish	Mfr
6	EA HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
2	EA MANUAL FLUSH BOLT	FB458	626	IVE

1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080P 03A	626	SCH
1	EA	SURFACE CLOSER	4041XP SCUSH	689	LCN
1	EA	OVERHEAD STOP	100S	630	GLY
1		SET SEALS	188S	BLK	ZER

END OF SECTION

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SECTION 088000

GLASS AND GLAZING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the glass and glazing as shown on the drawings and/or specified herein, including but not limited to glazing of the following:
 - 1. Doors.
 - 2. Entrances.
 - 3. Storefront framing.
 - 4. Interior borrowed lites.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Hollow metal doors and frames - Section 081113.
- F. Aluminum entrances and storefronts - Section 084313.
- G. Demountable partitions - Section 102219.

1.4 REFERENCES

- A. Comply with the recommendations of the following references unless more stringent requirements are indicated herein.
 - 1. FGMA Publications: FGMA Glazing Manual.
 - 2. LSGA Publications: LSGA Design Guide.
 - 3. SIGMA Publications: TM-3000 Vertical Glazing Guidelines.

4. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201.
5. Fire-Resistive Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
6. Fire-Resistive Glazing Products for Window Assemblies: Products identical to those tested per ASTM E 163, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
7. 16 CFR 1201, Safety Standards for Architectural Glazing, Sealed Insulating Glass Manufacturing Association.
8. ASTM C 920, Elastomeric Joint Sealant.
9. Insulating Glass Criteria - IGCC International Glass Cert. Council.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated on drawings and/or specified herein are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: 30 psf or greater if required by Code.
 2. Probability of Breakage for Vertical Glazing:
 - a. 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - b. 1 lite per 1000 for lites installed 15 degrees from the vertical and under wind action.
 - c. Load Duration: 60 seconds or less.
 3. Maximum Lateral Deflection: For glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/100 times the short side length or 0.5", whichever is less.
 4. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

- a. Temperature Change (Range): 120 deg. F ambient; 180 deg F, material surfaces.
 - 5. Thermal Solar Performance: See Article 2.2 herein.
 - C. Glass units shall be annealed, heat strengthened, fully tempered or laminated where required to meet wind and/or snow loads and safety glazing requirements, as shown, specified or recommended by the glass fabricator and as required by the prevailing Building Code.
- 1.6 SUBMITTALS
- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the products.
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 - 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 - B. Product Data: Submit manufacturer's printed product data, specifications, standard details, glazing instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements, including performance requirements.
 - C. Submit compatibility and adhesion test reports from sealant manufacturer indicating materials were tested for compatibility and adhesion with glazing sealant, as well as other glazing materials including insulation units.
 - D. Initial Selection Samples: Submit samples of each glass and glazing material showing complete range of colors, textures, and finishes available for each material used.

1. Submit complete range of samples of standard colors and patterns for ceramic frits at insulating glass.
 2. Submit complete range of samples of sandblasted glass showing variations of grits and opacity achieved.
- E. Verification Samples: Submit representative samples of each glass and glazing material that is to be exposed in completed work. Show full color ranges and finish variations expected. Provide glass samples having minimum size of 144 sq. in. and 6 in. long samples of sealants and glazing materials; all samples shall bear the name of the manufacturer, brand name, thickness, and quality.
- F. Calculations: Provide wind load charts, calculations, thermal stress analysis, and certification of performance of this work. Indicate how design requirements for loading and other performance criteria have been satisfied. Document shall be signed and sealed by a Professional Engineer licensed in the State of New York.
- G. Test Reports: Provide certified reports for specified tests.
- H. Warranties: Provide written warranties as specified herein.

1.7 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- C. Source: For each glass and glazing type required for work of this Section, provide primary materials which are products of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.

- D. Installer: A firm with a minimum of three years' experience in type of work required by this Section and which is acceptable to manufacturers of primary materials; and with a successful record of in-service installations similar in size and scope to this Project.
- E. Glass Thickness: Glass thicknesses shown on drawings and/or specified herein are minimum thicknesses. Determine and provide size and thickness of glass products that are certified to meet or exceed performance requirements specified in this Section.
- F. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated.
 - 1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
 - 2. IGMA Publications: IGMA TM-3000, "Vertical Glazing Guidelines for Sealed Insulating Glass Units."
- G. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- H. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- I. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council.
 - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
- J. Insulating Glass Certification Program: Permanently marked on spacers with appropriate certification label of the following testing and inspecting agency:
 - 1. Insulating Glass Certification Council.
 - 2. Associated Laboratories, Inc.
 - 3. Insulating Glass Manufacturers Alliance.
- K. Manufacturer shall be ISO 9001-2000 Certified.

1.8 TESTS

- A. **Preconstruction Sealant Test:** Submit samples of materials to be used to glazing sealant manufacturer to determine sealant compatibility. Include samples of glass, gaskets, glazing materials, framing members, and other components and accessories of glazing work. Test in accordance with ASTM C 794 to verify what type of primers (if any) are required to ensure sealant adhesion to substrates.
1. Submit minimum of nine pieces of each type and finish of framing member, and nine pieces of each type, class, kind, condition, and form of glass, including monolithic, laminated, and insulating glass for adhesion tests.
 2. Provide manufacturer's written report and recommendations regarding proper installation.

1.9 PROJECT CONDITIONS

- A. **Weather:** Perform work of this Section only when existing or forecasted weather conditions are within limits established by manufacturers of materials and products used.
- B. **Temperature Limits:** Install sealants only when temperatures are within limits recommended by sealant manufacturer, except, never install sealants when temperatures are below 40 deg. F.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations and GANA Manual.
1. Protect materials from moisture, sunlight, excess heat, sparks and flame.
 2. Sequence deliveries to avoid delays, but minimize on-site storage.

1.11 WARRANTIES

- A. **General:** Warranties shall be in addition to, and not a limitation of, other rights the City of New York may have under the Contract Documents.
- B. **Manufacturer's Special Project Warranty on Coated Glass Products:** Provide written warranty signed by manufacturer of coated glass agreeing to furnish f.o.b. point of manufacture, within specified warranty period indicated below, replacements for those coated glass units which develop manufacturing defects. Manufacturing defects are defined as peeling, cracking or deterioration in metallic coating due to normal conditions and not due to handling or installation or cleaning practices contrary to glass manufacturer's published instructions.
1. **Warranty Period:** Manufacturer's standard but not less than five (5) years after date of substantial completion.
- C. **Manufacturer's Special Project Warranty on Insulating Glass:** Provide written warranty signed by manufacturer of insulating glass agreeing to furnish f.o.b. point of manufacture, freight allowed project site, within specified warranty period indicated

below, replacements for those insulating glass units developing manufacturing defects. Manufacturing defects are defined as failure of the hermetic seal of air space (beyond that due to glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coatings, if any, and other visual indications of seal failure or performance; provided the manufacturer's instructions for handling, installing, protecting and maintaining units have been complied with during the warranty period.

1. Warranty Period: Manufacturer's standard but not less than ten (10) years after date of substantial completion.
- D. Manufacturer's Special Project Warranty on Laminated Glass: Manufacturer's standard form, made out to the City of New York and signed by laminated glass manufacturer agreeing to replace laminated glass units that deteriorated, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty period five (5) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/FABRICATORS

- A. All glass and glazing used at the exterior of the Project shall be manufactured by the same manufacturer. The same manufacturer and the same furnace shall be used for all tempered and heat strengthened glass used throughout the project. Acceptable manufacturers include the following:
1. PPG Industries.
 2. Guardian Industries.
 3. Pilkington.
 4. AFG.
 5. JE Berkowitz, LP.
 6. Viracon.

2.2 GLASS MATERIALS AND PRODUCTS

- A. Clear Float Glass: ASTM C 1036, Type I (Transparent, Flat), Class 1 (Clear), Quality q3, minimum 1/4" thick.
- B. Clear Tempered Glass: ASTM C 1048, Condition A (Uncoated), Type I (Transparent, Flat), Class 1 (Clear), Quality q3, Kind FT, minimum 1/4" thick. Tempered glass must be certified by SGCC to meet applicable standards. Tempered glass shall also conform to the following:
1. Length and Width: For 2.9 mm to 6.0 mm; +/-1.6 mm.
 2. Diagonal: +/- 3.0 mm.

3. Edgework: Belt seaming or diamond wheels. 1.5 mm seam of upper and lower glass edges. No sharp edges.
 4. Corners: No more than 3.0 mm from square.
 5. Float Glass Defects: Must meet the requirements of ASTM C 1036. The most common defects are scratches, stones gaseous bubbles and edge chips. Tables in the glass standards have limits for size/quantity of defects.
 6. Tempered glass shall have a minimum surface compression of 10,000 psi.
 7. Tempered glass to be heat-treated by horizontal (roller hearth) process with inherent roller-wave distortion parallel to the bottom edge of the glass when installed.
 8. Flatness Tolerances
 - a. Roller-Wave or Ripple: The deviation from flatness at any peak shall be targeted not exceed 0.003" as measured per peak to valley for 1/4" (6mm) thick glass.
 - b. Bow and Warp: The bow and warp tolerances shall not exceed 1/32" per linear foot.
 - c. Fully tempered glass shall be heat soaked to EN 14179-1:2005-European Heat Soaking Standard.
- C. Low 'E' Coated Glass: Provide high-performance, clear, metallic coating, equal to VE1-2M, as manufactured by Viracon.
- D. Laminated Safety Glass: Provide two glass panes of equal thickness, laminated together with a polyvinyl butyl interlayer, conform to ASTM C 1172, and as follows:
1. Interlayer Color: Clear.
 2. Interlayer Material: Provide Monsanto "Saflex" or DuPont "Butacite," 0.030" thick at vertical applications, and 0.060" thick at sloped or horizontal applications.
 3. Minimum thickness of 1/4".
- E. Insulating Glass: Insulated glass composition shall consist of 1/4" clear exterior lite of float (or tempered, where required) glass with Low E coating on No. 2 face, 1/2" air space and 1/4" clear interior lite of float (or tempered, where required) glass. Provide factory assembled units of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space, complying with ASTM E 2190, and as follows:
1. Sealing System: Dual Seal.
 2. Primary Sealant: Polyisobutylene.
 3. Secondary Sealant: Silicone, General Electric IGS 3204 or IGS 3100, or Dow Corning 982.
 - a. For structurally glazed IG units, secondary seal shall conform to ASTM C 1249.

4. Primary and secondary seals shall not contain voids and must be continuously bonded to the glass structure.
5. Spacer: Clear finish aluminum with welded, soldered, or bent corners, hollow tube types, filled with low nitrogen absorption desiccant.
6. Desiccant: Molecular sieve, silica gel, or blend of both.
7. Air Space Thickness: 1/2".
8. Glass Thickness: 1/4" minimum.
9. Units shall be certified for compliance with seal classification "CBA" by the Insulating Glass Certification Council (IGCC) or by IGMA, and tested in accordance with the above ASTM Test Methods.
10. Insulating glass shall conform to the following tolerances:
 - a. Length and Width: + 3.0 mm/ -2.0 mm.
 - b. Diagonal: +/- 3.0 mm.
 - c. Thickness: As agreed +/- 1.0 mm.
 - d. Edge-Deletion of Coating: Minimum 8 mm wide. Width of deletion must be more than the width of the secondary seal. Silver layer(s) must be completely removed. Appearance must be uniform.
 - e. Primary PIB Seal: Must be complete with no breaks. Appearance must be uniform. PIB bead must overlap coating. No visible bright line when glass is viewed in transmission. The width of the PIB bead shall be 4.0 mm + 3.0/ - 1.5 mm.
 - f. Secondary Seal: Nominal 6 mm + 3.0/ - 1.5 mm. The minimum width of the secondary silicone seal for IG units that are glazed structurally must be determined according to ASTM C 1249. The secondary seal must be uniformly applied without bubbles, cavities or gaps. Avoid excess sealant that will need to be trimmed off later.
11. Additional requirements and properties for primary and secondary insulating glass seals and spacers:
 - a. Insulating glass unit hermetic seal to consist of butyl primary and silicone secondary seals with bent, welded, or soldered interpane spacer corners; keyed corners are not acceptable unless also soldered or welded. Spacers shall be aluminum or stainless steel. Locate spacer joint at the top or sides of the units, but in no instances at the sill. Design units to minimize the number of spacer joints. Provide solid keys, embedded in butyl sealant on all four sides, at spacer joints.
 - b. Hermetic seals must be continuous and intimately bonded to both lites of glass. Provide primary seal of uniform depth with a nominal width of 1/8 to 3/16 in. Hermetic seals shall not be contaminated with debris, fingerprints, or other foreign matter and shall not contain voids or air pockets that decrease the width of the seal below the minimum widths listed in these Specifications, or that breach the seal. The width of the primary seal shall not be less than 1/16 in., and the total cumulative length of the primary seal between 1/16 in. and 1/8 in. shall be less than 12 in. in any one insulating glass unit. The

primary seal shall not have a reduced thickness at the corners. An increased thickness of the primary seal at the corners is acceptable.

- c. Provide secondary seal of uniform depth with a nominal width of 1/4 in. Provide a total width of the primary and secondary seal of 1/2 in. Units shall carry CBA rating as established by ASTM E774 and shall meet SIGMA 65-7-2, latest edition. Units shall not contain breather or capillary tubes or similar penetrations.

- F. Acoustical Door Vision Panels: Vision panels for acoustically-rated doors shall comprise two panes of glazing of different thicknesses. Glazing shall be set into metal frames with integral seals that will not degrade the acoustical performance of the door assembly. Glazing shall at minimum consist of one 1/4" thick pane and one 3/8" thick pane with a minimum 1/2" air space between the panes.

2.3 GLAZING MATERIALS AND PRODUCTS

- A. General: Provide sealants and gaskets with performance characteristics suitable for applications indicated. Ensure compatibility of glazing sealants with insulating glass sealants, with laminated glass interlayers, and with any other surfaces in contact.

- B. General Glazing and Cap Bead Sealant: Provide sealant with maximum Shore A hardness of 50. Provide one of the following:
 - 1. Dow Corning 795.
 - 2. General Electric Silglaze N 2500 or Contractors SCS-1000.
 - 3. Tremco Spectrem 2.

- C. Weather Seal Sealant: Provide non-acid curing sealant with movement range $\pm 50\%$, ASTM C 719. Provide one of the following:
 - 1. Dow Corning 795.
 - 2. General Electric Silpruf.
 - 3. Tremco Spectrem 2.

- D. Backer Rod: Closed cell non-gassing polyethylene rod with rod diameter 25% wider than joint width.

- E. Dense Elastomeric Compression Seal Gaskets: Provide molded or extruded neoprene or EPDM gaskets, Shore A hardness of 75 ± 5 for hollow profile, and 60 ± 5 for solid profiles, ASTM C 864.

- F. Cellular, Elastomeric Preformed Gaskets: Provide extruded or molded closed cell, integral-skinned neoprene, Shore A 40 ± 5 , and 20% to 35% compression, ASTM C 509; Type II.

- G. Preformed Glazing Tape: Provide solvent-free butyl-polyisobutylene rubber with 100% solids content complying with ASTM C1281 AAMA A 800 with integral continuous EPDM shim. Provide preformed glazing tape in extruded tape form. Provide Tremco "Polyslim II" or approved equal.

- H. **Setting Blocks:** Provide 100% or silicone blocks with Shore A hardness of 80-90. Provide products certified by manufacturer to be compatible with silicone sealants. Length to be not less than 4". Width for setting blocks to be 1/16" more than glass thickness and high enough to provide the lite recommended by glass manufacturer. When thickness of setting block exceeds 3/4" the glass manufacturer must be consulted for sizes and configuration. In a vented system, setting block shall be designed so as to not restrict the flow of water within the glazing rabbet to the weep holes.
 - 1. **Shims:** For shims used with setting blocks, provide same materials, hardness, length and width as setting blocks.
 - 2. **Structural Silicone Glazing:** Provide silicone setting blocks where structural silicone occurs at sills and at insulating units with silicone edge seals.
- I. **Edge Blocks:** Provide neoprene or silicone as required for compatibility with glazing sealants. Provide blocks with Shore A hardness of 55±5.
- J. **Spacers:** Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place.
- K. **Miscellaneous Glazing Materials:** Provide sealant backer rods, primers, cleaners, and sealers of type recommended by glass and sealant manufacturers.

2.4 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.
- C. Grind smooth and polish exposed glass edges.

2.5 GLASS AND GLAZING

- A. G-1: See Section 057010.
- B. G-2: Insulated Low E glass.
- C. G-3: 3/8" Clear laminated safety glass.
- D. G-4: 1/2" laminated acoustical glass 2 layers 1/4" clear float with 0.030 mm PVB interlayer.
- E. G-5: Not used.
- F. G-6: Laminated safety glass with translucent mylar interlayer (equal to Galaxy Glass double sided acid etched translucent).
- G. G-7: 5" IGU, 1/4" clear plate glass, 4-1/2" airspace, interior 1/4" clear laminated glass.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GENERAL GLAZING STANDARDS

- A. Install products using the recommendations from the manufacturer of glass, sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those in the "GANA Glazing Manual".
- B. Verify that Insulating Glass (IG) Unit secondary seal is compatible with glazing sealants.
- C. Install glass in prepared glazing channels and other framing members.
- D. Install setting blocks in rabbets as recommended by referenced glazing standards in "GANA Glazing Manual" and "IGMA Glazing Guidelines".
- E. Provide bite on glass, minimum edge and face clearances and glazing material tolerances recommended by "GANA Glazing Manual".
- F. Provide weep system as recommended by "GANA Glazing Manual".
- G. Set glass lites in each series with uniform pattern, draw, bow and similar characteristics.
- H. Distribute the weight of glass unit along the edge rather than the corner.
- I. Comply with manufacturers and referenced industry standards on expansion joint and anchors; accommodating thermal movement; glass openings; use of setting blocks, edge, face, and bite clearances; use of glass spacers; edge blocks and installation of weep systems.
- J. Protect glass edge damage during handling and installation.
- K. Prevent glass from contact with contaminating substances that result from construction operations, such as weld spatter, fireproofing or plaster.
- L. Remove and replace glass that is broken, chipped cracked or damaged in any way.

3.4 GLAZING

- A. Glazing channel dimensions, as indicated on Shop Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead. Install setting blocks at the one greater points of each lite along the horizontal mullion.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where the length plus width is larger than 50 inches as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- J. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
- K. Flush Glazing
 - 1. If the butt joint in the metal framing is in the vertical direction, the glazier shall run the tape initially on the head and sill members going directly over this joint. Should

the butt joint in the metal framing run horizontally, tapes must first be applied to the jambs so that it crosses over the joint.

2. Each tape section shall butt the adjoining tape and be united with a tool to eliminate any opening.
3. Do not overlap the adjoining length of tape or rubber shim as this will prevent full contact around the perimeter of glass.

L. Off-Set Glazing

1. Where the glazing legs are off-set, the difference in the rabbet width shall be compensated by employing different glazing tapes with different diameter shims. The difference in shim shall be equal to the size of the off-set. The thinner tape shall be positioned first on the glazing leg closest to the interior. The thicker tape shall be cut to the exact length of the dimension between the applied tapes, and installed on the outermost glazing leg.
2. Immediately prior to setting glass, paper backing shall be removed. Apply a toe bead of sealant 6" in each direction, from each corner.
3. Locate setting blocks in the sill member at quarter points, or if necessary to within 6" of each corner. Setting blocks must be set equal distance from center line of the glass and high enough to provide the recommended bite and edge clearances.
4. Set edge block according to glass manufacturer's recommendations.
5. Set Glass: The glass shall be pressed firmly against the tape to achieve full contact.
6. In a vented system, apply a heel bead (air seal) of sealant around the perimeter of glass, between the sole of the I.G. unit and the base of the rabbet of the metal framing developing a positive bond to the unit and to the metal framing. The bead of the sealant shall be deep enough so that it will partially fill the channel to a depth of 1/4" between the glass edge and the base of the metal framing rabbet.
7. Interior stops shall be set, and glazing tape spline for the appropriate face clearance shall be rolled into place, compressing the glass to the shim within the glazing tape.

3.5 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant as recommended by glass manufacturer or glass frame manufacturer.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape where noted on approved shop drawings.

3.6 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.7 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
 - 1. Exterior glazing gasket shall be set a minimum of 1/8" below exterior glazing stop to create a channel for sealant installation.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.8 PROTECTION AND CLEANING

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating

substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Clean excess sealant or compound from glass and framing members immediately after application, using solvents or cleaners recommended by manufacturers.
- F. Glass to be cleaned according to:
 - 1. GANA Glass Information Bulletin GANA 01-0300 – “Proper Procedure for Cleaning Architectural Glass Products”.
 - 2. GANA Glass Informational Bulletin GANA TD-02-0402 – “Heat Treated Glass Surfaces are Different”.
- G. Do not use razor blades, scrapers or metal tools to clean glass.

END OF SECTION

SECTION 092900

GYPSUM DRYWALL

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the gypsum drywall as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Gypsum board work for partitions, ceilings, column enclosures, furring, and elsewhere where gypsum drywall work is shown on drawings.
 - 2. Metal supports for gypsum drywall construction.
 - 3. Acoustical insulation for gypsum drywall work.
 - 4. Acoustical accessories.
 - 5. Sealant for gypsum drywall work.
 - 6. Concealed metal reinforcing for attachment of railings, toilet partitions and other items supported on drywall partitions and walls.
 - 7. Taping and finishing of drywall joints.
 - 8. Installing rings and frames in drywall surfaces for grilles, registers and lighting fixtures.
 - 9. Gypsum wallboard cants at beams and other projections over 2" deep in elevator shafts where adjoining wall is of gypsum wallboard construction.
 - 10. Gypsum shaftwall construction.
 - 11. Bracing and connections.
 - 12. Isolated wall and ceiling assemblies.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.

- D. Construction IAQ requirements – Section 018119.
- E. Thermal insulation - Section 072100.
- F. Hollow metal door frames - Section 081113.
- G. Access doors - Section 083113.
- H. Painting - Section 099000.
- I. Elevators - Division 14.
- J. Rings for grilles, registers and light fixtures - Division 23 and 26.
- K. Acoustical sealant and perimeter isolation board - Section 079200.

1.4 ENVIRONMENTAL CRITERIA

- A. Recycled Content: Gypsum wallboard shall contain recycled content material as follows:
 - 1. Paper Facings: Where feasible, a minimum of 100% post-consumer recycled paper content.
 - 2. Gypsum Cores: Where feasible, a minimum of 75% post-industrial recycled gypsum content (also called "synthetic gypsum" – from coal-fired power plants).
- B. The percentage of recycled content is based on the weight of the component materials.

1.5 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
 - 1. Steel studs, track, and miscellaneous framing shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials).
 - 2. Gypsum wallboard shall contain "synthetic" gypsum produced with a minimum of 75% post-industrial recycled content, if readily available.
 - 3. Certification of recycled content shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

4. Steel framing and gypsum wallboard products harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the LEED BUILDING Submittal Requirements of this Section.
 5. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable
 6. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- C. The following standards, as well as other standards which may be referred to in this Section, shall apply to the work of this Section:
1. The Gypsum Construction Handbook, latest edition, USG.
 2. Construction Guide, latest edition, National Gypsum.
 3. ASTM A 568 "Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements For"
 4. ASTM C 475 "Standard Specification for Joint Treatment Materials For Gypsum Wallboard Construction"
 5. ASTM C 645 "Standard Specification for Non-Structural Steel Framing Members"
 6. ASTM C 754 "Standard Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products"
 7. ASTM C 840 "Standard Specification for Application and Finishing of Gypsum Board"
 8. ASTM C 919 "Standard Specification for Use of Sealants in Acoustical Applications"
 9. ASTM C 954 "Standard Specification for Steel Drill Screws For the Application of Gypsum Board or Metal Plaster Bases to Steel Studs From 0.033 in. to 0.112 in. in Thickness"
 10. ASTM C 1002 "Standard Specification for Steel Self-Piercing Tapping Screws For the Application of Gypsum Board"
 11. ASTM C 1177 "Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing"
 12. ASTM C 1178 "Standard Specification for Glass Mat Water Resistant Gypsum Backing Board"
 13. ASTM C 1278 "Standard Specification for Fiber-Reinforced Gypsum Panel"
 14. ASTM C 1396 "Standard Specification for Gypsum Board"
 15. ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber"

- D. Allowable Tolerances: 1/32" offsets between planes of board faces, and 1/16" in 8'-0" for plumb, level, warp and bow.
- E. System Design Load
1. Provide drywall shaft systems for elevators designed and tested by manufacturer to withstand a lateral loading (air pressure) of 10 lbs. per sq. ft. for the maximum wall height required, and with deflection limited to L/240 of partition height.
 2. Provide standard drywall wall assemblies designed and tested by manufacturer to withstand a lateral load of 5 lbs. per sq. ft. for the maximum wall height required, and with deflection limited to L/240 of partition height.
 - a. Drywall assemblies with tile finish shall have a deflection limit of L/360.
 3. Provide drywall ceiling assemblies designed, fabricated and installed to have a deflection not to exceed L/360.
- F. Fire-Resistance Rating: Where gypsum drywall with fire resistance ratings are indicated, provide materials and installations which are identical with those of applicable assemblies tested per ASTM E 119 by fire testing laboratories, or to design designations in UL "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction, and compliant with UL Test #2079; criteria for cycle movement for all field height wall sections requiring allowance for vertical deflection within framing details.
- G. Installer: Firm with not less than 3 years of successful experience in the installation of specified materials.
- H. For projects located in New York City, comply with New York City Section 32-05 of Chapter 32 of Title 1 of the Official Compilation of the Rules of the City of New York regarding "Impact Resistant Stair and Elevator Enclosures" when such enclosures are of gypsum drywall construction.

1.6 SUBMITTALS

- A. LEED BUILDING Submittal Requirements The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits.
- B. Submit shop drawing for each drywall partition, furring and ceiling system showing size and gauges of framing members, hanger and anchorage devices, wallboard types, insulation, sealant, methods of assembly and fastening, control joints indicating column lines, corner details, joint finishing and relationship of drywall work to adjacent work.
 - C. Samples: Each material specified herein, 12" x 12", or 12" long, or in manufacturer's container, as applicable for type of material submitted.
 - D. Manufacturer's Literature: Submit technical and installation instructions for each drywall partition, furring and ceiling system specified herein, and for each fire-rated and sound-rated gypsum board assembly. Submit other data as required to show compliance with these specifications, including data for mold resistant joint compound.
 - E. Test Reports: This Contractor shall submit test report, obtained by drywall manufacturer, indicating conformance of drywall assemblies to required fire ratings and sound ratings.
 - F. For isolated walls, submittal drawing shall also indicate locations and numbers of sway braces to be employed in the wall. Provide calculations showing that loading of sway braces is in accordance with manufacturer's guidelines.
 - G. For isolation ceilings, submit a ceiling shop drawing showing isolation hanger layout, calculations for isolation hanger load selection and isolation hanger static deflections.

1.7 PRODUCT HANDLING AND PROTECTION

- A. Deliver, store and handle drywall work materials to prevent damage. Deliver materials in their original, unopened containers or bundles, and store where protected from moisture, damage and from exposure to the elements. Store wallboard in flat stacks.
- B. Protect wallboard from becoming wet.

1.8 ENVIRONMENTAL CONDITIONS

- A. Provide and maintain minimum temperature of fifty-five (55) degrees F. and adequate ventilation to eliminate excessive moisture within the building in the area of the drywall work for at least twenty-four (24) hours, prior to, during and after installation of drywall work. Installation shall not start until windows are glazed and doors are installed, unless openings are temporarily closed. Space above suspended ceilings shall be vented sufficiently to prevent temperature and pressure build up.

1.9 JOB MOCK-UP

- A. At a suitable location, where directed by the Commissioner, lay up a portion of a finished wall and ceiling demonstrating the quality of work, including finishing, to be obtained under this Section. Omit drywall boards in locations as directed by the Commissioner to show stud spacing and attachments; after acceptance, complete assembly.
- B. Adjust the finishing techniques as required to achieve the finish required by the Commissioner as described in this Section of these specifications.
- C. Upon approval of the mock-up, the mock-up may be left in place as a portion of the finished work of this Section.
- D. All drywall work shall be equal in quality to approved mock-up.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers for Gypsum Drywall Panels and Accessories: Materials specified below, unless noted otherwise or specified herein, are those of U.S. Gypsum Co. Equivalent materials of Georgia Pacific, Lafarge North America, or National Gypsum Co. meeting specification requirements are acceptable.
- B. Acceptable Manufacturers for Metal Supports of Drywall Assemblies: Unless otherwise noted, provide products manufactured by Dietrich Metal Framing, Super Stud Building Products, Marino/Ware, Clark Western or approved equal.

2.2 METAL SUPPORTS

- A. Metal Floor and Ceiling Runners
 - 1. Channel Type: Formed from 20 U.S. Std. gauge (unless otherwise noted) galvanized steel, width to suit channel type metal studs. Use 20 ga. top runners with 1-1/4" minimum flanges.
 - 2. Ceiling runners and head of wall connections at rated partitions shall conform to UL #2079 for cycle movement. Provide positive mechanical connection of framing to structure, allowing for vertical movement within connections. Minimum of 20 ga. galvanized steel for clips, 25 ga. galvanized steel for ceiling runners. Providing a friction free – anti-seizure movement capacity.
 - a. As manufactured by the Steel Network, VertiClip or VertiTrack or equal made by Metal-Lite Inc.
 - b. FireTrak (including stud clips) by FireTrak Corp. or equal made by Metal-Lite Inc.
 - 3. "J" Type: Formed from 20 U.S. Std. gauge galvanized steel, 1" x 2-1/2" or 4" wide (to suit detail) x 2-1/4" (for shaft wall).

B. Metal Studs, Framing and Furring

1. Channel Type Studs: Channel type with holes for passage of conduit formed from minimum 20 U.S. Std. gauge (unless heavier gauge is required to meet deflection limits) galvanized steel, width as shown on drawings.
2. Furring Channels: Hat shaped, formed from galvanized steel, 25 U.S. Std. gauge.
3. "C-H," "CT," or "I" Type Stud: 1-1/2" x 2-1/2", 4" or 6" wide (to suit detail) galvanized steel. Use for shaft wall construction; gauge and size as required to meet deflection limits given herein.
4. Double "E" Type Stud or "J" Track with Holding Tabs: 2" x 2-1/2", 4" or 6" wide (to suit detail) galvanized steel. Use for shaft wall construction; gauge and size as required to meet deflection limits given herein.
5. Continuous 16 gauge x 8" wide steel wall plate screwed to studs as required for support of railings, toilet partitions and other items supported on drywall partitions and walls.

C. Suspended Ceiling and Fascia Supports

1. Main Runners: 1-1/2" steel channels, cold rolled at 0.475 lbs. per ft., rust-inhibitive paint finish.
2. Furring Members: Screw-type hat-shaped furring channels of 25 ga. zinc-coated steel; comply with ASTM C 645.
3. Hangers: Galvanized, 1" x 3/16" flat steel slats capable of supporting 5x calculated load supported.
4. Hanger Anchorages: Provide inserts, clips, bolts, screws and other devices applicable to the required method of structural anchorage for ceiling hangers. Size devices for 5x calculated load supported.
5. Furring Anchorages: 16 ga. galvanized wire ties, manufacturer's standard clips, bolts or screws as recommended by furring manufacturer.

D. All galvanized steel members shall have coating conforming to ASTM A 653, G60.

2.3 GYPSUM WALLBOARD TYPES

- A. Gypsum Wall Board: 1/2" thick and 5/8" thick as indicated on drawings, 48" wide, in maximum lengths available to minimize end-to-end butt joints.
- B. Fire Rated Gypsum Wall Board: 1/2" thick and 5/8" thick as indicated on drawings, 48" wide, in maximum lengths available to minimize end-to-end butt joints.
- C. Moisture/Mold Resistant Gypsum Wall Board (for areas in toilet rooms, not scheduled to receive ceramic tile and scheduled to receive tile, or where fire rating is required): 1/2" thick and 5/8" thick as indicated on drawings; "Mold Tough," "Mold Tough FR," by U.S. Gypsum, "DensArmor Plus" by Georgia Pacific or Lafarge "Mold Defense" and/or Lafarge "Mold Defense Type X," 48" wide, in maximum lengths available to minimize end-to-end butt joints.

1. Board must have a rating of 10 per ASTM D 3273 with a core that meets ASTM C 1396, Section 6 or ASTM C 1658.
- D. Mold Resistant Shaft Wall Liner: Solid gypsum board liner for shaft wall construction, 1" thick, 24" wide, as required to suit condition, by standard lengths as required, beveled edges. Provide "Mold Tough Liner Panel," "DensGlass Ultra Shaft Guard" by Georgia Pacific, or Lafarge "Mold Defense Shaftliner Type X" and/or Lafarge "Weather Defense Shaftliner Type X."
1. Liner board must have a rating 10 per ASTM D 3273 with a core that meet ASTM C 1396 Section 6 and ASTM C 442.
- E. Water Resistant Backing Board for Tile Finish: 5/8" thick, 3' x 6', "Durock Tile Backer Board" by USG, "Dens-Shield Tile Backer Board" by Georgia Pacific, or "Perma Base Brand Cement Board" by National Gypsum. Cover joints with a pressure sensitive woven glass fiber tape equal to Imperial Type P Tape.
- F. Abuse Resistant Wallboard: 5/8" thick unless otherwise indicated on drawings, "Fiberock Brand Panel VHI Abuse Resistant" by USG, "Dens Armor Plus Abuse Resistant Panels" by Georgia Pacific, or Lafarge "Protects AR100," 48" wide, in maximum lengths available to minimize end-to-end butt joints.
1. Board must achieve a Level 3 rating per ASTM C 1629.

2.4 ACCESSORIES

- A. Acoustical Insulation: Paper-less, non-combustible, semi-rigid mineral fiber mat, 3 lb./cu. ft. maximum density; Thermafiber LLC "Thermafiber," or approved equal.
- B. Fasteners for Wall Board: Steel drill screws complying with ASTM C 1002; provide manufacturer's recommended type specifically for fastening wallboard to lighter gauge interior metal framing (up to 20 ga.); for fastening wallboard to heavier gauge interior metal framing (20 ga. to 12 ga.); for attaching metal studs to door frames and runners; and for fastening wallboard to wall board. Lengths specified below under "Part 3 - Execution" Articles and as recommended by drywall manufacturer.
- C. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- D. Metal Trim: Conforming to ASTM C 1047, 27 U.S. Std. ga. galvanized steel, 1-1/4" x 1-1/4", for 90 degree external corners.
1. Edge Beads: Paper-faced.
 2. Reveal Molding: "Z" Reveal Molding, 1/2", as manufactured by Fry Reglet Corporation, or equivalent of Gordon Inc., Pittcon Industries, or approved equal. Provide J bead for some locations.
- E. Joint Treatment Materials
1. Joint Tape
 - a. Interior Gypsum Board: Paper.
 - b. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

- c. Tile Backing Panels: As recommended by panel manufacturer.
2. Joint Compound: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats. Use setting type or lightweight setting type joint compound for taping and topping, and a ready mix compound for finishing.
 3. Joint Compound for Tile Backing Panels
 - a. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
 - b. Cementitious Backer Units: As recommended by backer unit manufacturer.
 - c. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
- F. Control Joints: #93 zinc control joint; USG, ClarkDietrich, Amico, or approved equal.
- G. Acoustical Sealant: USG "Acoustical Sealant," Tremco "Acoustical Caulking," Pecora "Acoustical Sealant," or approved equal.
- H. Neoprene Gaskets: Conform to ASTM D 1056.
- I. Acoustical Accessories:
1. Neoprene floor isolation.
 2. Floor pads.
 3. Low profile and regular isolation sway braces.
 - a. Neoprene Sway Brace shall prevent buckling or overturning of tall or extremely long walls without direct structural contact. Spacing shall be 4'-0" on center maximum. Neoprene shall be 60 Durometer, and meet the following physical requirements:
 - 1). Hardness (ASTM D 676): 60 \pm 5.
 - 2). Tensile Strength, minimum psi (ASTM D 412): 2,500.
 - 3). Elongation at Break, minimum percent: 350.
 - b. Isolator shall be selected upon ability to satisfy a maximum response frequency of 10 Hz for the composite wall/isolator construction. Manufacturer shall submit calculations of loads and isolator spacings and connection details for approval.
 - c. The following are acceptable: Type DNSB from Mason Industries, Type PSB from Kinetics Noise Control, or approved equal. For areas where clearance will not allow for installation of a standard sway brace, the following low-profile sway braces are acceptable: Type WIC from Mason Industries, Type KWSB from Kinetics Noise Control or approved equal.
 4. Low profile and full height ceiling suspension.
 - a. Combination neoprene element and spring hangers shall consist of a steel frame containing a neoprene isolation element at the top and a coil steel spring seated in a neoprene cup on the bottom. Both the element and the cup shall be molded with a neoprene bushing that passes through the steel frame. The neoprene element shall be capable of an average deflection of

0.35". The steel springs shall be capable of a minimum static deflection of 0.75" with a minimum additional travel to solid of 1/2". Spring diameters and hanger box lower hole size shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the box and short circuiting the spring. Hangers shall be factory precompressed to 70% of the total deflection determined by the assigned load per hanger. Hangers shall be manufactured with provision for bolting or attaching to ceiling flat iron straps, rods or steel runners. Hangers shall be of a fail safe design.

- b. The following are acceptable, subject to the above: Type W30N from Mason Industries Inc., Type RSH-30A from Vibration Mountings and Controls, Type SNRC4 from Vibration Eliminator Company, Type SRH from Kinetics Noise Control, or approved equal. For areas where clearance will not allow for installation of a standard combination hanger, the following low-profile ceiling hangers are acceptable: Type 30CSCH from Mason Industries, Type KSCH from Kinetics Noise Control or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where gypsum drywall is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. 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.
- B. 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.
- C. General
 1. Install drywall work in accordance with drywall manufacturer's printed instructions and as indicated on drawings and specified herein.
 2. All metal framing for drywall partitions shall extend from floor to underside of structural deck above. Provide for vertical deflection with positive mechanical connections of framing members to structure.

3. Provide concealed reinforcement, 16 ga. thick by eight (8) inches wide or as detailed or as recommended by manufacturer, for attachment of railings, toilet partitions, and other items to be supported on the partitions that cannot be attached to the metal framing members. Concealed reinforcement shall span between metal studs and be attached thereto using two (2) self-tapping pan head screws at each stud.
 - a. Back of drywall shall be scored or notched to prevent bulging out where reinforcement plate occurs.
- D. Fire-Rated Assemblies: Install fire-rated assemblies in accordance with requirements of authorities having jurisdiction, Underwriters' Laboratories and test results obtained and published by the drywall manufacturer, for the fire-rated drywall assembly types indicated on the drawings.
- E. Acoustic Assemblies: Install acoustic rated assemblies to achieve a minimum STC as noted on drawings, in accordance with test results obtained and published by the drywall manufacturer, for the drywall assembly type indicated on the drawings.
- F. Sealant
 1. Install continuous acoustical sealant bead at top and bottom edges of wallboard where indicated or required for sound rating as wallboard is installed, and between metal trim edge beads and abutting construction.
 2. Install acoustical sealant in 1/8" wide vertical control joints within the length of the wall or partitions, and in all other joints, specified below under "Control Joints." Install bead of acoustical sealant around electric switch and outlet boxes, piping, ducts, and around any other penetration in the wallboard; place sealant bead between penetrations and edge of wallboard.
 3. Where sealant is exposed to view, protect adjacent surfaces from damage and from sealant material, and tool sealant flush with and in same plane as wallboard surface. Sealant beads shall be 1/4" to 3/8" diameter.
- G. Wall Board Application
 1. Do not install wallboard panels until steel door frames are in place; coordinate work with Section 081113, "Steel Doors and Frames."
 2. See drawings for all board types. Use fire-rated wallboard for fire-rated assemblies. Use water-resistant wallboard where indicated on drawings and where wallboard would be subject to moisture. Install water-resistant wallboard in full, large sheets (no scraps) to limit number of butt joints.
 3. Apply wallboard with long dimension parallel to stud framing members, and with abutting edges occurring over stud flanges.
 4. Install wallboard for partitions from floor to underside of structure above and secure rigidly in place by screw attachment, unless otherwise indicated.
 5. Provide non combustible fire safing insulation meeting standards of Section 078413 at flutes of metal deck where partitions carry up to bottom of metal deck.

6. Neatly cut wallboard to fit around outlets, switch boxes, framed openings, piping, ducts, and other items that penetrate wallboard; fill gaps with acoustic sealant.
7. Where wallboard is to be applied to curved surfaces, dampen wallboard on back side as required to obtain required curve. Finish surface shall present smooth, even curve without fluting or other imperfections.
8. Screw fasten wallboard with power-driven electric screw driver, screw heads to slightly depress surface of wallboard without cutting paper, screws not closer than 3/8" from ends and edges of wallboard.
9. Where studs are doubled-up, screw fasten wallboard to both studs in a staggered pattern.

H. Cement Backer Board

1. General: Furnish cementitious backer board in maximum available lengths. Install horizontally, with end joints over framing members.
2. Fastening: Secure cementitious backer board to each framing member with screws spaced not more than 12 inches on center and not closer than 1/2" from the edge. Install screws with a conventional screw gun so that the screw heads are flush with the surface of the board.
3. Joint Treatment: Fill space between edge of backer and receptor with dry-set Portland cement or latex-Portland cement mortar. Fill all horizontal and vertical joints and corners with dry-set Portland cement or latex-Portland cement mortar. Apply fiberglass tape over joints and corners and embed with same mortar.

I. Metal Trim: Install and mechanically secure in accordance with manufacturer's instructions; and finish with three (3) coats of joint compound, feathered and finish sanded smooth with adjacent wallboard surface, in accordance with manufacturer's instructions.

1. Corner Beads: Install specified corner beads in single lengths at all external corners, unless corner lengths exceed standard stock lengths.
2. Edge Beads: Install specified edge beads in single lengths at all terminating edges of wallboard exposed to view, where edges abut dissimilar materials, where edges would be exposed to view, and elsewhere where shown on drawings. Where indicated on drawings, seal joint between metal edge bead and adjoining surface with specified gasket, 1/8" wide minimum and set back 1/8" from face of wallboard, unless other size and profile indicated on drawings.
3. Casing beads shall be set in long lengths, neatly butted at joints. Provide casing beads at juncture of board and vertical surfaces and at exposed perimeters.

J. Control Joint Locations: Gypsum board surfaces shall be isolated with control joints where:

1. Ceiling abuts a structural element, dissimilar wall or other vertical penetration.
2. Construction changes within the plane of the partition or ceiling.

3. Shown on approved shop drawings.
4. Ceiling dimensions exceed thirty (30) feet in either direction.
5. Wings of "L," "U," and "T" shaped ceiling areas are joined.
6. Expansion or control joints occur in the structural elements of the building.
7. Shaftwall runs exceed 30' without interruption.
8. Partition or furring abuts a structural element or dissimilar wall or ceiling.
9. Partition or furring runs exceed 30' without interruption.
10. Where control joints are required, ceiling height door frames may be used as control joints. Less than ceiling height frames shall have control joints extending to the ceiling from both corners.

K. Joint Treatment and Spackling

1. Joints between face wallboards in the same plane, joints at internal corners of intersecting partitions and joints at internal corners of intersections between ceilings and walls or partitions shall be filled with joint compound.
2. Screw heads and other depressions shall be filled with joint compound. Joint compound shall be applied in three (3) coats, feathered and finish surface sanded smooth with adjacent wallboard surface, in accordance with manufacturer's instructions. Treatment of joints and screw heads with joint compound is also required where wallboard will be covered by finish materials that require a smooth surface, such as vinyl wall coverings.

3.3 FURRED WALLS AND PARTITIONS

- A. Use specified metal furring channels. Run metal furring channel framing members vertically, space sixteen (16) inches o.c. maximum. Fasten furring channels to concrete or masonry surfaces with power-driven fasteners or concrete stub nails spaced sixteen (16) inches o.c. maximum through alternate wing flanges (staggered) of furring channel. Furring channels shall be shimmed as necessary to provide a plumb and level backing for wallboard. At inside of exterior walls, an asphalt felt protection strip shall be installed between each furring channel and the wall. Furring channel and splices shall be provided by nesting channels at least eight (8) inches and securely anchoring to concrete or masonry with two (2) fasteners in each wing.
- B. Wallboard Installation: Same as specified under Article 3.4 - "Metal Stud Partitions."

3.4 METAL STUD PARTITIONS

- A. Runner Installation: Use channel type. Align accurately at floor according to partition layout. Anchor runners securely sixteen (16) inches o.c. maximum with power-driven anchors to floor slab below and with power-driven anchors to structural slab above. See "Stud Installation" below for runners over heads of metal door frames. Where required, carefully remove sprayed-on fireproofing to allow partition to be properly installed.
- B. Stud Installation

1. Use channel type, positioned vertically in runners, spaced as noted on drawings, but not more than sixteen (16) inches o.c.
 2. Anchor studs to floor runners with screw fasteners. Provide snap-in or slotted hole slip joint bolt connections of studs to ceiling runners leaving space for movement. Anchor studs at partition intersections, partition corners and where partition abuts other construction to floor and ceiling runners with sheet metal screws through each stud flange and runner flange.
 3. Connection at ceiling runner for non-rated partitions shall be snap-in or slotted hole slip joint bolt connection that shall allow for movement. Seal studs abutting other construction with 1/8" thick neoprene gasket continuously between stud and abutting construction.
 4. Connections for fire rated partitions at ceiling runners shall conform to UL Design #2079.
 5. Install metal stud horizontal bracing wherever vertical studs are cut or wallboard is cut for passage of pipes, ducts or other penetrations, and anchor horizontal bracing to vertical studs with sheet metal screws.
 6. At jambs of door frames and borrowed light frames, install doubled-up studs (not back to back) from floor to underside of structural deck, and securely anchor studs to jamb anchors of frames and to runners with screws. Provide cross braces from hollow metal frames to underside of slab.
 7. Over heads of door frames, install cut-to-length section of runner with flanges slit and web bent to allow flanges to overlap adjacent vertical studs, and securely anchor runner to adjacent vertical studs with sheet metal screws. Install cut-to-length vertical studs from runner (over heads of door frame) to ceiling runner sixteen (16) inches maximum o.c. and at vertical joints of wallboard, and securely anchor studs to runners with sheet metal screws.
 8. At control joints, in field of partition, install double-up studs (back to back) from floor to ceiling runner, with 1/4" thick continuous compressible gasket between studs. When necessary, splice studs with eight (8) inches minimum nested laps and attach flanges together with two (2) sheet metal screws in each flange. All screws shall be self-tapping sheet metal screws.
- C. Runners and Studs at Chase Wall: As specified above for "Runners" and "Studs" and as specified herein. Chase walls shall have either a single or double row of floor and ceiling runners with metal studs sixteen (16) inches o.c. maximum and positioned vertically in the runners so that the studs are opposite each other in pairs with the flanges pointing in the same direction. Anchor all studs to runner flanges with sheet metal screws through each stud flange and runner flange following requirements of paragraph 3.4, B. Provide cross bracing between the rows of studs by attaching runner channels or studs set full width of chase attached to vertical studs with one self-tapping screw at each end. Space cross bracing not over thirty-six (36) inches o.c. vertically.
- D. Wallboard Installation - Single Layer Application (Screw Attached)
1. Install wallboard with long dimension parallel to framing member and with abutting edge joints over web of framing member. Install wallboard with long dimension perpendicular to framing members above and below openings in drywall extending

to second stud at each side of opening. Joints on opposite sides of wall shall be arranged so as to occur on different studs.

2. Boards shall be fastened securely to metal studs with screws as specified. Where a free end occurs between studs, back blocking shall be required. Center abutting ends over studs. Correct work as necessary so that faces of boards are flush, smooth, true.
3. Wallboard screws shall be applied with an electric screw gun. Screws shall be driven not less than 3/8" from ends or edges of board to provide uniform dimple not over 1/32" deep. Screws shall be spaced twelve (12) inches o.c. in the field of the board and 8" o.c. staggered along the abutting edges.
4. All ends and edges of wallboard shall occur over screwing members (studs or furring channels). Boards shall be brought into contact but shall not be forced into place. Where ends or edges abut, they shall be staggered. Joints on opposite sides of a partition shall be so arranged as to occur on different studs.
5. At locations where piping receptacles, conduit, switches, etc., penetrate drywall partitions, provide non-drying sealant and an approved sealant stop at cut board locations inside partition.

E. Wallboard Installation - Double-Layer Application

1. General: See drawings for wallboard partition types required.
2. First Layer (Screw Attached): Install as described above for single layer application.
3. Second Layer (Screw Attached): Screw attach second layer, unless laminating method of attachment indicated on drawings or necessary to obtain required sound rating or fire rating. Install wallboard vertically with vertical joints offset thirty-four (34) inches from first layer joints and staggered on opposite sides of wall. Attach wallboard with 1-5/8" screws sixteen (16) inches o.c. along vertical joints and sixteen (16) inches o.c. in the field of the wallboard. Screw through first layer into metal framing members.
4. Second Layer (Laminated): Install wallboard vertically. Stagger joints of second layer from first layer joints. Laminate second layer with specified laminating adhesive in beads or strips running continuously from floor to ceiling in accordance with manufacturer's instructions. After laminating, screw wallboard to framing members with 1-5/8" screws, spaced twelve (12) inches o.c. around perimeter of wallboard.

F. Wallboard Installation - Laminated Application: Where laminated wallboard is indicated, use specified laminating adhesive, install wallboard vertically and maintain tolerances as specified for screw attached wallboard.

G. Insulation Installation: Install where indicated on drawings. Place blanket tightly between studs.

H. Deflection of Structure Above: To allow for possible deflection of structure above partitions, provide top runners for non-rated partitions with 1-1/4" minimum flanges and do not screw studs or drywall to top runner. Where positive anchorage of studs to top

runner is required, anchorage device shall be by means of slotted hole (in clip connection with screw attachment to web of steel through bushings located in slots of clips), or other anchorage device approved by the Commissioner.

I. Control Joints

1. Leave a 1/2" continuous opening between gypsum boards for insertion of surface mounted joint.
2. Back by double framing members.
3. Attach control joint to face layer with 9/16" galvanized staples six (6) inches o.c. at both flanges along entire length of joint.
4. Provide two (2) inch wide gypsum panel strip or other adequate seal behind control joint in fire rated partitions and partitions with safing insulation.

3.5 DRYWALL FASCIAS AND CEILINGS

- A. Furnish and install inserts, hanger clips and similar devices in coordination with other work.
- B. Secure hangers to inserts and clips. Clamp or bolt hangers to main runners.
- C. Space main runners 4'-0" o.c. and space hangers 4'-0" o.c. along runners, except as otherwise shown.
- D. Level main runners to a tolerance of 1/4" in 12'-0", measured both lengthwise on each runner and transversely between parallel runners.
- E. Metal Furring Channels: Space sixteen (16) inches o.c. maximum. Attach to 1-1/2" main runner channels with furring channel clips (on alternate sides of main runner channels). Furring channels shall not be let into or come in contact with abutting masonry walls. End splices shall be provided by nesting furring channels no less than eight (8) inches and securely wire tying. At any openings that interrupt the furring channels, install additional cross reinforcing to restore lateral stability.
- F. Mechanical accessories, hangers, splices, runner channels and other members used in suspension system shall be of metal, zinc coated, or coated with rust inhibitive paint, of suitable design and of adequate strength to support units securely without sagging, and such as to bring unit faces to finished indicated lines and levels.
 1. Provide special furring where ducts are over two (2) feet wide.
- G. Apply board with its long dimension at right angles to channels. Locate board butt joints over center of furring channels. Attach board with one (1) inch self-drilling drywall screws twelve (12) inches o.c. in field of board at each furring channel; eight (8) inches o.c. at butt joints located not less than 3/8" from edges.

3.6 SHAFT WALLS

- A. Runner Installation: Use "J" metal runners at floor and ceiling, with the short leg toward finish side of wall. Securely attach runners to structural supports with power-driven fasteners at both ends and twenty-four (24) inches o.c.

- B. Shaft Wall Liner: Cut shaft wall liner panels one (1) inch less from floor to ceiling height and erect vertically between J-runners.
- C. C-H Studs: Cut metal studs 3/8" to not more than 1/2" less than floor to ceiling height and install between shaft wall liner panels so that panels are fitted snugly into the one (1) inch wide "H", "T" or "I" portion of the stud. Space studs twenty-four (24) inches o.c., unless otherwise indicated on drawings. Install full-length steel E-Studs or J-runners vertically at T-intersections, corners, door jambs, and columns. Install full length E-Studs or J-runners over shaft wall liner both sides of closure panels. Frame openings cut within a liner panel with J-Runner around perimeter. For openings, frame with vertical E-Stud or J-runner at edges, horizontal runner at head and sill, and reinforcing as shown on the drawings. Suitably frame all openings to maintain structural support for wall. Install floor-to-ceiling steel E-Studs or J-runners each side of elevator door frames to act as strut-studs. Attach strut-stud to floor and ceiling runners with two (2) 3/8" Type S screws, space twelve (12) inches o.c. Over metal doors, install a cut to length section of runner and attach to strut-studs with clip angles and 3/8" Type S Screws space twelve (12) inches o.c.
- D. Wallboard Installation - Double Layer Installation: Erect gypsum wallboard base layer horizontally one side of studs with end joints staggered. Fasten base layer panels to studs with one (1) inch Type S screws twenty-four (24) inches o.c. Caulk perimeter of base layer panels. Apply gypsum wallboard face layer vertically over base layer with joints staggered and attached with 1-5/8" Type S screws staggered from those in base, spaced eight (8) inches o.c. and driven into studs.
- E. Wallboard Installation (Where Both Sides of Shaft Wall are Finished): Apply gypsum wallboard face layers vertically both sides of studs. Stagger joints on opposite partition sides. Fasten panels with one (1) inch or two (2) inches Type S screws spaced eight (8) inches o.c. in field and along edges into studs.
- F. Cants: Provide one (1) inch thick shaft wall liner, cut to suit condition, at beams and other projections wider than two (2) inches in elevator shafts. Cants shall slope seventy-five (75) degrees from the horizontal. Screw attach shaft wall liner to the vertical metal studs.
- G. Support elevator hoistway door frames independently of drywall shaft framing system, or reinforce system in accordance with system manufacturer's instructions.
- H. Where handrails are indicated for direct attachment to drywall shaft system, provide not less than a sixteen (16) ga. x eight (8) inches wide galvanized steel reinforcement strip, accurately positioned and secured to studs and concealed behind not less than one 1/2" thick course of gypsum board in the system.
- I. Integrate stair hanger rods with drywall shaft system by locating cavity of system as required to enclose rods.

3.7 ERECTION AT COLUMN ENCLOSURES

- A. Metal furring supports shall be provided under work of this Section, and shall be cut to lengths as necessary for tight fit such that spacing is not more than sixteen (16) inches o.c.
- B. Board shall be fastened securely to supports with screws as specified. Place boards in position with minimum amount of joints. Where free ends occur between supports,

back-blocking or furring shall be required. Center abutting ends over supports. Correct work as necessary so that faces of boards are flush, smooth and true. Provide clips or cross furring for attachment as required.

- C. All layers shall be screw attached to furring.
- D. When column finish called for on drawings to be in the same plane as drywall finish layer, maintain even, level plane.

3.8 ISOLATED WALL CONSTRUCTION

- A. Where walls are indicated to be supported using sway braces, bottom track shall be supported on floating wood floor assembly (Floor Type F5). Top track shall not be attached to underside of slab above but shall float free of structure. Vertical height of wall framing shall be supported using sway braces per manufacturers guidelines.

3.9 ISOLATION CEILING CONSTRUCTION

- A. Locate and layout suspension hangers for elements that are to be suspended below the isolation ceiling such as ducts, sprinkler piping and the like. Ensure that these hanger extend at least 6-inches below the plane of the finished isolation ceiling (or more if required by the elevation of the item being supported below the ceiling). Note that suspension hangers that penetrate the isolation ceiling may only be round or square in section. Angle section or flat section hangers are not permitted. Ensure that all suspension are hanging plumb and true.
- B. Locate and layout isolation hangers in accordance with the approved isolation ceiling shop drawings. Ensure that hangers are vertical and that they do not rub against pipe, duct, ceiling beams or other adjacent constructions.
- C. Connect straps or wires between lower end of hangers and structural channels that are located as described on the drawings. At the perimeter of the space, structural channels shall be provided within 6" of perimeter walls. Position channels for proper ceiling height, level and secure. Provide 1" clearance between channels and abutting walls. If necessary apply perimeter isolation board at the perimeter walls to ensure that channels, furring and/or drywall do not contact adjacent walls. Verify that all hangers for ducts, fixtures or other elements to be hung beneath the isolation ceiling layer are already in place.
- D. Erect metal furring channels at right angles to the structural channels. Space furring 2'-0" on center or as otherwise described in the drawings and within 6" of walls. Provide 1" clearance between furring ends and abutting walls. Secure furring to carrying channels with clips or saddle tie to supports using double-strand 18-gauge tie wire. At splices, nest or overlap furring channels at least 8" and securely wire-tie each end with double-strand 18-gauge tie wire.
- E. Pre-cut or pre-drill (or pre-mark for drilling) the 5/8" thick gypsum boards to allow passage of penetrations through the ceiling. Apply gypsum board of maximum practical length with long dimension at right angles to furring channels. Position end joints over channel web and stagger in adjacent rows. Fit ends and edges closely, but not forced together. Fasten panels to channels with 1" screws spaced 12" on center in field of panels and along abutting ends and edges. Progressively locate 4-inch thick acoustical insulation across ceiling above base layer as base layer is installed.

- F. Apply face layer of 5/8" thick gypsum board to base layer with joints staggered in both directions by 24". Face layer shall be strip laminated to base layer with lamination strips offset from screws. Face layer shall be screwed 24" on center at perimeter and in field.
- G. Spacers, 1/4" thick, shall be used to keep the isolation ceiling away from walls, columns and any other rigid interface. After the ceiling has been hung, the spacers shall be removed. If at any time the ceiling then shifts and touches a rigid interface structure, that portion of the ceiling must be rehung and reassembled so as to be plumb and true.
- H. Penetrations of sound isolation ceilings should be minimized to the greatest extent possible. Where they are required, these penetrations shall be sealed as follows:
 - 1. If the object is attached to the framing of the floating ceiling, (such as light fixtures) then the penetration should be caulked in place. This way all objects move together and there are no sound leaks. Light fixtures should be surface or pendant mounted with only conduit penetration. If fixtures must be recessed, then the gypsum board must wrap around the fixture box on all sides on the top of the ceiling.
 - 2. If the object is attached to the building structure (not floating) or is capable of independent movement from the ceiling (pipes, duct) then an oversized hole by 1/2" all around should be left. After the gypsum board has been installed, pack the gap around the penetrating element with mineral wool insulation for the full depth of the gypsum board. Trim mineral wool flush with face of the underside of the gypsum board and caulk with acoustical sealant.

3.10 FINISHING

- A. Taping: A thin, uniform layer of compound shall be applied to all joints and angles to be reinforced. Reinforcing tape shall be applied immediately, centered over the joint, seated into the compound. A skim coat shall follow immediately, but shall not function as a fill or second coat. Tape shall be properly folded and embedded in all angles to provide a true angle.
- B. Filling: After initial coat of compound has hardened, additional compound shall be applied, filling the board taper flush with the surface. The fill coat shall cover the tape and feather out slightly beyond the tape. On joints with no taper, the fill coat shall cover the tape and feather out at least four (4) inches on either side of the tape. No fill coat is necessary on interior angles.
- C. After compound has hardened, a finishing coat of compound shall be spread evenly over and extending slightly beyond the fill coat on all joints and feathered to a smooth, uniform finish. Over tapered edges, the finished joint shall not protrude beyond the plane of the surface. All taped angles shall receive a finish coat to cover the tape and taping compound, and provide a true angle. Where necessary, sanding shall be done between coats and following the final application of compound to provide a smooth surface, ready for painting.
- D. Fastener Depressions: Compound shall be applied to all fastener depressions followed, when hardened by at least two (2) coats of compound, leaving all depressions level with the plane of the surface.

- E. Finishing Beads and Trim: Compound shall be applied to all bead and trim and shall be feathered out from the ground to the plane of the surface. When hardened, this shall be followed by two (2) coats of compound each extending slightly beyond the previous coat. The finish coat shall be feathered from the ground to the plane of the surface and sanded as necessary to provide a flat, smooth surface ready for decoration.
- F. Level of finish for surface exposed to view shall conform to Level 5 of ASTM C 840 and GA-214 of the Gypsum Association.
- G. Drywall construction with defects of such character which will mar appearance of finished work, or which is otherwise defective, will be rejected and shall be removed and replaced at no expense to the City of New York.

3.11 CLEANING AND ADJUSTMENT

- A. At the completion of installation of the work, all rubbish shall be removed from the building leaving floors broom clean. Excess material, scaffolding, tools and other equipment shall be removed from the building.
- B. Work shall be left in clean condition ready for painting or wall covering. All work shall be as approved by the Commissioner.
- C. Cutting and Repairing: Include all cutting, fitting and repairing of the work included herein in connection with all mechanical trades and all other trades which come in conjunction with any part of the work, and leave all work complete and perfect after all trades have completed their work.

3.12 PROTECTION OF WORK

- A. Installer shall advise Contractor of required procedures for protecting drywall work from damage and deterioration during remainder of construction period.

3.13 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 093013

CERAMIC TILING

PART 1. GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the ceramic tiling work as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Ceramic mosaic floor tile.
 - 2. Ceramic glazed wall tile and matching base.
 - 3. Stone thresholds.
 - 4. Setting beds, grout, sealant and waterproofing membrane.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Gypsum drywall - Section 092900, for tile backing board.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. Qualifications of Installers: For cutting, installing and grouting of ceramic tile, use only thoroughly trained and experienced journeyman tile setters who are completely familiar with the requirements of this work, and the recommendations contained in the referenced standards.

- C. Adhesives: "Green Seal Environmental Standard for Certification of Commercial Adhesives" (GS-36), Green Seal, Inc., Washington, DC, <http://www.greenseal.org>
- D. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the following:
 - 1. Manufacture all ceramic tile in accordance with Standard Grade Requirements of ANSI A-137.1.
 - 2. Install all ceramic tile in accordance with the recommendations contained in Handbook for Ceramic Tile Installation of the Tile Council of America, Inc., latest edition.

1.5 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications.
 - 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 - 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 - 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 - 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Commissioner for review.
- B. Samples
 - 1. Before any ceramic tile is delivered to the job site, submit to the Commissioner sample panels, approx. 12" x 12", mounted on hardboard back-up with selected grout color for each color and pattern of ceramic tile and grout specified.
 - 2. Submit 6" length of stone thresholds.
 - 3. Submit 12" x 12" samples of waterproofing membrane.

- C. Master Grade Certificates: Prior to opening ceramic tile containers, submit to the Commissioner a Master Grade Certificate, signed by an officer of the firm manufacturing the ceramic tile used, and issued when the shipment is made, stating the grade, kind of tile, identification marks for tile containers, and the name and location of the project.
- D. Manufacturer's certification of recycled content per section 2.1 of this specification.
- E. Manufacturer's certification of lead-free glazings (for glazed tiles) per section 2.1 of this specification.
- F. Manufacturer's certification of product compliance with adhesive standards per section 2.1 of this specification (for mastic-set applications).
- G. Manufacturer's certification of product compliance with VOC limits for mortars and grouts per section 2.1 of this specification.
- H. Material Safety Data Sheets.
- I. Manufacturer's maintenance and cleaning instructions.
- J. Manufacturer's policy statement on ceramic tile recycling programs.
- K. Mock-Ups
 - 1. At an area on the site where approved by the Commissioner, provide a mock-up ceramic tile installation.
 - a. Make the mock-up approximately 36" x 36" in dimension.
 - b. Provide one mock-up for each type, class, and color of installation required under this Section.
 - c. The mock-ups may be used as part of the Work, and may be included in the finished Work when so approved by the Commissioner.
 - d. Revise as necessary to secure the Commissioner's approval.
 - 2. The mock-ups, when approved by the Commissioner, will be used as datum for comparison with the remainder of the work of this Section for the purposes of acceptance or rejection.
 - 3. If the mock-up panels are not permitted to be part of the finished Work, completely demolish and remove them from the job site upon completion and acceptance of the work of this Section.

1.6 PRODUCT HANDLING

A. Delivery and Storage

- 1. Deliver all materials of this Section to the job site in their original unopened containers with all labels intact and legible at time of use.
- 2. Store all materials under cover in a manner to prevent damage and contamination; store only the specified materials at the job site.

- B. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and to protect the installed work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.
- C. Maintain temperatures at not less than 50 deg. F. in tiled areas during installation and for 7 days after completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS OF TILE

- A. Provide tile manufactured by American Olean, or approved equal meeting these specifications. The Commissioner reserves the right to pick tile from any price group.
- B. Tile in the public restrooms (F-4)
 - 1. Company: Pinocchi
 - 2. Product: Pino 24" x 48"
 - 3. Source: Stone Source
- C. Wall tile (T-1):
 - 1. Company: Mosa Tile
 - 2. Product: 13210 (10 x 30 CM) Matte White
 - 3. Source: Town and Country Flooring.

2.2 WALL TILE AND BASE (T-2)

- A. Cushion edge units, matte glazed, and 6" x 6" x 1/4" thick, American Olean in colors as scheduled on the drawings.
- B. Provide sanitary cove base for floor/wall transition, and bullnose tile for top trim.

2.3 FLOOR TILE (F-4B)

- A. Provide 2" x 2" porcelain type ceramic mosaic floor tile with all-purpose edge in color and pattern as scheduled on the drawings. Tile to have water absorption not to exceed 0.5%.

2.4 TRIM AND SPECIAL SHAPES

- A. Provide external and internal corners, trim shapes at openings, and all other trim and special shapes to match the tile specified herein, as required by field conditions and drawing details.

2.5 STONE THRESHOLDS

- A. Marble: Provide sound Group "A" white marble complying with ASTM C 503, min. 3/4" thick.
- B. Stone thresholds shall have an abrasive hardness of not less than 10.0, when tested in accordance with ASTM C 241. Cut saddle to fit jamb profile, honed finish.

2.6 SETTING BEDS AND GROUT

- A. Portland Cement: ASTM C 150, Type 1.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Sand: ASTM C 144, clean and graded natural sand.
- D. Reinforcing for Mud Set Systems: 2" x 2" x 16/16 ga. welded wire mesh.
- E. Latex Additives: As manufactured by Laticrete or Mapei as follows:
 - 1. Laticrete 272 premium floor and wall thin set mortar, fortified with Laticrete 333 Mortar Admix.
 - 2. Mapei Kerabond thin set mortar, fortified with Ker 310 Keralastic System additive.
- F. Wall and Base Tile
 - 1. Over cement board use a Latex Portland cement mortar bond coat conforming to ANSI A118.4 and TCA Detail W-244; coat back of board with waterproof membrane as specified below.
 - 2. Over glass mat water resistant gypsum backer board use a Latex Portland cement mortar bond coat conforming to ANSI A118.4 and TCA Detail W-245.
- G. Floor Tile and Threshold - Thin Set with Waterproof Setting Bed: Set floor tile and threshold using thin set latex Portland cement bond coat conforming to ANSI A118.4 and waterproofing membrane conforming to TCA Detail F-122. Use this system where toilet room occurs over occupied space other than another toilet room and wherever else noted on drawings.
- H. Waterproofing Membrane: "Laticrete 9235 with Microban" made by Laticrete International or approved equal by Mapei.
- I. Water: Clean, fresh and suitable for drinking.
- J. Grout: For grouting ceramic tile, provide a commercial Portland cement grout made by Laticrete, Mapei, or approved equal; color as selected by the Commissioner. Add latex additive to grout made by same manufacturer as grout.

- K. **Physical Properties:** The setting beds and grouts must meet the following physical requirements:
1. Compressive Strength: 3000 psi min.
 2. Shear Bond Strength: 500 psi min.
 3. Water Absorption: 4.0% max.
 4. Service Rating (ASTM C 627): Extra Heavy Duty.
- L. **Sealer:** Seal all grout joints and all unglazed tile using No. 004 "Keraseal Penetrating Sealer for Unglazed Grout and Tile" as manufactured by Mapei Corp. or approved equal.
- M. **Temporary Protective Coating:** Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil, with a melting point of 120 to 140 deg. F. per ASTM D 87.
 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- N. **Tile Cleaner:** A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.7 SEALANT

- A. **Joint Backing:** Preformed, compressible, resilient, non-extruding, non-staining strips of foam neoprene, foam polyethylene, or other material recommended by sealant manufacturer.
- B. **Bond Breaker:** Polyethylene tape, 3 mils thick, or other material recommended by sealant manufacturer.
- C. **Sealant Primer:** Colorless, non-staining, or type to suit substrate surface, as recommended by sealant manufacturer.
- D. **Sealant:** One-part silicone based sanitary sealant, conforming to ASTM C 920, Type S, Grade NS, Class 25. Sealant hardness upon full cure shall be between 20-30 Shore "A" Durometer. Color of sealant to blend with or match adjacent materials, and as selected by the Commissioner. Sealant shall be equivalent to 1700 Sanitary Sealant made by General Electric or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where ceramic tile is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 CONDITION OF SURFACES

- A. Allowable Variations in Substrate Levels in Floors: + 1/8" in 10'-0" distance and 1/4" total max. variation from levels shown.
- B. Grind or fill concrete and masonry substrates as required to comply with allowable variations.

3.3 PREPARATION

- A. Steel trowel and fine broom finish concrete slabs that are to receive ceramic tile. Cure concrete slabs that are to receive tile before tile application. Do not use liquid curing compounds or other coatings that may prevent bonding of tile setting materials to slabs. Slab shall be dry at time of tile installation.
- B. Etch concrete substrate as may be required to remove curing compounds or other substances that would interfere with proper bond of setting bed. Rinse with water to remove all traces of treatment.
- C. Seal substrate with sealer as recommended by manufacturer of mortar or adhesive.

3.4 JOINTS IN TILE WORK

- A. Joint Widths: 1/16" wide in ceramic tile.
- B. Alignment: Wall, base and floor joints shall align through the field and trim. Direction and location of all joints as directed by Commissioner.
- C. Movement Joints: Conform to TCA Detail EJ171. Locate where movement joints are in back-up material. Provide movement joint at joints between mop receptors and ceramic tile. Provide movement joint at all vertical internal joints of wall tile. Movement joints 1/8" wide in ceramic tile. Fill all movement joints with specified backing and sealant. Use bond breaker where sufficient space for joint backing does not exist.
 - 1. Provide sealant between ceramic tile and plumbing fixtures, mirrors, pipes, countertops and other dissimilar materials penetrating or adjacent to ceramic tile.

3.5 INSTALLATION

- A. Comply with the following installation standards
 - 1. Wall tile over cement board or glass mat backer board using dry set mortar - ANSI A108.5 and A108.10.
 - 2. Floor tile over waterproofing membrane - ANSI A108.5 and A108.10.

- B. Allowable Variations in Finished Work: Do not exceed the following deviations from level and plumb, and from elevations, locations, slopes and alignment shown.
 - 1. Floors: 1/8" in 10'-0" run, any direction; +/- 1/8" at any location; 1/32" offset at any location.
 - 2. Walls: 1/8" in 8'-0" run, any direction; 1/8" at any location; offset at any location, 1/32".
 - 3. Joints: +/- 1/32" joint width variation of any location; 1/16" in 3'-0" run deviation from plumb and true.
- C. Waterproofing Membrane
 - 1. Install the membrane in strict accordance with manufacturer's written recommendations.
 - 2. Upon completion of work, test horizontal membrane for leaks by plugging the drain or damming areas and filling with water. Inspect for leakage. Make necessary adjustments to stop all leakage and retest until watertight. If membrane is not covered by another surface immediately, provide protection until membrane is covered.
- D. Handle, store, mix and apply setting and grouting materials in compliance with the manufacturer's instructions.
- E. Extend tile work into recesses and under equipment and fixtures, to form a complete covering without interruptions. Terminate work neatly at obstructions, edges and corners without disruption of pattern or joint alignment.
- F. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight, aligned joints. Fit tile closely to electrical outlets, piping and fixtures so that plates, collars, or covers overlap tile.
- G. Lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are the same size. Lay out tile work and center tile fields both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths.

3.6 INSTALLATION OF STONE THRESHOLDS

- A. Install stone thresholds cut to profiles and sizes shown, accurately fitted to jambs, coped at stops, set in full bed of mortar herein specified, and with grouted edge joints as specified for floor tile.

3.7 CLEANING AND PROTECTION OF CERAMIC TILE

- A. Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but not sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.

- B. Apply to all clean completed tile walls and floors a protective coating of neutral cleaner solution, 1 part cleaner to 1 part water.
- C. Leave finished installation clean and free of cracked, chipped, broken, unbonded or otherwise defective tile work.
- D. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent damage and wear. Prohibit foot and wheel traffic from using tiled floors for at least 3 days after grouting is completed. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.8 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.

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SECTION 096400

WOOD FLOORING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the wood strip flooring, as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Wood strip flooring and base.
 - 2. Hardboard for use at floors of Theaters 1 and 2.
 - 3. Plywood subflooring.
 - 4. Accessories, including acoustical underlayment.
 - 5. Field finishing of wood flooring.

1.3 RELATED SECTIONS

- A. Waste Management Requirements – Section 017419.
- B. Sustainable Design Requirements – Section 018113.
- C. VOC Limits for Adhesives, Sealants and Architectural Coatings – Section 018114.
- D. Indoor Air Quality Requirements – Section 018119.
- E. Concrete slab - Section 033000.
- F. Carpentry - Section 062000.

1.4 SUBMITTALS

A. LEED BUILDING SUBMITTAL REQUIREMENTS

- 1. The Contractor and their sub-contractors shall submit the LEED BUILDING Certification items listed herein. LEED BUILDING Submittals shall include the following:
 - a. For all installed products and materials of this Section, complete the ENVIRONMENTAL MATERIALS REPORTING FORM (blank copy attached at end of Section 018113 "Sustainable Design Requirements"). Information to be supplied for this Form shall include:
 - 1) Cost breakdowns for the materials included in the Contractor or sub-contractor's work. Cost breakdowns shall include total installed cost and material-only cost.

- 2) The percentages (by weight) of post-consumer and/or post-industrial recycled content in the supplied product(s).
 - 3) Indication (Y/N) of whether the raw materials have been extracted, harvested or recovered, as well as the final product has been manufactured (location of final assembly), within 500 miles of the project site.
 - 4) For all field-applied interior adhesives, sealants, and paints relating to work of this Section, provide the Volatile Organic Compound (VOC) content in grams/liter or lbs./gallon.
- b. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the product information supplied for the ENVIRONMENTAL MATERIALS CERTIFICATION FORM.
 - c. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as stated below. Cut sheets shall be submitted with the Construction Manager or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 - d. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
2. The LEED BUILDING Submittal information outlined above shall be assembled into one (1) package per Specification section or sub-contractor. Incomplete or inaccurate LEED Submittals may be used as the basis for rejecting the submitted products or assemblies.
- B. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
 - C. Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
 - D. Maintenance Data: Submit manufacturer's maintenance data, including maintenance schedule.
 - E. Extra Stock: Submit extra stock equal to 2% of total used.

1.5 QUALITY ASSURANCE

- A. LEED BUILDING PERFORMANCE CRITERIA: Products of this Section shall meet the following requirements and shall be documented in accordance with the LEED BUILDING SUBMITTAL REQUIREMENTS of this Section:
 1. Products of this Section which have been extracted, harvested or recovered, as well as manufactured (location of final assembly), within 500 miles of the project site shall be identified and documented.
 2. Field-applied interior adhesives, sealants, and paints relating to work of this Section shall meet the requirements of Section 018114 "VOC Limits for Adhesives, Sealants and Architectural Coatings," and shall be identified and documented.

3. Certification of criteria shall be in accordance with the Submittal Requirements of this section.
- B. Installer Qualifications: Specialized wood flooring firm with not less than three (3) years' successful experience in installation of types specified, and acceptable to manufacturer of wood flooring.
- C. General Standard: Comply with recommendations of National Wood Flooring Association (WFA) Installation Guidelines.
- D. Source Quality Control: Obtain flooring of each type from single manufacturer or source, to ensure match of quality, color, pattern and texture.
- E. Field-Constructed Mock-Up: Prior to installing wood flooring and trim, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for completed work.
 1. Build mock-ups of wood flooring and each type of trim, in the form, dimensions, and location designated by the Commissioner.
 2. Notify Commissioner one week in advance of the dates and times when mock-ups will be erected.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Modify or reinstall mock-ups as required to obtain Commissioner's acceptance. Simulate finished lighting conditions for reviewing mock-ups.
 5. Obtain Commissioner's acceptance of mock-ups before start of final unit of work.
 6. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of work. When directed, demolish and remove mock-ups from project site, except that accepted in place mock-ups in undisturbed condition at the time of Substantial Completion may become part of completed unit of work.
- F. The Contractor shall furnish a letter from the adhesive manufacturer stating that the concrete substrate has been tested for moisture vapor transmission and that the moisture vapor transmission levels do not exceed the manufacturers' recommendations.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Moisture Content: At time of delivery, limit average moisture content of wood flooring to 6%, with 8% maximum for any piece.
- B. Protect wood flooring from excessive moisture in shipment, storage and handling. Deliver in unopened cartons or bundles and store in a dry place, with adequate air circulation. Do not deliver material to building until "wet work" such as concrete and plaster have been completed and cured to a condition of equilibrium.

1.7 PROJECT CONDITIONS

- A. Conditioning: Do not proceed with installation of wood flooring until spaces have been enclosed. Building must be dry with all wet work (i.e. concrete, plaster, drywall, fireproofing) completed. Further, the building HVAC system must be operating and the space shall have been at the expected ambient temperature and relative humidity for

five days. Condition wood for five (5) days prior to start of installation by placing in spaces to receive flooring and maintaining ambient conditions in which it will be used before, during and after installation. Open packages of wood flooring which are sealed to permit natural adjustment of moisture content.

1.8 SPECIAL PROJECT WARRANTY

- A. Submit one (1) year warranty signed by Manufacturer agreeing to repair or replace wood flooring which shrinks, warps, cracks, or otherwise deteriorates excessively, or which breaks its anchorage or bond with substrate or otherwise fails to perform as required, due to failures of materials and/or workmanship and not due to unusual exposure to moisture or other abusive forces or elements not anticipated for application.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Wood strip flooring shall be Quarter Sawn, Select, White Oak (per NOFMA grading rules), 25/32" thick and 2-1/4" face width. No lengths less than 4' -0". Flooring strips shall be tongued-and-grooved and end-matched; back face of each strip shall be backchanneled. Strips shall be standard random lengths, complying with grading rules. Wood shall be kiln-dried and moisture content of wood at time of installation shall not exceed 8%.
- B. Hardboard: Signature S2S High Performance Panel by Decorative Panels International (DPI), or approved equal.
- C. Wood block flooring: See Section 096401, Wood Block Flooring.
- D. Plywood Subflooring: 3/4" thick C-D EXT APA Rating Sheathing, Exposure 1. Cover top of plywood with 30 lb. asphalt felt prior to application of wood flooring.
- E. Wood Trim: Where indicated to match wood flooring, provide wood base board molding, base shoe molding and stair risers of same species and grade as wood flooring. Provide wood stripping, nosings, saddles and thresholds, as indicated in or adjacent to wood flooring, of same species, grade and cut as wood flooring.

2.2 HARDWOOD FIELD FINISHING

- A. Polyacrylate Floor Finish: Provide (3) three coats of water-based urethane floor finish equal to "Naturale" as manufactured by Bona Kemi.
- B. For hardboard opaque finish, see Section 099000, Painting and Finishing.

2.3 ACCESSORIES

- A. Fasteners: Provide screw type flooring nails as recommended by NWFA in "Installation Guidelines Manual."
- B. Cork Expansion Strip: Composition cork expansion strip, where not specified or drawn otherwise.

- C. Red rosin building paper.
- D. Mastic: Cut black asphalt type.

2.4 ACOUSTIC MATERIALS

- A. The floating floor system shall be Model RIM by Kinetics Noise Control, Inc., Dublin, Ohio, or approved equal. Model RIM Floating Floor System shall consist of high density molded fiberglass pads individually coated with a flexible elastomeric membrane. Isolation pads shall be 2" thick and be spaced as recommended by the manufacturer but not greater than 16" centerline spacing. Pads shall be manufactured from annealed glass fibers stabilized by precompression during manufacture. Pads shall be designed to safely withstand a minimum imposed load of 75 PSF in all open areas and shall have a minimum overload capacity of 100% in all high load areas.
- B. Sound rated floor underlayment shall be Model SR Floorboard as manufactured by Kinetics Noise Control, Dublin, Ohio, (800) 959-1229; or approved equal. The material consists of a 5/8" thick composite consisting of a rigid phenolic-treated honeycomb core molded between two layers of high-density glass fiber. The isolation board shall be capable of withstanding up to 1,000 lbs./sq. ft. loading with a maximum of 0.060" of additional deflection.
- C. Pads shall have satisfactorily passed WMATA Section 3.49 dynamic test for isolator permanence.
- D. 1-1/2" thick low-density fiberglass absorption material shall be bonded to the isolation pads and shall cover a minimum of 95% of the area between the isolation pads.
- E. Perimeter Isolation Board: As specified in Section 079200, Joint Sealers.
- F. Self-Leveling Underlayment: "DSP-520" by H. B. Fuller, or approved equal.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where wood strip flooring is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PREPARATION

- A. Wherever direct application of wood flooring to concrete substrate is indicated, test for dryness before proceeding with installation. If tests show dampness or moisture content in excess of 10%, do not proceed until slab is dry. Wood flooring manufacturer must approved substrate in writing, to the Commissioner prior to start of work of this Section.
- B. Grind high spots and fill low spots on concrete substrates to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge. Use

trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

- C. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION (GENERAL)

- A. General: Comply with flooring manufacturer's instructions and recommendations, but not less than recommended by NWFA "Installation Guidelines."
- B. Pattern: Comply with pattern or direction of pattern for laying wood flooring, as directed by Commissioner.
- C. Expansion Space: Provide expansion space at walls and other obstructions and terminations of flooring, not less than 1/2". Fill expansion space with perimeter isolation board. Nail shoe molding or other trim to baseboard, rather than to flooring.
- D. Wood strip flooring shall be securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16" out of plane.

3.4 INSTALLATION OVER ACOUSTIC UNDERLAYMENT

- A. The installation of all sound isolation materials specified herein, including those installed under other sections of the specifications, shall be in accordance with procedures submitted by the isolation material manufacturer, and approved by the Commissioner.
- B. All sound isolation materials and building components supported by isolation materials shall be free from rigid contact with any part of the building structure.
- C. Plywood Sub-Floor: Provide floating installation of plywood over sound control mat. Cut plywood to 16" x 8'-0" planks scored on back 3/8" deep a minimum of every 12" across width. Place 16" planks perpendicular to direction of wood flooring. Stagger planks every 2'-0" and spaced 1/8" between ends. Do not attach planks to acoustic underlayment or sub-structure.
 - 1. Leave 3/4" space at all wall lines and 1/8" between panels. Cut plywood to fit within 1/8" near and around door jambs and other obstructions where finish trim will not be used.
- D. Apply rosin paper over plywood.
- E. Blind nail flooring to plywood spacing nails 8" o.c. in accordance with NWFA recommendations.
 - 1. Fasteners for blind nailing must be sized so that they cannot penetrate into the acoustic underlayment mat.

- F. Wood Trim: Nail baseboard to wall and nail shoe molding to other trim to baseboard; do not nail to flooring.

3.5 SANDING AND FINISHING

- A. Machine sand installed unfinished flooring to remove offsets and non-level conditions, ridges, cups, and sanding machine marks which would be visually noticeable after finishing. Use three (3) grades of sandpaper, ending with 00 grade. Vacuum clean and immediately apply finish. Do not permit traffic on floor after sanding and until finish is completed. Cover sanded floor with building paper to provide access for application of first finish coats.
- B. Immediately after proper sanding, tack rag with clean-up solvent. Apply a thin coat of polyurethane. Allow to dry thoroughly. Sand floors using NOFMA/MFMA procedures. Tack rag with clean-up solvent. Apply a second and third coat of polyurethane in same manner.

3.6 PROTECTION

- A. Protect completed wood flooring during remainder of construction period with heavy Kraft paper or other suitable covering, so that flooring and finish will be without damage or deterioration at time of acceptance.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- C. Restore damaged finishes. Clean and protect work from damage.

END OF SECTION

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SECTION 096401

WOOD BLOCK FLOORING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the wood flooring, as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Wood block flooring.
 - 2. Field finishing of wood flooring.

1.3 RELATED SECTIONS

- A. Waste Management Requirements – Section 017419.
- B. Sustainable Design Requirements – Section 018113.
- C. VOC Limits for Adhesives, Sealants and Architectural Coatings – Section 018114.
- D. Indoor Air Quality Requirements – Section 018119.
- E. Concrete sub-floor – Section 033000.
- F. Joint Sealers - Section 079200.

1.4 QUALITY ASSURANCE

- A. LEED BUILDING PERFORMANCE CRITERIA: Products of this Section shall meet the following requirements and shall be documented in accordance with the LEED BUILDING SUBMITTAL REQUIREMENTS of this Section:
 - 1. Products of this Section which have been extracted, harvested or recovered, as well as manufactured (location of final assembly), within 500 miles of the project site shall be identified and documented.
 - 2. Field-applied interior adhesives, sealants, and paints relating to work of this Section shall meet the requirements of Section 018114 "VOC Limits for Adhesives, Sealants and Architectural Coatings," and shall be identified and documented.
 - 3. Certification of criteria shall be in accordance with the Submittal Requirements of this section.
 - 4. Wood shall meet FSC and LEED standards noted in Section 064023.

- B. **Installer Qualifications:** Specialized wood flooring firm with not less than 3 years' successful experience in installation of types specified, and acceptable to manufacturer of wood flooring.
- C. All work of this Section shall meet the requirements of the manufacturer's specifications; copy available from the Commissioner.
- D. **Source Quality Control:** Obtain flooring of each type from single manufacturer or source, to ensure match of quality, color, pattern and texture.

1.5 SUBMITTALS

A. LEED BUILDING SUBMITTAL REQUIREMENTS

1. The Contractor and their sub-contractors shall submit the LEED BUILDING Certification items listed herein. LEED BUILDING Submittals shall include the following:
 - a. For all installed products and materials of this Section, complete the ENVIRONMENTAL MATERIALS REPORTING FORM (blank copy attached at end of Section 018113 "Sustainable Design Requirements"). Information to be supplied for this Form shall include:
 - 1). Cost breakdowns for the materials included in the Contractor or sub-contractor's work. Cost breakdowns shall include total installed cost and material-only cost.
 - 2). The percentages (by weight) of post-consumer and/or post-industrial recycled content in the supplied product(s).
 - 3). Indication (Y/N) of whether the raw materials have been extracted, harvested or recovered, as well as the final product has been manufactured (location of final assembly), within 500 miles of the project site.
 - 4). For all field-applied interior adhesives, sealants, and paints relating to work of this Section, provide the Volatile Organic Compound (VOC) content in grams/liter or lbs./gallon.
 - b. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the product information supplied for the ENVIRONMENTAL MATERIALS CERTIFICATION FORM.
 - c. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as stated below. Cut sheets shall be submitted with the Construction Manager or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 - d. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets,

manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

2. The LEED BUILDING Submittal information outlined above shall be assembled into one (1) package per Specification section or sub-contractor. Incomplete or inaccurate LEED Submittals may be used as the basis for rejecting the submitted products or assemblies.
- B. Product Data: Submit manufacturer's detailed technical product data and installation instructions for each type of wood flooring. Include instructions for handling, storage, installation, finishing, protection, and maintenance.
 - C. Samples: Submit sets of range samples for wood flooring; include finish.
 1. Include 6" samples of cork expansion strip and zinc divider strip.
 2. Provide 24" x 24" finished floor sample for review.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Moisture Content: At time of delivery, limit average moisture content of wood flooring to 8%, with 10% maximum for any piece.
- B. Protect wood flooring from excessive moisture in shipment, storage and handling. Deliver in unopened cartons or bundles and store in a dry place, with adequate air circulation. Do not deliver material to building until "wet work" such as concrete and plaster have been completed and cured to a condition of equilibrium.

1.7 PROJECT CONDITIONS

- A. Conditioning: Do not proceed with installation of wood flooring until spaces have been enclosed and are at approximate humidity condition planned for occupancy. Condition wood for 5 days prior to start of installation by placing in spaces to receive flooring and maintaining ambient temperature between 65 and 70 degrees F. before, during and after installation. Open packages of wood flooring which are sealed to permit natural adjustment of moisture content.

1.8 SPECIAL PROJECT WARRANTY

- A. Submit 1 year warranty signed by Manufacturer agreeing to repair or replace wood flooring which shrinks, warps, cracks, or otherwise deteriorates excessively, or which breaks its anchorage or bond with substrate or otherwise fails to perform as required, due to failures of materials and/or workmanship and not due to unusual exposure to moisture or other abusive forces or elements not anticipated for application.

1.9 EXTRA STOCK

- A. Extra Stock: Deliver stock of maintenance material to the City of New York. Furnish maintenance material matching products installed, packaged with protective covering for storage and identified with appropriate labels.
 1. Wood Block: Furnish quantity of full size units equal to 5.0% of amount installed.

PART 2 PRODUCTS

2.1 WOOD MATERIALS

- A. Wood Flooring: End Block, Douglas Fir, 1" thick, random widths, as produced by Kaswell Flooring Systems. (508) 879-1500, Oregon Lumber, or approved equal. Wood shall be kiln dried.
 - 1. Wood block flooring shall be end-grain solid block, kiln dried (8% - 10%) light colored wood turned on end and double edge wired with soft aluminum wire to form a flexible strip. Block faces shall be sanded 40 and 60 grit and edges chamfered to 1/64". Backs of blocks shall be double grooved with bottom edges beveled.

2.2 ACCESSORIES

- A. Mastic: As recommended by flooring and adhesive manufacturers for application indicated.
- B. Perimeter Isolation Board: As specified in Section 079200, Joint Sealers.
- C. Finish: Two coats of field applied water-based polyurethane and clear floor finish; matte finish as selected by the Commissioner.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where wood flooring is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PREPARATION

- A. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 CONDITIONING

- A. Open wrapping only after heating and air conditioning facilities are operating normally, and assuming a room temperature between 65 and 75 degrees F; then break the palletized units and restack vertically in the room where the flooring will be installed for 10 days or longer. To be sure air reaches all material, restack in a vertical column each strip individually on edge 1/2" apart (cross hatch) so that air can reach all surfaces. When handling keep all thin end blocks on the strip.
- B. Install flooring during the winter, spring or fall (neutral humidity) months. Material shall be as dry as possible and installed at very low humidified conditions.

3.4 INSTALLATION

- A. General: Comply with flooring manufacturer's instructions and recommendations, but not less than recommended by NOFMA in "Hardwood Flooring Installation Material".
 - 1. Pattern: Comply with pattern or direction of pattern for laying wood flooring, as directed by the Commissioner.
- B. Expansion Space: Provide expansion space at walls and other obstructions and terminations of flooring, not less than 3/8". Fill expansion space with perimeter isolation board. Nail shoe molding or other trim to baseboard, rather than to flooring.
- C. Apply adhesive to approved substrate in two applications as follows:
 - 1. First application shall be applied with a flat trowel, allowing the adhesive to be used as a primer and as a sealer. Allow to dry overnight.
 - 2. The second application shall be applied with a 3/16" notched trowel for block installation.
- D. Wood Flooring: Apply wood blocking strips using soap lines to start and maintain squareness. Place first strip in corner parallel and tight to temporary lumber filler. Place adjoining strips close as possible to next strip to avoid crowding mastic between strips. Stagger ends. Do not pound direct on edges of blocking. Instead place short section of 2 x 4 lumber on edge and pound only the 2 x 4 with mallet to avoid edge damage. Be sure strips are flat prior to placement by flat tapping out any curl. If after acclimation blocks are loose, carefully end tap blocks on the strip tight and snip excess wire. Continue snap lines to maintain squareness. All mastic must be kept off exposed surfaces.
 - 1. All half blocks at strip ends should be removed prior to installation.

3.5 SANDING AND FINISHING

- A. General: Wood block flooring shall be presanded with 60 grit from the factory. Any light brown (mottled) resin spots or discoloration on the surface must be removed by sanding. If slab irregularity causes over wood, drum sand with 40 grit necessary to flush all blocks to even height. Assuming slab sufficiently smooth so that after laying there is no over wood, then:
 - 1. Using drum belt sander sand first with 60 grit.
 - 2. Vacuum clean and fill any large cracks with patch compound. Under pressure gun, matching trowel or putty knife force deep and solid into the voids. Allow to dry thoroughly (usually 2 hours).
 - 3. With the drum make a second sanding pass with 80 grit (this will clean discoloration caused by patch compound).
 - 4. Using a rotary machine (either high speed or slow) lightly and quickly sand last with a 100 grit disc or screen.

- a. Eliminate all of the hard-to-see scratch marks no matter how faint and other blemishes. Be absolutely sure no liquids (paint, water, mud, etc.) touch this floor, and keep everyone out of the room until the surface is protected.
 - B. Field finish following manufacturer's application requirements.
 - C. Clean: Vacuum and sweep clean. Remove all sources of dust and other particles from ledges, radiators, etc.
- 3.6 PROTECTION
- A. Protect completed wood flooring during remainder of construction period with heavy Kraft paper or other suitable covering, so that flooring and finish will be without damage or deterioration at time of acceptance.

END OF SECTION

SECTION 096500

RESILIENT FLOORING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the resilient tile flooring, as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Vinyl composite tile (VCT)
 - 2. Rubber base.
 - 3. Transition strips.
 - 4. Accessories.

1.3 RELATED SECTIONS

- A. Waste Management Requirements – Section 017419.
- B. Sustainable Design Requirements – Section 018113.
- C. VOC Limits for Adhesives, Sealants and Architectural Coatings – Section 018114.
- D. Indoor Air Quality Requirements – Section 018119.
- E. Gypsum board partitions - Section 092900.
- F. Carpeting - Section 096800.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. Qualifications of Installers: Use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.

1.5 SUBMITTALS

- A. **LEED BUILDING Submittal Requirements:** The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications.
 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Commissioner for review.
- B. **Manufacturer's Data:** For information only, submit manufacturer's technical information and installation instructions for type of resilient tile.
- C. **Samples**
1. Submit full-size sample tiles for each type and color required, representative of the expected range of color and pattern variation. Sample submittals will be reviewed for color, texture and pattern only. Compliance with all other requirements is the exclusive responsibility of the Contractor.
 2. Submit six (6) inch long samples of base and strips.

1.6 DELIVERY AND STORAGE

- A. Deliver materials to the project site in the manufacturer's original unopened containers, clearly marked to indicate pattern, gauge, lot number and sequence of materials.
- B. Carefully handle all materials and store in original containers at not less than seventy (70) degrees F. for at least forty-eight (48) hours before start of installation.

1.7 JOB CONDITIONS

- A. Continuously heat spaces to receive tile to a temperature of seventy (70) degrees F. for at least forty-eight (48) hours prior to installation, whenever project conditions are such that heating is required. Maintain seventy (70) degrees F. temperature continuously during and after installation as recommended by the tile manufacturer, but

for not less than forty-eight (48) hours. Maintain a temperature of not less than fifty-five (55) degrees F. in areas where work is completed

PART 2 PRODUCTS

2.1 VCT TILE

- A. Provide 12" x 12" x 1/8" thick vinyl composition tile conforming to ASTM F 1066, Class 2, Dolphin IMP 0211, equal to "Impressions" made by LG Floors, or equivalent product of Armstrong, Johnsonite Tarkett, or approved equal. Provide tile units with uniformly distributed color and pattern throughout the thickness of tile. Variations in shades and off-pattern matches between containers are not acceptable.
 - 1. Color: Match VCT color and alignments in residential corridor. Other colors shall be as selected by the Commissioner.
- B. Provide 4" matching wall base.

2.2 ACCESSORIES

- A. Adhesives: Waterproof, stabilized type, as recommended by the tile manufacturer for the type of service indicated.
- B. Concrete Slab Primer: Non-staining type recommended by the tile manufacturer.
- C. Leveling Compound: Latex/Portland cement flash patching and leveling compound equal to No. DSP-520 made by H.B. Fuller or No. 226 with 3701 admixture made by Laticrete or equal made by Mapei, or approved equal.
- D. Edging Strips: 1/8" thick, homogeneous vinyl or rubber composition, tapered or bullnose edge, color as selected by the Commissioner from manufacturer's standards.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where resilient tile flooring is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.
- B. Installer must review prepared substrate for tolerances. Identify objections or concerns in writing.
- C. Installer shall confirm tile starts with Commissioner prior to layout and installation.
- D. Provide requirements for cement leveling.

3.2 CONDITION OF SURFACES

- A. Allowable Variations in Substrate Levels (Floors): $\pm 1/8"$ in 10'-0" distance and 1/4" total maximum variation from levels shown.
- B. Grind or fill concrete substrates as required to comply with allowable variation.

3.3 PREPARATION

- A. Prepare concrete slabs to receive resilient tile flooring in accordance with ASTM F-710 "Standard Practice For Preparing Concrete Floors to Receive Flooring".
- B. Concrete Primer: Apply concrete slab primer if recommended by tile manufacturer, prior to application of the adhesive. Apply in compliance with manufacturer's directions.

3.4 ALLOWABLE TOLERANCES

- A. Allowable Tolerances in Finished Work: Do not exceed the following deviations from level and plumb, and from elevations, locations, slopes and alignment shown.
 - 1. Floors: 1/8" in 10'-0" run, any direction; 1/32" offset at any location.

3.5 INSTALLATION

- A. Install tile only after all finishing operations, including painting, have been completed and permanent heating system is operating. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by tile manufacturer.
- B. Place tile units with adhesive cement in strict compliance with the manufacturer's recommendations. Butt tile units tightly to vertical surfaces, thresholds, nosings and edgings. Scribe around obstructions and to produce neat joints, laid tight, even and in straight, parallel lines. Extend tile units into toe spaces, door reveals, and into closet and similar openings.
- C. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on the finish tile as marked in the subfloor. Use chalk or other non-permanent marking devices.
- D. Lay tile from center marks established with principal walls, discounting minor off-sets, so that tile at opposite edges of the room are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.
- E. Match tiles for color and pattern by using tile from cartons in the same sequence as manufactured and packaged. Cut tile neatly to and around all fixtures. Broken, cracked, chipped or deformed tile is not acceptable.
- F. Tightly cement tile to sub-base without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks through tile, or other surface imperfections.
- G. Lay tile with grain in all tile running in the same direction.
- H. Place resilient edge strips tightly butted to tile and secure with adhesive. Provide edging strips at all unprotected edges of tile, unless otherwise shown.

- I. Bases: In all spaces where base is indicated, install bases tight to walls, partitions, columns, built-in cabinets, etc., without gaps at top or bulges at bottom, with tight joints and flush edges, with molded corner pieces at internal and external corners. Provide end stops adjacent to flush type door frames and where base does not terminate against an adjacent surface. Keep base in full contact with walls until adhesive sets.

3.6 CLEANING AND PROTECTION

- A. Remove any excess adhesive or other surface blemishes from tile, using neutral type cleaners as recommended by the tile manufacturer. Protect installed flooring from damage by use of heavy Kraft paper or other covering.
- B. Finishing: After completion of the project and just prior to the final inspection of the work, thoroughly clean tile floors and accessories. Apply two (2) coats of wax and buff using materials as specified herein.

END OF SECTION

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SECTION 096800

CARPETING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the carpeting as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Carpet, glue down installation, including adhesive.
 - 2. Carpet, tackless installation, including carpet pad.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Resilient flooring - Section 096500.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. Installer Qualifications: Firm with not less than three (3) years of experience in installation of commercial carpeting of type, quantity and installation methods similar to work of this Section.
- C. Manufacturer Qualifications: Firm (carpet mill) with not less than three (3) years of production experience with carpet similar to types specified in this Section; and whose published product literature clearly indicates general compliance of products with requirements of this Section.

D. **General Terminology/ Information Standard:** Refer to current edition of "Carpet Specifier's Handbook" by The Carpet and Rug Institute (CRI); for definitions of terminology not otherwise defined herein, and for general recommendations and information.

1. Installation methods and procedures must meet standards of CRI Installation Manual.

E. Carpet used on Project must be from same dye lot for each carpet type.

1.5 SUBMITTALS

A. **LEED BUILDING Submittal Requirements:** The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications.

2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.

3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.

4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Commissioner for review.

B. **Product Data:** Submit manufacturer's complete technical product data for each type of carpet and accessory item required.

C. **Shop Drawings:** Submit carpet layout and seaming drawings, clearly indicating carpet directions, locations and methods of jointing seams and locations and types of edge strips. Indicate columns, doorways, enclosing wall/partitions, built-in cabinets and locations where cut-outs are required in carpet.

D. **Samples:** Submit 18" x 27" samples of each carpet required and six (6) inches long samples of each type exposed edge stripping.

E. **Certification:** Submit manufacturer's certification stating that carpet materials furnished comply with specified requirements.

1. Include listing of mill register numbers for carpet furnished.

2. Include supporting certified laboratory test data indicating that carpet meets or exceeds specified test requirements.

F. Maintenance Data: Submit manufacturer's printed maintenance recommendations, including methods and frequency recommended for maintaining carpet in optimum conditions under anticipated traffic and use conditions.

1.6 EXTRA STOCK

A. Overrun: Produce and deliver to project at least five (5) percent overrun on calculated yardage. Provide required overrun exclusive of carpet needed for proper installation, waste and usable scraps.

1.7 PRODUCT DELIVERY AND STORAGE

A. Deliver carpeting materials in original mill protective wrapping with mill register numbers and tags attached. Store inside, in well ventilated area, protected from weather, moisture and soiling.

1.8 WARRANTY

A. The Contractor shall promptly repair seams and edges in the carpet as required, for a period of one (1) year after Substantial Completion of the Project. The exact time for this work shall be left to the discretion of the City of New York. Fourteen (14) day notice for repairs shall be given by the City of New York, so that the Contractor can make the necessary arrangements.

B. The manufacturer shall provide a warranty that the face yarn of the carpet will not wear more than ten (10) percent in five years. If the carpet wears more than ten (10) percent in five (5) years, the manufacturer will replace the carpet including parts, labor and materials, to the City of New York's satisfaction.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers: Bentley Mills, Ruckstuhl, or approved equal.

B. Carpet Material:

1. Material: 80% Goat Hair, 15% nylon, 5% rayon.
2. Installation Method: Direct glue down.
3. Installation Method: Tackless mounting with carpet cushion.
4. Colors:
 - a. Color 1 559 Burnt Orange (Theater 1).
 - b. Color 2 512 Dapple Grey (Sound and Light Locks).
 - c. 3 Administration area.
5. Roll Width: 5'-7" or greater.

2.2 ACCESSORIES

- A. Provide vinyl edges, nosing strips, reducers and threshold plates where required. They shall be sized to be compatible with the thickness of the carpet, in a color as selected by the Commissioner, of a commercial quality as manufactured by Armstrong, Mercer Plastics Co., Inc., or approved equal. The type shall be as required by site conditions, as is the custom of the trade, and installation shall be made as recommended by the manufacturer.
- B. Underlayment: Provide polyurethane pad underlayment, 0.250" thick with releasable woven backing and breathable integral skin barrier equal to "Foundation XP" made by Healthier Choice Flooring or approved equal. Underlayment shall be antimicrobial treated, pas pill test FF 1-70, have an optical smoke density of <100 as per ASTM E662 and meet "Green Label" program of the Carpet and Rug Institute.
- C. Tackless Strips: Provide manufacturer's standard water resistant plywood stripping, with angular pins, designed to hold stretched carpet from below. Provide stripping with two rows of pins where carpet width is less than 20 ft., and with 3 rows of pins where width of carpet is 20 ft. or more. Provide pre-nailed stripping, ready for anchorage to substrate.
- D. Adhesive: Provide adhesive as recommended by the carpet manufacturer. Provide adhesive which complies with flame spread rating required for the carpet installation, if any.
- E. Leveling Compound: Latex/Portland cement flash patching and leveling compound equal to No. DSP-520 made by H.B. Fuller or No. 226 with 3701 admixture made by Laticrete or equal made by Mapei, or approved equal.
- F. Miscellaneous Materials: Provide the types of seaming, adhesives and tape, thread, and other accessory items recommended by the carpet manufacturer and Installer for the conditions of installation and use.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where carpet is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PRE-INSTALLATION REQUIREMENTS

- A. Repair minor holes, cracks, depressions or rough areas in substrate using latex leveling compound.
- B. Clear away debris and scrape up cementitious deposits from surfaces to receive carpeting. Vacuum clean immediately before installation. Check concrete surfaces to ensure no "dusting" through installed carpet; apply sealer where required to prevent dusting.

- C. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period.
- D. Installer must review prepared substrate for tolerances. Identify objections or concerns in writing.
- E. Provide requirements for cement leveling.

3.3 INSTALLATION

A. General

1. Comply with manufacturer's instructions and recommendations. Place seams in the directions as accepted on shop drawings. Maintain direction of pattern and texture, including lay of pile. So not seam weft to warp.
2. Extend carpet under open-bottomed and raised-bottom obstructions, and under removable flanges of obstructions. Extend carpet into closets and alcoves of rooms indicated to be carpeted, unless another floor finish is indicated for such spaces. Extend carpet under all movable furniture and equipment, unless otherwise indicated.
3. Provide cut-outs for removable access devices in the substrate. Bind edges as neatly as possible and secure both sides of cuts to the substrate. Use double-faced tape on carpet cut-outs which must be lifted from the substrate to gain access to the devices. Cut only three (3) sides wherever it is feasible to provide a carpet flat in lieu of a fully-removable cut-out.
4. Install vinyl carpet edge guard at every location where edge of carpet is exposed to traffic, except where another device is indicated.

B. Glue-Down Installation

1. Unroll carpet face up and cut the lengths required, making sure that pile-lay runs in the same direction. Check starting wall for squareness, allow for off-square wall. Strike chalk line the entire length of area where seam falls.
2. Place two (2) lengths in proper position for installing, trim selvage. Line up seam edge with chalk line. Make sure that carpet lays perfectly flat and tension free.
3. Fold or roll both widths back three (3) feet from seam area the entire length of the carpet.
4. Installers shall start spreading adhesive from approximate center towards each end using 1/16" V-notched trowel on concrete subfloors.
5. When sufficient floor area has been covered with adhesive, the first width can be dropped or rolled into place. Apply coating of edge sealer to seam edge of first width.
6. The remaining portion of the first width can now be folded or rolled from the wall. The adhesive is applied to the floor and the carpet dropped or rolled into place. Be sure to have enough men spreading the adhesive so that after the floor area is

covered with the adhesive, the carpet must be in place within the twenty (20) minute open time.

7. Roll or fold back dry portion of second width towards seam, spread the adhesive and place carpet to three (3) feet from where next seam will fall.
8. Brush or roll out looseness and air bubbles as carpet is put in place. Repeat above procedure on continuing widths. For trimming carpet at wall, use razor blade knife or suitable wall trimmer.
9. Contact adhesive (about six (6) inches wide) must be used along carpet edges where they butt to a wall and along all cross-seams to minimize the possibility of later shrinkage from over-wetting. Strike a chalk line along carpet width six (6) inches from edge and apply contact adhesive to both floor and carpet back according to instructions.

C. Tackless Installation

1. Install tackless carpet stripping in accordance with manufacturer's instructions. Turn cut-edge of carpet down to substrate in tight slot between wall base and edge of stripping.
2. Install underlayment over entire area to be carpeted. Butt cushion tight against edge stripping. Hold cushion back from terminal edge of the carpeting, approximately one (1) inch, but only where carpet edge is not secured by edge stripping or binder bar. Place cushion with slip resistant face down; comply with underlayment manufacturer's recommendations.
3. Install carpet with seams taped or sewn, or taped and sewn, using permanent type construction which is of sufficient strength for stretching and wear without failure during the life of the carpet. Apply seaming cement to edges without being in evidence on the face of the carpet. Maintain straight seams, running true with the lines of the building.
4. Stretch, adjust and trim carpet in accordance with recognized installation practices. Secure edges in the manner indicated, and as recommended by the carpet manufacturer. Use power stretchers of the type recommended by the carpet manufacturer, in areas exceeding 18'-0" in width.

3.4 CLEANING UP

- A. Upon completion of the carpeting installation in each area, visually inspect all carpet installed in that area and immediately remove all dirt, soil, and foreign substance from the exposed face; inspect all adjacent surfaces and remove all marks and stains caused by the carpet installation; remove all packaging materials, carpet scraps, and other debris from the carpet installation to the area of the job site set aside for its storage.

3.5 PROTECTION

- A. Provide temporary, protection against soiling or damage of carpet for the remainder of the construction period.

- B. Any carpet lengths soiled or damaged through final completion shall be replaced by the contractor at no cost to the City of New York.

END OF SECTION

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SECTION 098413

ACOUSTIC WALL PANELS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the acoustic wall panels as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. ACW-1: Field spray painted Tectum Finale panels at dressing room ceilings, backstage ceilings, rehearsal room ceilings, lobby ceiling, and theater 1 sidewalls.
 - 2. ACW-2: 1-1/8" thick acoustical absorption panels wrapped in selected fabric.
 - 3. ACW-3: 1" industrial felt.
 - 4. ACW-4: 1/2" duct liner for theater 2.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Carpentry - Section 062000.
- F. Gypsum wallboard - Section 092900.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.

- B. **Installer Qualification:** At least 3 years' experience installing comparable work, employing skilled mechanics under competent supervision for all phases of the Work.

1.5 SUBMITTALS

- A. **LEED BUILDING Submittal Requirements:** The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Commissioner for review.

- B. **Shop Drawings/Product Data**

1. Base drawings on field measurements.
2. Show dimensioned wall elevations with seam and joint locations, cutout sizes and locations, anchor locations, relation to adjacent work; large scale joint and mounting details; materials type, weight/thickness, design, color; and other data necessary to fabricate and install work and coordinate work with affected trades.

- C. **Samples:** Two 12" x 12" (minimum) panels in selected finish, showing seam, edge and cutout conditions.

- D. **Certification**

1. **Acoustical Performance:** Certified reports of acoustical performance tests conducted and/or witnessed by a recognized, independent, testing agency. Tests shall have been done by specified methods or recognized equivalent. Sound absorption tests shall be not more than three years old. Reports on earlier tests are acceptable if it can be established to the Commissioner's satisfaction, that they are valid indications of compliance with Project requirements.
2. **Fire Hazard:** Evidence of compliance with regulatory agency and specifications requirements.

- E. Cleaning and Maintenance Instructions: Recommendations for maintenance and cleaning per DDC Genral Conditions requirements. Identify cleaning/spotting products generically or by trade name.
- F. Manufacturer Qualifications: List comparable projects with 3-year (minimum) service histories. Describe projects and give owner/building manager names and addresses.

1.6 REFERENCES

- A. ASTM C 423 Test for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- B. ASTM D 6207 Standard Test Method for Dimensional Stability of Fabrics to changes in Humidity and Temperature.
- C. ASTM E 84 Test for Surface Burning Characteristics of Building Materials.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Allow materials to become acclimated to Project conditions before installation, if necessary to prevent sag and distortion during service life.

1.8 PROJECT CONDITIONS

- A. Environmental Conditions
 - 1. Work areas shall be at or near ambient occupancy temperature and relative humidity.
 - 2. Painting, dust-raising activities, and work that introduces dampness shall be completed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. ACW-1" Provide "Finale" acoustical wall panels as manufactured by Tectum or approved equal.
- B. ACW-2: Provide "Type HIR-1" acoustical wall panels as manufactured by Decoustics, or approved equal by Conwed, MDC Wall or approved equal.
- C. ACW-3: Provide 1" Felt Sutherland F-3 (grey) 1" thickness or approved equal.
- D. ACW-4: 1" Black duct liner Permacoat Linacoustic by Johns Manville or approved equal.

2.2 GENERAL

- A. Fabricate panels to sizes and configurations indicated; attach facing materials to cores to produce installed panels with visible surfaces fully covered and free from waves in fabric weave, wrinkles, sages, blisters, seams, adhesive or other foreign matter.

1. Fabricate back mounted panels in factory to exact sizes required to fit wall surfaces based on field measurements of completed substrates indicated to receive acoustical wall panels.
 2. Where radius corners are indicated; attach facing material so there are no seams or gathering of material.
- B. Dimensional Tolerances of Finished Units: Overall height and width of panels - plus or minus 1/16".
- C. Sound Absorption Performance: Provide acoustical wall panels with minimum noise reduction coefficients (NRC) indicated, as determined by testing per ASTM C 423 for mounting type specified under individual product requirements.
- D. Colors, Textures, and Patterns: Where manufacturer's standard material is indicated, provide acoustical wall panels faced with manufacturer's material complying with the following requirements:
1. Provide Commissioner's selections from manufacturer's full range of colors, textures, and patterns for products of type indicated.
 2. Selected fabric for ACW-2 shall be used at custom millwork speaker enclosures inside Theater 1.

2.3 BACK MOUNTED ACOUSTICAL WALL PANELS

- A. Back Mounted, Edge Reinforced Acoustical Wall Panels: Manufacturer's standard panel construction consisting of facing material laminated to front, edges, and back border of molded glass fiber board core; with edges chemically hardened to reinforce panel perimeter against warpage and damaged; and complying with the following requirements:
1. Core Density: 6 - 7 lb./cu. ft.
 2. Thickness and NRC: Nominal overall panel thickness of 1-1/8" and NRC of not less than 0.90 for Type A (ABPMA No. 4) mounting.
 3. Facing Material: Anchorage 2335 Guilford of Main in colors as follows:
 - a. Onyx 2016.
 - b. Aubergine 2036
 - c. Asteroid 2053
 - d. Graphite 2079.
 4. Panel Size: As indicated.
 5. Edge Detail: Square.

2.4 ACCESSORIES

- A. Back Mounting Accessories: Manufacturer's standard or recommended accessories for securely mounting panels of type and size indicated to substrates provided, and complying with the following requirements:

1. Mechanically Mounted Edge Reinforced Panels: Metal panel clip and base support bracket system consisting of 2 part panel clips, with one part of each clip mechanically attached to back of panel and the other part to wall substrate, designed to support panels laterally; and base support brackets designed to support full weight of panels; with both designed to allow panel removal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where acoustic wall panels are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

A. General

1. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, scribed to fit adjoining work accurately at borders and at penetrations. Comply with panel manufacturer's printed instructions for installation of panels using type of mounting accessories indicated or, if none indicated, as recommended by manufacturer.
2. Construction Tolerances
 - a. Variation from Plumb and Level: $\pm 1/16"$.
 - b. Variation of Joints from Hairline: Not more than $1/16"$.
3. Actual location of sound absorptive panel to be determined through field evaluation with acoustic engineer. Provide temporary secure method for testing purposes. Provide installation cost for initial and two (2) follow up configurations as part of final installation.
4. Panels will require careful field scribing to accommodate ceiling mounted pipe supports, devices, outlet boxes, lighting canopies, lighting tracks, and so on.

- B. Anchoring to Drywall: Anchor clips to unreinforced gypsum board with toggle or Molly anchors. Anchor clips to metal drywall framing with tapping sheet metal screws.

- C. Panels shall be pressed against wall and slid down engaging "Z" clips into wall brackets.

- D. Remove and replace panels that are damaged and are unacceptable to the Commissioner.

3.3 ADJUSTING AND CLEANING

- A. Correct non-complying and damaged/defective Work. Replace work that cannot be satisfactorily repaired.

- B. Restretch and reinstall sagging and distorted fabric and correct other defects that occurred during normal service.

C. Carefully and thoroughly clean completed work by vacuuming and/or other means.
Remove soil, stains, loose threads.

D. Protect work from soiling and other damage.

END OF SECTION

SECTION 099000

PAINTING AND FINISHING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the drawings and/or specified herein, including, but not limited to, the following:
 1. Prime painting unprimed surfaces to be painted under this Section.
 2. Painting all items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.
 3. Painting all ferrous metal (except stainless steel) exposed to view.
 4. Painting all galvanized ferrous metals exposed to view.
 5. Painting interior concrete block exposed to view.
 6. Painting gypsum drywall exposed to view.
 7. Epoxy floor paint.
 8. Painting of wood exposed to view, except items which are specified to be painted or finished under other Sections of these specifications. Back painting of all wood in contact with concrete, masonry or other moisture areas.
 9. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports and other mechanical and electrical items and equipment exposed to view.
 10. Painting surfaces above, behind or below grilles, gratings, diffusers, louvers, lighting fixtures, and the like, which are exposed to view through these items.
 11. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
 12. Painting of any surface not specifically mentioned to be painted herein or on drawings, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, shall be included as though specified.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Shop priming is required on some, but not all of the items scheduled to be field painted. Refer to other Sections of work for complete description.
- F. Shop coat on machinery and equipment: Refer to the Sections under which various items of manufactured equipment with factory applied shop prime coats are furnished, including, but not necessarily limited to, the following Sections. All items of equipment furnished with prime coat finish shall be finish painted under this Section.
 - 1. Plumbing - Division 22.
 - 2. Heating, ventilation and air conditioning – Division 23.
- G. Color Coding of Plumbing Piping and Electrical Conduits – Divisions 22 and 26.
 - 1. This Color Coding consists of an adhesive tape system and is in addition to painting of piping and conduits under this Section, as specified above.

1.4 MATERIALS AND EQUIPMENT NOT TO BE PAINTED

- A. Items of equipment furnished with complete factory finish, except for items specified to be given a finish coat under this Section.
- B. Factory-finished toilet partitions.
- C. Non-ferrous metals, except for items specified and/or indicated to be painted.
- D. Finished hardware, excepting hardware that is factory primed.
- E. Surfaces not to be painted shall be left completely free of droppings and accidentally applied materials resulting from the work of this Section.

1.5 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.

B. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:

1. Paints and coatings manufactured within 500 miles (by air) of the project site shall be documented in accordance with the LEED BUILDING Submittal Requirements of this Section.
2. Paints used for interior applications shall meet the volatile organic compound (VOC) and chemical component limitations of the Green Seal Paint Standards GS-11 and GC-03, of Green Seal, Inc., Washington, DC. Other architectural coatings shall meet the VOC limits as established in the South Coast Air Product-specific environmental requirements are as follows:

a. Volatile Organic Compounds: the VOC concentrations (in grams per liter) of the product shall not exceed those listed below as determined by U. S. Environmental Protection Agency (EPA) Reference Test Method 24.

1). Interior Paints:

Non-flat:	150 grams/liter
Flat:	50 grams/liter

2). Interior Anti-Corrosive Paints (if used in interior applications):

Gloss:	250 grams/liter
Semi-gloss:	250 grams/liter
Flat:	250 grams/liter

3). Other Interior Coatings: Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to the interior shall meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by SCAQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter, less water and less exempt compounds.

(1) Clear Wood Finishes	
(a) Varnish	350
(b) Sanding Sealers	350
(c) Lacquer	550
(2) Shellac	
(a) Clear	730
(b) Pigmented	550
(3) Stains	250
(4) Floor Coatings	100
(5) Waterproofing Sealers	250
(6) Sanding Sealers	275
(7) Other Sealers	200

The calculation of VOC shall exclude water and tinting color added at the point of sale.

4). Adhesives or sealants used for work in this section shall meet the requirements of DDC General Conditions, where applicable.

- 5). Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
 - C. "Green Seal Environmental Standard for Paints" (GS-11), Green Seal, Washington, DC, www.greenseal.org
 - D. "Green Seal Environmental Standard for Anti-Corrosive Paints (GC-03), Green Seal, Washington, DC, www.greenseal.org
 - E. Job Mock-Up
 1. In addition to the samples specified herein to be submitted for approval, apply in the field, at their final location, each type and color of approved paint materials, applied 10 feet wide, floor to ceiling of wall surfaces, before proceeding with the remainder of the work, for approval by the Commissioner. Paint mock-ups to include door and frame assembly.
 2. These applications when approved will establish the quality and workmanship for the work of this Section.
 3. Repaint individual areas which are not approved, as determined by the Commissioner, until approval is received. Assume at least two paint mock-ups of each color and gloss for approval.
 - F. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces.
 - G. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Commissioner in writing of any anticipated problems using the coating systems as specified with substrates primed by others.
 - H. All paints must conform to the Volatile Organic Compounds (VOC) standards of prevailing codes and ordinances.
- 1.6 ENVIRONMENTALLY-PREFERABLE PRODUCT CRITERIA:
- A. 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).

1.7 INTERIOR PAINTS AND ANTI-CORROSIVE PAINTS

A. Paints

Non-flat:	150	Gloss:	250
Flat:	50	Semi-gloss:	250
		Flat:	250

B. 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

1.8 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.

- b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits
- B. Materials List
 1. Before any paint materials are delivered to the job site, submit to the Commissioner a complete list of all materials proposed to be furnished and installed under this portion of the work.
 2. This shall in no way be construed as permitting substitution of materials for those specified or accepted for this work by the Commissioner.
- C. Samples
 1. Accompanying the materials list, submit to the Commissioner copies of the full range of colors available in each of the proposed products.
 2. Upon direction of the Commissioner, prepare and deliver to the Commissioner two (2) identical sets of Samples of each of the selected colors and glosses painted onto 8-1/2" x 11" x 1/4" thick material; whenever possible, the material for Samples shall be the same material as that on which the coating will be applied in the work.
- D. Manufacturer's Recommendations: In each case where material proposed is not the material specified or specifically described as an acceptable alternate in this Section of these specifications, submit for the Commissioner's review the current recommended method of application published by the manufacturer of the proposed material.

1.9 PRODUCT HANDLING

- A. Deliver all paint materials to the job site in their original unopened containers with all labels intact and legible at time of use.

B. Protection

1. Store only the approved materials at the job site, and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.
2. Use all means necessary to ensure the safe storage and use of paint materials and the prompt and safe disposal of waste.
3. Use all means necessary to protect paint materials before, during and after application and to protect the installed work and materials of all other trades.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.10 EXTRA STOCK

- A. Upon completion of this portion of the Work, deliver to the City of New York an extra stock of paint equaling approximately ten (10) percent of each color and gloss used and each coating material used, with all such extra stock tightly sealed in clearly labeled containers.

1.11 JOB CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 90 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F. and 95 degrees F. unless otherwise permitted by the paint manufacturer's printed instructions.
- C. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds eighty-five (85) percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
- D. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

PART 2 PRODUCTS

2.1 PAINT MANUFACTURERS

- A. Except as otherwise noted, provide the painting products listed for all required painting made by one of the manufacturers listed in the paint schedule (Section 2.4). These companies are Benjamin Moore, Akzo Nobel Paint (Glidden Professional) and Sherwin Williams (S-W), Pratt and Lambert Paint. Comply with number of coats and required minimum mil thicknesses as specified herein.

2.2 MATERIALS

- A. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only to recommended limits.

B. Colors and Glosses: All colors and glosses shall be as selected by the Commissioner. Certain colors will require paint manufacturer to prepare special factory mixes to match colors selected by the Commissioner. Color schedule (with gloss) shall be furnished by the Commissioner.

1. NOTE: There will be at least 3 different colors for walls that are not scheduled to be painted white. Colors shall be noted on the drawing as "Color A," "Color B," and "Color C." Color A, Color B and Color C have color that requires more back paint job than white color. Bidders are hereby apprised of this, and shall include proper amount of cost for painting using these colors in their bids.

C. Coloring Pigment: Products of or furnished by the manufacturer of the paint or enamel approved for the work.

D. Linseed Oil: Raw or boiled, as required, of approved manufacture, per ASTM D 234 and D 260, respectively.

E. Turpentine: Pure distilled gum spirits of turpentine, per ASTM D 13.

F. Shellac: Pure gum shellac (white or orange) cut in pure denatured alcohol using not less than four (4) lbs. of gum per gallon of alcohol.

G. Driers, Putty, Spackling Compound, Patching Plaster, etc.: Best quality, of approved manufacture.

H. Heat Resistant Paint: Where required, use heat resistant paint when applying paint to heating lines and equipment.

2.3 GENERAL STANDARDS

A. The various surfaces shall be painted or finished as specified below in Article 2.4. However, the Commissioner reserves the right to change the finishes within the range of flat, semi-gloss or gloss, without additional cost to the City of New York.

B. All paints, varnishes, enamels, lacquers, stains and similar materials must be delivered in the original containers with the seals unbroken and label intact and with the manufacturer's instructions printed thereon.

C. All painting materials shall bear identifying labels on the containers with the manufacturer's instructions printed thereon.

D. Paint shall not be badly settled, caked or thickened in the container, shall be readily dispersed with a paddle to a smooth consistency and shall have excellent application properties.

E. Paint shall arrive on the job color-mixed except for tinting of under-coats and possible thinning.

F. All thinning and tinting materials shall be as recommended by the manufacturer for the particular material thinned or tinted.

G. It shall be the responsibility of the Contractor to see that all mixed colors match the color selection made by the Commissioner prior to application of the coating.

2.4 SCHEDULE OF FINISHES (BASIS OF DESIGN)

A. High Performance Coating On Exterior Galvanized Ferrous Metals (EPT-1)

- First Coat: "27 Typoxy" or "N69 Epoxoline II" by Tnemec; "Intergard 345" by International Protective Coatings; "Carboguard 893 SG" or "Carboguard 888" by Carboline; "Devran 203 WB Epoxy Primer" by Akzo; or "Recoatable Epoxy Primer 867-45" by Sherwin Williams.
- Second Coat: "V73 Endura Shield" or "1074/1075" by Tnemec; "Interthane 870UHS" or "990 UHS" by International Protective Coatings; "Carbothane 133 LH" by Carboline; "Devthane 379H Aliphatic Urethane" by Akzo; or "Hi-Solids Urethane B65-300/350" by Sherwin Williams.

B. High Performance Coating On Exterior Non-Galvanized Ferrous Metals (EPT-2)

- Prime Coat: "Tneme-Zinc 90/97" by Tnemec; "Interzinc 52" or "315" by International Protective Coatings; "Carbozinc 859, Class B" by Carboline; "Cathacoat 302V Reinforced Inorganic Zinc Primer" by Akzo; or "Zinc Clad II Plus Inorganic Zinc Rich Coating B69V212" by Sherwin Williams.
- Second Coat: "27 Typoxy" or "N69 Epoxoline II" by Tnemec; "Intergard 345" by International Protective Coatings; "Carboguard 893 SG" or "Carboguard 888" by Carboline; "Bar-Rust 231V Multi Purpose Epoxy Mastic" by Akzo; or "Macropoxy G46 I.C. Epoxy B58-600" by Sherwin Williams.
- Third Coat: "V73 Endura Shield" or "1074/1075" by Tnemec; "Interthane 870UHS" or "990 UHS" by International Protective Coatings; "Carbothane 133 LH" by Carboline; "Devthane 379H Aliphatic Urethane" by Akzo; or "Hi-Solids Polyurethane B65-300/350" by Sherwin Williams.

C. Interior Ferrous Metal (IPT-1)

Satin Finish/Latex

- Primer: 1 coat Moore Alkyd Metal Primer (Z06)
1 coat Akzo Devflex 4020 PF DTM Prime/Flat Finish or touch-up shop primer
1 coat Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer B66-310
1 coat Pratt and Lambert Steeltech Acrylic Prime or Finish Z190
- First Coat: 1 coat Water Borne Satin Impervo (314)
1 coat Akzo: Glidden Professional Diamond 350 Acrylic Eggshell 6P1403
1 coat S-W Pro-Classic Waterborne Acrylic Satin, B20
1 coat Pratt and Lambert Red Seal Latex Satin Enamel Z2300
- Second Coat: 1 coat Water Borne Satin Impervo (314)
1 coat Akzo: Glidden Professional Diamond 350 Acrylic Eggshell 6P1403
1 coat S-W Pro-Classic Waterborne Acrylic Satin, B20
1 coat Pratt and Lambert Red Seal Latex Satin Enamel Z2300 or Pro-Hide Gold Interior Latex Satin Z9490
- a. Total DFT not less than: 3.9 mils

Semi-Gloss Finish/Latex

- Primer: 1 coat Iron Clad Latex Low Lustre Metal & Wood Enamel (363)
1 coat Akzo Devflex 4020 PF DTM Primer/Flat Finish or touch-up shop primer.
1 coat Sherwin-Williams, Pro Industrial Pro-Cryl Universal Primer B66-310
- First Coat: 1 or 2 coats Pratt and Lambert; Steeltech Acrylic Prime or Finish Z190
1 coat Regal ICI Premium Interior 100% Acrylic Semi-gloss Finish (N333)
1 coat Akzo: Glidden Professional Diamond 350 Acrylic S/G 6P1407
1 coat S-W Pro-Classic Waterborne Acrylic Satin, B31
1 coat Pratt and Lambert; Pro Hide gold Interior Latex Semi-Gloss Z8300
- Second Coat: 1 coat Regal Premium Interior 100% Acrylic Semi-gloss finish (N333)
1 coat Akzo: Glidden Professional Diamond 350 Acrylic S/G 6P1407
1 coat S-W Pro-Classic Waterborne Acrylic Satin, B31
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Semi-Gloss Z8300
- a. Total DFT not less than: 4.0 mils

D. Interior Concrete Block (IPT-2)

Flat Finish/Vinyl Acrylic Latex over Filler

- Block Filler: 1 coat Moorcraft Super Craft Latex Block Filler (285)
1 coat Akzo Glidden Professional Concrete Coatings Block Filler GP 3010-1200
1 coat S-W Preprite Block Filler, B25W25
1 coat Pratt and Lambert; Pro Hide Silver Interior/Exterior Latex Block Filler Z8485
- First Coat: 1 coat Regal Wall Satin (215)
1 coat Akzo Glidden Professional Diamond 350 Flat GP 1201
1 coat S-W Pro Green 200 Interior Latex Flat, B30-600
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Flat Z8100
- Second Coat: 1 coat Regal Wall Satin (215)
1 coat Akzo Glidden Professional Diamond 350 Flat GP 1201
1 coat S-W Pro Green 200 Interior Latex Flat, B30-600
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Flat Z8100
- a. Total DFT not less than: 10.7 mils

Semi-Gloss Finish/Vinyl Acrylic Latex over Filler

- Block Filler: 1 coat Moorcraft Super Craft Latex Block Filler (285)
1 coat Akzo Glidden Professional Concrete Coatings Block Filler GP 3010-1200
1 coat S-W Preprite Block Filler, B25W25
1 coat Pratt and Lambert; Pro Hide Silver Interior/Exterior Latex Block Filler Z8485
- First Coat: 1 coat Regal AquaGlo (333)
1 coat Akzo Glidden Professional Diamond 350 Acrylic S/G GP 1407
1 coat S-W Pro Green 200 Interior Latex S. Gloss, B31-600
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Semi-Gloss Z8300

- Second Coat: 1 coat Regal AquaGlo (333)
1 coat Akzo Glidden Professional Diamond 350 Acrylic S/G GP 1407
1 coat S-W Pro Green 200 Interior Latex S. Gloss, B31-600
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Semi-Gloss
Z8300
a. Total DFT not less than: 10.7 mils

E. Interior Drywall (IPT-3)

Flat Finish/Vinyl Acrylic Latex

- Primer: 1 coat Regal FirstCoat (216)
1 coat Akzo Glidden Professional Gripper GP 3210
1 coat S-W Pro Green 200 Interior Latex Primer, B28-600
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Wall Primer
Z8160
First Coat: 1 coat Regal Wall Satin (215)
1 coat Akzo Glidden Professional Diamond 350 Flat GP 1201
1 coat S-W Pro Green 200 Interior Latex Flat, B30-600
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Flat Z8100
Second Coat: 1 coat Regal Wall Satin (215)
1 coat Akzo Glidden Professional Diamond 350 Flat GP 1201
1 coat S-W Pro Green 200 Interior Latex Flat, B30-600
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Flat Z8100
a. Total DFT not less than: 3.6 mils

F. Interior Painted Wood (IPT-4)

Satin Finish/Latex

- Primer: 1 coat Moore's Fresh Start 023
1 coat Akzo Glidden Professional Gripper GP 3210
1 coat S-W Premium Wall and Wood Primer B28W111
1 coat Pratt and Lambert Suprime Interior/Exterior 100% Acrylic
Multi Purpose Primer Z1001
First Coat: 1 coat Waterborne Satin Impervo 314
1 coat Akzo Glidden Professional Diamond 350 Acrylic Eggshell GP
1403
1 coat S-W Pro Green 200 Interior Latex Egg-Shell, B20-600
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Satin Z9490
Second Coat: 1 coat Waterborne Satin Impervo 314
1 coat Akzo Glidden Professional Diamond 350 Acrylic Eggshell GP
1403
1 coat S-W Pro Green 200 Interior Latex Egg-Shell, B20-600
1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Satin Z9490
a. Total DFT not less than: 4.0 mils

Semi-Gloss Finish/Latex

- Primer: 1 coat Moore's Fresh Start 023
1 coat Akzo Glidden Professional Gripper GP 3210
1 coat S-W Premium Wall and Wood Primer B28W111
1 coat Pratt and Lambert Suprime Interior/Exterior 100% Acrylic
Multi Purpose Primer Z1001

- First Coat: 1 coat Moore's Regal AquaGlo 333
 1 coat Akzo Glidden Professional Diamond 350 Acrylic S/G GP 1407
 1 coat Pro Green 200 Interior Latex S. Gloss, B31-600
 1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Semi-Gloss
 Z8300
- Second Coat: 1 coat Moore's Regal AquaGlo 333
 1 coat Akzo Glidden Professional Diamond 350 Acrylic S/G GP 1407
 1 S-W Pro Green 200 Interior Latex S. Gloss, B31-600
 1 coat Pratt and Lambert; Pro Hide Gold Interior Latex Semi-Gloss
 Z8300
- a. Total DFT not less than: 3.8 mils

G. Concrete Floor Paint

- Primer: 1 coat I.M.C. Polyamide Epoxy Clear Sealer/Finish (CM36-00/M37)
 First Coat: 1 coat IM.C. Polyamide Epoxy Semi-Gloss (M36/M38)
 Second Coat: Same as second coat.
 Broadcast M67 anti slip aggregate in the first coat.

2.5 EXISTING SURFACES TO BE PAINTED

- A. Existing surfaces shall be painted in accordance with schedule given in Article 2.4 and on drawings herein except that first or prime coat may be eliminated where existing paint is sound. Where existing paint must be removed down to base material, provide first or prime coat as specified.

2.6 PIPING AND MECHANICAL EQUIPMENT EXPOSED TO VIEW

- A. Paint all exposed piping, conduits, ductwork and mechanical and electrical equipment. Use heat resisting paint when applied to heating lines and equipment. The Contractor is cautioned not to paint or otherwise disturb moving parts in the mechanical systems. Mask or otherwise protect all parts as required to prevent damage.
- B. Exposed Uncovered Ductwork, Piping, Hangers and Equipment: Latex Enamel Undercoater and one (1) coat Acrylic Latex Flat.
- C. Exposed Covered Piping, Duct Work and Equipment: Primer/Sealer and one (1) coat Acrylic Latex Flat.
- D. Panel Boards, Grilles and Exposed Surfaces of Electrical Equipment: Latex Enamel Undercoater and two (2) coats Latex Semi-Gloss.
- E. Equipment or Apparatus with Factory-Applied Paint: Refinish any damaged surfaces to match original finish. Do not paint over name plates and labels.
- F. All surfaces of insulation and all other work to be painted shall be wiped or washed clean before any painting is started.
- G. All conduit, boxes, distribution boxes, light and power panels, hangers, clamps, etc., are included where painting is required.
- H. All items of Mechanical and Electrical trades which are furnished painted under their respective Contracts shall be carefully coordinated with the work of this Section so as to leave no doubt as to what items are scheduled to be painted under this Section.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where painting and finishing are to be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 GENERAL WORKMANSHIP REQUIREMENTS

- A. 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%; and 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. Only skilled mechanics shall be employed. Application may be by brush or roller. Spray application only upon acceptance from the Commissioner in writing.
- D. The Contractor shall furnish the Commissioner a schedule showing when he expects to have completed the respective coats of paint for the various areas and surfaces. This schedule shall be kept current as the job progresses.
- E. The Contractor shall protect his work at all times, and shall protect all adjacent work and materials by suitable covering or other method during progress of his work. Upon completion of the work, he shall remove all paint and varnish spots from floors, glass and other surfaces. He shall remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and shall leave his part of the work in clean, orderly and acceptable condition.
- F. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide ample in place protection. Upon completion of each space, carefully replace all removed items by workmen skilled in the trades involved.
- G. Remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.
- H. All materials shall be applied under adequate illumination, evenly spread and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.
- I. Coverage and hide shall be complete. When color, stain, dirt or undercoats show through final coat of paint, the surface shall be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to the City of New York.

- J. All coats shall be dry to manufacturer's recommendations before applying succeeding coats.
- K. Do not apply paint behind frameless mirrors that use mastic for adhering to wall surface.

3.3 PREPARATION OF SURFACES

- A. Existing Surfaces: Clean existing surfaces requiring paint or finishing, remove all loose and flaking paint or finish and sand surface smooth as required to receive new paint or finish. No "telegraphing" of lines, ridges, flakes, etc., through new surfacing is permitted. Where this occurs, Contractor shall be required to sand smooth and re-finish until surface meets with Commissioner's approval.

- B. General

1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished shall be perfectly dry, clean and smooth.
2. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.

- C. Metal Surfaces

1. Weld Fluxes: Remove weld fluxes, splatters, and alkali contaminants from metal surfaces in an approved manner and leave surface ready to receive painting.
2. Bare Metal: Thoroughly clean off all foreign matter such as grease, rust, scale and dirt before priming coat is applied. Clean surfaces, where solder flux has been used, with benzene. Clean surfaces by flushing with mineral spirits. For aluminum surfaces, wipe down with an oil free solvent prior to application of any pre-treatment.
 - a. Bare metal to receive high performance coating specified herein must be blast cleaned SSPC SP-6 prior to application if field applied primer; coordinate with steel trades furnishing ferrous metals to receive this coating to insure that this cleaning method is followed.
3. Shop Primed Metal: Clean off foreign matter as specified for "Bare Metal." Prime bare, rusted, abraded and marred surfaces with approved primer after proper cleaning of surfaces. Sandpaper all rough surfaces smooth.
4. Galvanized Metal: Prepare surface as per the requirements of ASTM D 6386.

5. Metal Filler: Fill dents, cracks, hollow places, open joints and other irregularities in metal work to be painted with an approved metal filler suitable for the purpose and meeting the requirements of the related Section of work; after setting, sand to a smooth, hard finish, flush with adjoining surface.
- D. Gypsum Drywall Surfaces: Scrape off all projections and splatters, spackles all holes or depressions, including taped and spackled joints, sand smooth. Conform to standards established in Section 092900, "Gypsum Drywall."
- E. Wood Surfaces: Sand to remove all roughness, loose edges, splinters, or splinters and then brush to remove dust. Wash off grease or dirt with an approved cleaner. Fill all cracks, splits, nail holes, screw holes, and surface defects with putty after the priming coat has been applied. Putty shall be brought up flush with the surface and sanded smooth and touched-up with primer when dry.
- F. Block Masonry Surfaces: Thoroughly clean off all grit, grease, dirt mortar drippings or splatters, and other foreign matter. Remove nibs or projections from masonry surfaces. Fill cracks, holes or voids, not filled under the "Masonry" Section, with Portland cement grout, and bag surface so that it has approximately the same texture as the adjacent masonry surface.
- G. Testing for Moisture Content: Contractor shall test all plaster, masonry, and drywall surfaces for moisture content using a reliable electronic moisture meter. Contractor shall also test latex type fillers for moisture content before application of top coats of paint. Do not apply any paint or sealer to any surface or to latex type filler where the moisture content exceeds seven (7) percent as measured by the electronic moisture meter.
- H. Touch-Up: Prime paint all patched portions in addition to all other specified coats.

3.4 MATERIALS PREPARATION

- A. Mix and prepare painting materials in strict accordance with the manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir all materials before application to produce a mixture of uniform density, and as required during the application of the materials. Do not stir any film which may form on the surface into the material. Remove the film and, if necessary, strain the material before using.
- D. Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are to be applied. Tint undercoats to match the color of the finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

3.5 APPLICATION

A. General

1. Apply paint by brush or roller in accordance with the manufacturer's directions. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high pile sheep's wool as recommended by the paint manufacturer for material and texture required.
2. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried. Sand between each enamel or varnish coat application with fine sandpaper, or rub surfaces with pumice stone where required to produce an even, smooth surface in accordance with the coating manufacturer's directions.
3. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.
4. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - a. "Exposed surfaces" is defined as those areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, etc., are in place in areas scheduled to be painted.
5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint, before final installation of equipment.
6. Paint the back sides of access panels, removable or hinged covers to match the exposed surfaces.
7. Finish doors on tops, bottoms, and side edges the same as the faces, unless otherwise indicated.
8. Enamel finish applied to wood or metal shall be sanded with fine sandpaper and then cleaned between coats to produce an even surface.
9. Paste wood filler applied on open grained wood after beginning to flatten, shall be wiped across the grain of the wood, then with a circular motion, to secure a smooth, filled, clean surface with filler remaining in open grain only. After overnight dry, sand surface with the grain until smooth before applying specified coat.

B. Scheduling Painting

1. Apply the first coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

2. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- C. Prime Coats: Re-coat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- D. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage.
- E. "Touching-Up" of Factory Finishes: Unless otherwise specified or shown, materials with a factory finish shall not be painted at the project site. To "touch-up," the Contractor shall use the factory finished material manufacturer's recommended paint materials to repair abraded, chipped, or otherwise defective surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether to be painted or not, against damage by the painting and finishing work. Leave all such work undamaged. Correct any damages by cleaning, repairing or replacing, and repainting, as acceptable to the Commissioner.
- B. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.7 CLEAN UP

- A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
- B. Upon completion of painting work, clean window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION

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SECTION 101400

IDENTIFYING DEVICES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and services, and perform all operations in connection with the furnishing and installing of identifying devices, complete in accordance with the Drawings and Specifications.

- 1. Panel signs.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Carpentry - Section 062000.
- F. Exit signs - Division 26.

1.4 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications.
 - 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 - 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 - 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits,

then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Commissioner for review.
 - B. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of unit.
 - C. Shop Drawings: Include plans, elevations and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.
 - D. Samples for Initial Selection: For each type of sign material indicated that involves color section.
 1. Dimensional Characters: Full-size samples of each type of dimensional character (letter and number) required. Show character style, material, finish, and method of attachment.
 2. Panel Signs: Submit samples of each sign showing finishes, colors, surface textures and qualities of manufacture and design of each sign component, including graphics.
 3. Approved samples will not be returned for installation into Project.

1.5 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. Installer Qualifications: An employer of workers trained by signage manufacturer.
- C. Source Limitations: Obtain each sign type through one source from a single manufacturer.
- D. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions and Barrier Free Regulations as adopted by authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimension of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Comply with manufacturer's ordering instructions and Lead Time requirements to avoid construction delays.
- B. Deliver products in manufacturers original, unopened, undamaged containers.
- C. Store products protected from weather, temperature and other harmful conditions as recommended by manufacturer.
- D. Handle products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 PANEL SIGNS

- A. Etched zinc with brished aluminum letters.
- B. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, of letters, numbers, and other graphic devices.
- C. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surfaces, in contrasting color.
- D. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures, or other characteristics related to appearance, provide colors and surface textures as selected by Commissioner.
- E. Acceptable Manufacturers for Panel Signs: Subject to compliance with requirements, provide interior panels signs manufactured by ASI Sign Systems, Inc., or equivalent of Best Sign Systems, Inc., Mohawk Sign Systems, or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
- B. Field-Applied, Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages, and apply

and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.

- C. Dimensional Letters and Numbers: Mount letters and numbers using standard fastening methods recommended by the manufacturer for letter form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.

- 1. Projected Mounting: Mount letters at the projection distance from the wall surface indicated.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturers written instructions. Protect signs from damage until acceptance by the City of New York.

END OF SECTION

SECTION 102114

TOILET PARTITIONS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the toilet partitions as shown on the drawings and/or specified herein.
 - 1. Floor-mounted toilet partitions.
 - 2. Wall-hung urinal screens.

1.3 RELATED SECTIONS

- A. Waste Management Requirements – Section 017419.
- B. Sustainable Design Requirements – Section 018113.
- C. VOC Limits for Adhesives, Sealants and Architectural Coatings – Section 018114.
- D. Indoor Air Quality Requirements – Section 018119.
- E. Gypsum board partitions - Section 092900.
- F. Ceramic tile - Section 093000.
- G. Toilet accessories - Section 102813.

1.4 QUALITY ASSURANCE

- A. Field Measurements: Take field measurements prior to fabrication to ensure proper fitting of the work.
- B. Inserts and Anchorages: Furnish inserts and anchoring devices which must be built into other work for the installation of toilet partitions and related work. Coordinate delivery with other work to avoid delay.
- C. LEED BUILDING PERFORMANCE CRITERIA: Products of this Section shall meet the following requirements and shall be documented in accordance with the LEED BUILDING SUBMITTAL REQUIREMENTS of this Section:
 - 1. Products of this Section which have been extracted, harvested or recovered, as well as manufactured (location of final assembly), within 500 miles of the project site shall be identified and documented.

2. Field-applied interior adhesives, sealants, and paints relating to work of this Section shall meet the requirements of Section 018114 "VOC Limits for Adhesives, Sealants and Architectural Coatings," and shall be identified and documented.
 3. Certification of criteria shall be in accordance with the Submittal Requirements of this section.
 4. Wood shall meet FSC and LEED standards noted in Section 064023.
- D. **Installer Qualifications:** Specialized wood flooring firm with not less than 3 years' successful experience in installation of types specified, and acceptable to manufacturer of wood flooring.
- E. **Source Quality Control:** Obtain flooring of each type from single manufacturer or source, to ensure match of quality, color, pattern and texture.

1.5 SUBMITTALS

A. LEED BUILDING SUBMITTAL REQUIREMENTS

1. The Contractor and their sub-contractors shall submit the LEED BUILDING Certification items listed herein. LEED BUILDING Submittals shall include the following:
 - a. For all installed products and materials of this Section, complete the ENVIRONMENTAL MATERIALS REPORTING FORM (blank copy attached at end of Section 018113 "Sustainable Design Requirements"). Information to be supplied for this Form shall include:
 - 1). Cost breakdowns for the materials included in the Contractor or sub-contractor's work. Cost breakdowns shall include total installed cost and material-only cost.
 - 2). The percentages (by weight) of post-consumer and/or post-industrial recycled content in the supplied product(s).
 - 3). Indication (Y/N) of whether the raw materials have been extracted, harvested or recovered, as well as the final product has been manufactured (location of final assembly), within 500 miles of the project site.
 - 4). For all field-applied interior adhesives, sealants, and paints relating to work of this Section, provide the Volatile Organic Compound (VOC) content in grams/liter or lbs./gallon.
 - b. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the product information supplied for the ENVIRONMENTAL MATERIALS CERTIFICATION FORM.
 - c. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as stated below. Cut sheets shall be submitted with the Construction Manager or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.

- d. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
2. The LEED BUILDING Submittal information outlined above shall be assembled into one (1) package per Specification section or sub-contractor. Incomplete or inaccurate LEED Submittals may be used as the basis for rejecting the submitted products or assemblies.
- B. Shop Drawings: Before any of the materials of this Section are delivered to the job site, submit the following:
1. Room layouts and elevations for all areas, with dimensions based on actual dimensions taken at job site.
 2. Materials, finishes, details of construction, gauges of metal, hardware, fastening and anchoring conditions and relation to adjoining constructions.
- C. Samples: Submit the following:
1. One 12" x 12" sample of stainless steel.
 2. One sample of each type of hardware and fitting item including related fasteners. Include all items listed under 2.3 C. below.
- D. Templates: Submit templates to other trades as required for support of toilet partitions.

PART 2 PRODUCTS

2.1 TOILET PARTITIONS AND VISION SCREEN/TYPES AND MANUFACTURERS

- A. Provide toilet partitions and vision screens of the types indicated, as manufactured by one of the following, or approved equal:
1. "Flushart" of Flush-Metal Partition Corp.
 2. "Floor Anchored" of the Global Steel Products Corp.
 3. "Luxor Type FT-700" of the Metpar Co.
- B. Manufacturer's name or identifying markings are not permitted on exposed surfaces of metal toilet partition, vision screen, or related hardware.

2.2 URINAL SCREENS/TYPES AND MANUFACTURERS

- A. Provide wall mounted urinal screens of the types indicated, as manufactured by one of the following, or approved equal:
1. "WH Wall Hung" of Flush Metal Partition Corp.

2. "Wall Hung" of the Global Steel Products Corp.
 3. "Type T Wall Hung" of the Metpar Co.
- B. Manufacturer's name or identifying markings not permitted on exposed surfaces of urinal screens or related hardware.

2.3 MATERIALS FOR TOILET PARTITIONS AND SCREENS

- A. Stainless Steel Sheet: Prime quality stainless steel, cold rolled, stretcher leveled,) and bonderized.
- B. Core Insulation: Manufacturer's standard rot-proof and vermin-proof double faced honeycomb or corrugated type core material; required in all panels, screens, pilasters and doors.
- C. Hardware: Solid forged brass or stainless steel (Type 302 or 304), as indicated below. Stamped, cast alloy, or aluminum extrusions shall not be accepted.
1. Pilaster Shoes: Stainless steel, one piece (no visible joints or seams) flush or offset design, twenty (20) gauge.
 2. Hinges: Gravity hinge type, self-closing, concealed within door, fully adjustable, to bring door to rest in thirty (30) degree open position. Hinge brackets solid forged brass or stainless steel, with solid stainless steel pin and pintles.
 3. Latch: Solid forged stainless steel with solid stainless steel slide.
 4. Strike and Keeper: One piece, sixteen (16) gauge stainless steel, with rubber bumper mechanically applied and theft proof.
 5. Bumper Coat Hook: Solid forged stainless steel, with ferrule held rubber bumper on back of each toilet compartment door.
 6. Stirrup Brackets: Fourteen (14) gauge stainless steel or forged brass.
 7. Hardware Finishes
 - a. On Stainless Steel: No. 4, Satin Finish.
- D. Fasteners: Provide exposed fasteners of stainless steel or chromium plated brass, same finish as adjoining metal, theft proof. Provide concealed fasteners of non-corrosive metal.
- E. Furnish galvanized steel anchorage devices, complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters, to permit structural connection at floor. Furnish shoe at each pilaster to conceal anchorage.

2.4 FABRICATION

- A. Minimum Acceptable Metal Gauges
1. Face Sheets for Panels and Screens: Twenty (20) gauge stainless steel sheet.
 2. Face Sheets for Doors: Twenty-two (22) gauge stainless steel sheet.

3. Face Sheets for Pilasters: Sixteen (16) gauge stainless steel sheet for baked enamel finish, unless otherwise indicated.
 - a. For pilasters less than four (4) inches wide - fourteen (14) gauge.
 4. Edge Moldings: Eighteen (18) gauge stainless steel.
 5. Concealed Reinforcement: Fourteen (14) gauge stainless steel for tapping and twelve (12) gauge stainless steel for anchoring devices.
- B. Thicknesses
1. Panels, Screens and Doors: One (1) inch overall thickness.
 2. Pilasters: 1-1/4" overall thickness.
- C. Sizes: As shown on drawings. Pilasters for compartments shall all be of the same width, except end pilasters which shall be approximately 1/2 the normal width.
- D. Construction
1. Panels, screens, doors and pilasters shall have face sheets, with formed edges, pressure cemented to each side of core insulation, providing flat, smooth surface, free of waves, warping, buckles or other defects.
 2. Lock edges of face sheets together by either concealed tack welding face sheets at contacting edges at eight (8) inches o.c. and installing interlocking edge molding, or by using a combination integral edge molding and internal reinforcing channel epoxy bonded to face sheets.
 3. Edge molding shall have corners mitered, welded or brazed, ground flush and finished to match adjacent surfaces. Corners, caps or exposed welds not permitted.
 4. Provide concealed reinforcement for hardware, grab bars, fastenings and accessories specified for in both work of this Section and in work of other Sections (such as Toilet Accessories), and for rigidity, strength and support of units in accordance with requirements of type and use of metal toilet partitions. Cut partitions in shop to receive toilet accessories, using templates furnished by Section 102813.
- E. Compartment Sizes: Unless otherwise indicated, minimum dimensions of components for toilet compartments shall be as follows:
1. Enclosure Height: 5'-10".
 2. Typical Door Width: 2'-0".
 3. Door Width for Barrier Free Compartments: 2'-10".
 4. Door Height: 4'-0".
 5. Floor Clearance: 1'-0".

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where toilet partitions are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install work of this Section in a rigid and permanent manner, straight and plumb, with all horizontal lines level.
- B. Install panels and doors twelve (12) inches above finished floor, unless otherwise indicated. Toilet compartment doors shall be centered on water closets, unless otherwise indicated.
- C. Maintain uniform clearance of approximately 1/2" between pilasters and panels, and 1/2" between pilasters or panels and finished wall.
- D. Maintain uniform clearance of 1/4" or less between vertical edges of doors and pilasters.
- E. Set pilaster units with anchorages having not less than two (2) inches penetration into structural floor. Level, plumb, and tighten installation with devices furnished. Hang doors and adjust so that tops of doors are level with tops of pilasters when doors are in closed position.

END OF SECTION

SECTION 102219

DEMOUNTABLE PARTITIONS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the demountable partitions as shown on the drawings and/or specified herein, including but not limited to the following:
 - 1. Partition system.
 - 2. Doors and frames in partition system.
 - 3. Finish hardware for doors.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Hollow metal doors and frames - Section 081113.
- F. Finish hardware - Section 087100.
- G. Glass and Glazing - Section 088000.
- H. Drywall - Section 092900.
- I. Electrical - Division 26.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions,

or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.

- B. **LEED BUILDING Performance Criteria:** The following criteria are **REQUIRED** for the products included in this section:
 - 1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018419: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- C. **Manufacturer:** Provide office partition system manufactured by a single firm specializing in production of this type of work.
- D. **Shop Assembly:** Preassemble items in shop to greatest extent possible. Disassemble units only to extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- E. Installed partitions shall have a deflection limit of $L/240$ when subject to a 5 psf uniform lateral load and a concentrated load of 200 lbs.

1.5 SUBMITTALS

- A. **LEED BUILDING Submittal Requirements:** The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the products.
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. Product Data: Submit manufacturer's detailed materials and fabrication specifications and installation instructions. Include catalog cuts of hardware, fastenings and other data as required.
 - C. Shop Drawings: Submit shop drawings for fabrication and erection of partition assemblies which are not fully described by manufacturer's data. Show anchorage and accessory items and finishes.
 - D. Samples: Submit samples of each required finish and color. Prepare samples on same materials which will be used in partition assemblies.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver demountable panel partition components cartoned or crated to provide protection during transit and job storage.
- B. Inspect partition components upon delivery for damage. Minor damages may be repaired, provided finish items are equal to new work and acceptable to Commissioner. Remove and replace damaged items as directed.
- C. Store partition components on raised platforms in vertical positions with blocking between units to allow air circulation. Keep stored material covered and protected from damage.

PART 2 PRODUCTS

2.1 PARTITION SYSTEM

- A. Provide customized Acme Series 50 office partition system as manufactured by Inscape - Architectural Interiors, or equivalent of DIRTT, Transwall, or approved equal.
 1. Profiles: 16 ga cold rolled steel, 1-1/2" x 2-1/2"
 2. Finish: Powder coated metallic gray

2.2 MATERIALS

- A. Metal: Steel, cold-rolled, annealed, stretcher-leveled furniture stock free of pits, scale, and other surface defects, conforming to ASTM A 366, Type B, CS (commercial steel).
 1. Posts shall be formed of 18 gauge steel.

2. Bases shall be formed of 18 gauge steel, independently removable for access to wiring raceways.
 3. End fillers and closures shall be formed of 20 gauge steel and filled with 6 lb. density acoustic fiberglass insulation. Perimeter shall be sealed with acoustical sealant (USG, Tremco, Pecora, or approved equal).
 4. Panels shall be fabricated of 16 gauge steel.
 5. Ceiling channel shall be fabricated of 18 gauge steel.
- B. Glass and Glazing Accessories: Conform to the requirements of Section 088000.
 - C. Doors and Frames: Conform to the requirements of Section 081113.
 - D. Door Hardware: Conform to the requirements of Section 087100.
 - E. Insulation: Inorganic, incombustible mineral wool filler for sound deadening.
 - F. Light and Sound Seals: Dense, compressible neoprene or other acceptable flexible, non-hardening gasket material.

2.3 FABRICATION

- A. Panels: Flush hollow unit construction, minimum 16 gauge steel facing sheets, smooth and free of buckles, oil canning, and seams. Provide stiffening members welded to inside surfaces of panel faces or provide gypsum board backing solidly laminated to entire back surface of panel. Enclose perimeter edges of each panel with metal.
 1. Construct panels to interlock with adjoining panels or use internal vertical supports to ensure secure, rigid joints. Provide integral glazing recesses or other frame for glass at glazed openings. Insulate panels with inorganic mineral filler packed solidly for sound deadening.
- B. Base: Provide recessed, steel channel, 18 ga.
- C. Ceiling Trim: Minimum 20 gauge steel continuous profile, adjustable to variations in ceiling level, securely fastened to ceiling, with light and sound seal at ceiling contact.
- D. Field Joints: Provide concealed splice at field joints to ensure rigidity and alignment.
- E. Electrical Cutouts: Provide cutouts in panels or base for electrical outlets shown on Electrical drawings. Coordinate exact location and size with Electrical Work specified in Division 26.
- F. Door Frames: 18 gauge minimum steel, vertically adjustable to suit floor irregularities, with continuous sound-deadening closure seals at jamb and head stops. Mortise and reinforce frames to retain required hardware and to stiffen frame. Drill and tap for machine screws for mortise hardware per templates furnished with hardware. Conform to the requirements of Section 081113.
 1. Reinforce heads of frames to receive surface-mounted door closers whether or not such closures are indicated.

- G. Doors: Manufacturer's standard 2" x 2" thick flush or glazed hollow steel doors, formed of 20 gauge min. stainless steel face sheets. Pack interior of doors with inorganic mineral filler sound-deadening material.
 - 1. Door heights must be verified in the field by the Contractor and coordinated prior to fabrication.
 - 2. Factory prepare and reinforce doors to receive required hardware. Make cutouts and mortises and drill and tap for machine screws for mortise hardware per templates furnished with hardware.
 - 3. Conform to the requirements of Section 081113.
- H. Hardware: Install locks, door closers, door stops, thresholds, and other hardware furnished under the "Finish Hardware" Section 087100 for doors in demountable partitions. Install door bottoms and lock-reinforcing units at factory. Install other hardware at job site.
- I. Furnish and install the following hardware:
 - 1. Off set center hung pivot hardware.
 - 2. Fasteners: Provide Phillips-head screws and bolts, nuts, washers, grommets, and other fastening devices of appropriate type, metal, and finish. Countersink screws and bolts.
- J. Finishes: Steel to be shop finished with manufacturer's standard factory applied paint finish complying with ANSI A250.3; custom color and glass as selected by the Commissioner.
- K. Glazing: Set glass in glazing strips for firm retention and tight seal and to permit easy removal and reinstallation without damage. Loose glazing stops and exposed screws are not acceptable.
- L. Connectors and Accessories: Provide connectors, fasteners, and accessories required for rigid, secure, complete, and finished demountable metal partition system.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where demountable partitions are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Commissioner.

3.2 INSTALLATION

- A. Install partitions before floor coverings and after suspended drywall ceilings have been installed. Coordinate partition work with work of other trades which are affected by partition installation. Avoid damage to installed work.

- B. Repair damaged or defaced work or replace with new work, as acceptable to Commissioner. Completely refinish defaced partition components with factory finished materials, or replace defaced components.
- C. Furnish, drill for and install anchoring devices required, and secure partitions to floor, ceiling and walls, using concealed fasteners.
- D. Install partitions rigid, level, plumb and in alignment, with components secure together, in accordance with manufacturer's instructions.
- E. Provide through posts to ceiling, or other concealed supports as required to assure lateral stability of partition runs.
- F. Install continuous and positive seal to prevent light and sound transmission at partition contacts with floor, ceiling, wall and other abutting surfaces.
- G. Adjust hardware and doors and leave in proper operating condition.

END OF SECTION

SECTION 102813

TOILET ACCESSORIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the toilet accessories as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Gypsum board partitions - Section 092900.
- F. Ceramic tiling - Section 093013.
- G. Toilet partitions - Section 102113.
- H. Electrical - Division 26.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.
- C. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units. Accessories shall be installed at heights that comply with the prevailing Handicapped Code.

- D. **Products:** Unless otherwise noted, provide products of same manufacturer for each type of unit and for units exposed in same areas.
- E. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 SUBMITTALS

- A. **LEED BUILDING Submittal Requirements:** The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. **Material cost breakdowns,** submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications.
 - 2. **Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM,** as requested by the Commissioner.
 - 3. **Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM,** as requested by the Commissioner.
 - 4. **Material Safety Data Sheets, for all applicable products.** Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 - 5. **The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Commissioner for review.**
- B. **Product Data:** Submit manufacturer's technical data, catalogue cuts and installation instructions for each toilet accessory.
- C. **Setting Drawings:** Provide setting drawings, templates, instructions, and directions for installation of anchorage devices in other work.
- D. **Submit schedule of accessories indicating quantity and location of each item.**

1.6 PRODUCT HANDLING

- A. **Deliver accessories to the site ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type or material, manufacturer's name and brand name.** Delivered materials shall be identical to approved samples.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gauge minimum, unless otherwise indicated.
- B. Brass: ASTM B 19 flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Galvanized Steel Sheet: ASTM A 653, G60.
- D. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.
- E. Mirrors: ASTM C 1503, mirror glazing quality, clear glass mirrors, nominal 1/4" thick.

2.2 FASTENING DEVICES

- A. Exposed Fasteners: Theftproof type, chrome plated, or stainless steel; match finishes on which they are being used.
- B. Concealed Fasteners: Galvanized (ASTM A 123) or cadmium plated.
- C. No exposed fastening devices permitted on exposed frames.
- D. For metal stud drywall partitions, provide ten (10) gauge galvanized sheet concealed anchor plates for securing surface mounted accessories.

2.3 FABRICATION

- A. General: Stamped names or labels on exposed faces of toilet accessory units are not permitted. Unobtrusive labels on surfaces not exposed to view are acceptable. Where locks are required for a particular type of toilet accessory, provide same keying throughout project. Furnish two keys for each lock.
- B. Surface-Mounted Toilet Accessories, General: Fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage.
- C. Recessed Toilet Accessories, General: Fabricate units of all welded construction, without mitered corners. Hang doors or access panels with full-length stainless steel piano hinge. Provide anchorage which is fully concealed when unit is closed.

2.4 MANUFACTURERS

- A. Provide products manufactured by Bobrick Washroom Equipment Co., Kimberley Clark, Toto, American Specialties, Inc., Bradley Corp., or approved equal.

2.5 ACCESSORY SCHEDULE

- A. See Drawings.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where toilet accessories are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PREPARATION

- A. Accessories which are to be partition mounted shall be closely coordinated with other trades, so that the necessary reinforcing is provided to receive the accessories.
- B. Furnish templates and setting drawings and anchor plates required for the proper installation of the accessories at gypsum drywall and masonry partitions. Coordinate the work to assure that base plates and anchoring frames are in the proper position to secure the accessories.
- C. Verify by measurements taken at the job site those dimensions affecting the work. Bring field dimensions which are at variance with those on the approved shop drawings to the attention of the Commissioner. Obtain decision regarding corrective measures before the start of fabrication of items affected.
- D. Cooperate in the coordination and scheduling of the work of this Section with the work of other Sections so as not to delay job progress.

3.3 INSTALLATION

- A. Install accessories at locations indicated on the drawings, using skilled mechanics, in a plumb, level and secure manner.
- B. Concealed anchor assemblies for gypsum drywall partitions shall be securely anchored to metal studs to accommodate accessories. Assemblies shall consist of plates and/or angles tack welded to studs.
- C. Secure accessories in place, at their designated locations by means of theftproof concealed set screws, so as to render removing of the accessory with a screwdriver impossible.
- D. Unless otherwise indicated, accessories shall conform to heights from the finished floor as shown on the drawings. Where locations are not indicated, such locations shall be as directed by the Commissioner.
- E. Installed accessories shall operate quietly and smoothly for use intended. Doors and operating hardware shall function without binding or unnecessary friction. Dispenser type accessories shall be keyed alike. Prior to final acceptance, master key and one duplicate key shall be given to City of New York's authorized agent.
- F. The Commissioner shall be the sole judge of workmanship. Workmanship shall be of the highest quality. Open joints, weld marks, poor connections, etc., will not be permitted. The Commissioner has the right to reject any accessory if he feels the workmanship is below the standards of this project.

- G. Grab bars shall be installed so that they can support a three hundred (300) lb. load for five minutes per ASTM F 446.

3.4 CLEANING AND PROTECTION

- A. Upon completion of the installation, clean accessories of dirt, paint and foreign matter.
- B. During the installation of accessories and until finally installed and accepted, protect accessories with gummed canvas or other means in order to maintain the accessories in acceptable condition.
- C. Replace and/or repair installed work which is damaged or defective to the City of New York's satisfaction, at no additional cost.

END OF SECTION

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SECTION 104416

FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the fire extinguishers and cabinets as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Gypsum drywall - Section 092116.
- F. Fire suppression systems - Division 22.
- G. Fire hose cabinets and valve cabinets - Division 22.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. Provide portable fire extinguishers, cabinets and accessories by one manufacturer.
- C. UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

1.5 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications.
 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Commissioner for review.
- B. Product Data: Submit manufacturer's technical data and installation instructions for all portable fire extinguishers required. For fire extinguisher cabinets include roughing-in dimensions, and details showing mounting methods, relationships to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, style and materials. Where color selections by Commissioner are required, include color charts showing full range of manufacturer's standard colors and designs available.
- C. Samples: Submit samples, 6" square, of each required finish. Prepare samples on metal of same gauge as metal to be used in the work. Where normal color variations are to be expected, include 2 or more units in each sample showing the limits of such variations.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following:
1. J. L. Industries.
 2. Larsen's Mfg. Co.
 3. Potter Roemer.

2.2 EXTINGUISHERS

- A. **General:** Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in colors and finishes selected by Commissioner from manufacturer's standard which comply with requirements of governing authorities.
- B. Abbreviations indicated below to identify extinguisher type related to UL classification and rating system and not necessarily to type and amount of extinguishing material contained in extinguisher.
- C. **Multi-Purpose Dry Chemical Type:** UL rated 2A-10B:C, 5 lb. nominal capacity, in enameled steel container, for Class A, Class B and Class C fires.

2.3 MOUNTING BRACKETS

- A. Provide manufacturer's standard bracket designed to prevent accidental dislodgment of extinguisher, of proper size for type and capacity of extinguisher specified, in manufacturer's standard enamel finish; color to match extinguisher.

2.4 CABINETS

- A. **Type and Style:** Fire extinguisher cabinets shall be metal, recessed, with plexiglass panel, sized to fit within the partition or wall depth. Provide fire rated cabinets within fire rated partitions.
- B. **Color:** Stainless steel No. 4 finish.
- C. Design is based on "Model G-2409-R1" of Larsen's Mfg. Co. Other manufacturers noted herein may substitute their equivalent cabinet upon acceptance by the Commissioner.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where fire extinguishers and cabinets are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install items included in this Section in locations indicated and at heights to comply with applicable regulations of governing authorities.
 - 1. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
 - 2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.
- B. Where exact location of cabinets and bracket-mounted fire extinguishers is not indicated, locate as directed by the Commissioner.

3.3 IDENTIFICATION

- A. Identify fire extinguisher in cabinet with lettering spelling "FIRE EXTINGUISHER" painted on door by silk-screen process. Provide lettering on door as selected by Commissioner from manufacturer's standard letter sizes, styles, colors and layouts.
- B. Identify bracket-mounted extinguishers with red letter decals spelling 'FIRE EXTINGUISHER' applied to wall surface. Letter size, style and location as selected by the Commissioner.

3.4 SERVICE

- A. Determine the approximate completion date of the work and then inspect, charge, and tag the fire extinguishers at a date not more than 10 days before or not less than one day before actual completion date of the work.

END OF SECTION

SECTION 11 24 29

FALL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and General Requirements

1.2 SUMMARY

A. Section Includes:

- 1) The work in this section includes furnishing and installing an OSHA approved fall restraint system including the following major elements and associated accessories for the MCC Theater:
 - a. Installed Personnel Safety Fall Restraint System
 - b. Personnel Safety Fall Restraint Loose Equipment
 - c. User Instruction and Operations Manual
 - d. Instruction and Demonstration for Operators
 - e. Miscellaneous Rigging
- 2) Complete site survey, design, engineering, fabrication and installation of fall protection system and devices for theatrical technical locations at the MCC Theater.
- 3) Furnish all materials, components and services required to provide the work as specified herein, elsewhere in the project documents and/or as shown on related drawings.
- 4) Consult and coordinate with other affected work and contractors throughout the course of the work contained herein.

B. Products Supplied But Not Installed Under This Section

- 1) Loose equipment and accessories as detailed in this section.

C. Coordinate with all related sections of the specifications including, but not limited to:

- 1) Division 03 - Concrete.
- 2) Division 04 - Masonry.
- 3) Division 05 - Metals.
- 4) Division 09 - Finishes.

1.3 REFERENCES

- A. Reference the NYC DDC General Conditions for general project references and standards.

References to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.

- B. If an applicable code or standard permits work of lesser quality or extent than this specification, this specification and the related drawings will govern.
- C. Comply with prevailing local codes and applicable Underwriters Laboratory standards.
- D. Comply with national, state and local labor regulations and requirements.
- E. Equipment to have pertinent labels.
- F. Contractor shall know, understand, and comply with applicable OSHA and other regulatory requirements in New York, New York that govern the installation and testing of equipment in this section.

1.4 DEFINITIONS

- A. Reference the NYC DDC General Conditions for general project definitions.
- B. In all cases where a device or a part of equipment is referred to in a singular manner within the contract documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the project documents.
- C. "Contractor": Specialty Contractor/Manufacturer for the work contained in this section only. Contractors involved with other portions of the work shall be indicated with a specific trade preceding the word "Contractor" (i.e. General, Electrical, etc.).
- D. "Furnish": Purchase and/or fabricate and deliver to project site.
- E. "Install": Physically install the items in their proper location(s) on the project site.
- F. "Provide": Furnish and install complete, functioning and Complete With All Necessary Accessories (CWANA).

1.5 SYSTEM DESCRIPTION

- A. Personal Safety Fall Restraint System.
 - 1) The personal safety fall restraint system shall be a complete system dedicated exclusively to this purpose. All components of the system shall comply with OSHA standards 1910, 1926 and ANSI Z359, and any other state or local regulations under which this system is governed.
 - 2) The system shall consist of horizontal wire rope lifelines, fixed length lanyards for fall restraint and personnel harnesses, to provide employee fall restraint in catwalk areas of the facility.
 - 3) Anchorages shall be installed in locations as shown on the drawings. Steel embed plates with connection tabs required for the attachment of the horizontal lifelines will be installed under structural work.

- 4) Permanently installed wire rope lifelines will span between anchorage rings where indicated on the drawings. Fixed length lanyards, used in conjunction with full body harnesses, shall be used to prevent personnel center of gravity from extending beyond edge of catwalks to provide fall restraint.
- 5) System shall be designed so that the user may pass any intermediate supports without disconnecting from lifeline.
- 6) It shall be the responsibility of the contractor to verify site measurements and to provide lanyard devices of proper length for each application as described below.
- 7) The system shall be designed to accommodate two employees working between the same anchorage points as required by OSHA standards.
- 8) The system shall remain dormant until a Letter of Certification is issued and instruction of all users is complete.
- 9) System Coverage areas:
 - a. Theater 1
 1. 1 - 60' Horizontal Lifeline
 2. 2 - 20' Horizontal Lifelines
 - b. Theater 2
 1. 2 - 51' Horizontal Lifelines
 2. 6 - 44' Horizontal Lifelines

B. Operations and User Instruction Manual

- 1) Provide a detailed "Operations and User Instruction Manual". This manual shall be used as part of a complete user instruction program. This user instruction shall meet or exceed the OSHA requirement as detailed in 1910.66 Appendix C. The manual shall include at minimum, proper anchoring and tie-off techniques and inspection and storage of equipment.
- 2) An individual, known as an expert in the field of fall protection systems, shall conduct (1) four-hour seminar, for no more than 20 people. This instruction will include information as detailed in the Operations and User Instruction Manual. All aspects of the user instruction are to be performed by all members of the seminar.

1.6 SUBMITTALS

- A. All submittals shall be submitted in accordance with New York City DDC General Conditions. All submittals shall be submitted in a timely manner, allowing sufficient time for adequate review and possible resubmittals without jeopardizing the project schedule.
- B. Submittals will be reviewed, accepted and field dimensions verified prior to proceeding with the fabrication of the work in this section. The Commissioner shall only mark one set of drawings per submittal with comments. Any additional sets of drawings or product data shall be returned unmarked.
- C. All submittals shall leave space available for review stamps and comments.
- D. Product Data: Submit catalog or standard data sheets for component parts as part of the shop drawing submittal. The data shall include all information, which indicates compliance

with the specifications herein. Clearly indicate the manufacturer of each component and part.

- 1) If any work is required to be specially tested or approved, whether by the City of New York's instructions or by any laws, ordinance or any public authority, the Contractor shall give the General Contractor and owner timely notice of its readiness for inspections, and of dates of inspections to be made by appropriate authorities.
- 2) All fall protection equipment shall comply with OSHA 1926.500 and ANSI Z359.1.

E. Shop Drawings:

- 1) All elements shall be engineered, approved and drawings stamped by a licensed professional engineer licensed in the State of New York. The engineer shall verify that the equipment supplied under this section meets or exceed the design criteria of this specification.
- 2) Include a cover sheet with a drawing index including the sheet number and title for each sheet in the set.
- 3) Provide a 4" x 4" area near the title block for review stamps and comments. This area should be in relatively the same location on each sheet.
- 4) Provide 1/4" = 1'- 0" plans of all locations which contain equipment in this contract. Show all equipment properly located, dimensioned and labeled. Note all work by others in the vicinity, which may affect work in this contract.
- 5) Inventory of all equipment to be supplied, including quantities, manufacturer's part number, reference to applicable drawings, etc.
- 6) Complete, fully dimensioned, large scale detailed fabrication drawings of all major components.
- 7) Requisite schematics, plans and sections indicating assembly and installation of components.
- 8) Indications by arrow and boxed caption of all variations from contract drawings and specifications, except where variation is indicated as acceptable.
- 9) Indicate all elements with appropriate safety factors and/or safety equipment.
- 10) Indicate recommended load limits for each element in the system with loading requirements.

F. Samples: Submit samples for approval within 14 days of written request. These items may include, but are not limited to:

- 1) Samples of fall protection components if requested by the Commissioner.
- 2) Samples of harness, lanyard, and lanyard connection devices.

G. Quality Control Submittal:

- 1) Design Data:
 - a. Confirm full structural compliance to these specifications.

- 2) Manufacturer's Instructions:
 - a. The Contractor shall provide critical instructions to the construction manager with regard to work by others.
- 3) Contractor's Field Reports:
 - a. The Contractor shall provide field reports immediately upon site inspection and field measurements to the construction manager in a timely manner so that any anomalies may be addressed.
 - b. Field reports shall be distributed to the City of New York and the Commissioner.

H. Project Schedule

- 1) The Contractor shall submit a project schedule (critical path) within 30 days of contract award, which shall indicate coordinated functions with other trades and project requirements.

I. Project Record Documents:

- 1) Submit documents in accordance with The NYC DDC General Conditions.
- 2) At the time of acceptance testing, submit six bound copies of parts lists and operations/maintenance instruction sheets.
- 3) Within 30 days of the acceptance testing, submit one set of reproducible "as built and approved" drawings showing all equipment as installed. These drawings shall include all adjustments made during the checkout process.
- 4) Submit operation and maintenance manuals with the "as built and approved" drawings. Each manual shall be bound in an individual binder with the project name on the front cover and system identification on the spine. The manuals shall include:
 - a. Complete parts list for all equipment and telephone numbers for the authorized parts and service distributors.
 - b. Instructions as to the safe operation for all equipment.
 - c. Recommended maintenance schedule for component parts, which may need periodic replacement.
 - d. Recommendations for cleaning, maintaining and touch-up of all finished surfaces.
 - e. Warranties as required.
- 5) Where specific elements do not require manuals, instruction sheets as to care and handling shall be provided.
- 6) The record documents shall be reviewed by the Commissioner all modifications to the documents stemming from this review shall be made as required.
- 7) Above submissions are required as a condition for final approval of the work.

J. Closeout Submittals:

- 1) Verification that all punch list items have been corrected and as-built drawings so indicate.

1.7 QUALITY ASSURANCE

A. Special Experience Requirements

- 1) **Manufacturer:** 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. The systems described herein shall be provided by a Fall Protection Contractor who will be responsible for furnishing all services described herein including but not limited to coordination and supervision of the engineering, shop drawings, fabrication and provision for all systems specified herein and shown in the drawings. Special Experience Requirements
- 2) **Installer:** The contractor or subcontractor performing the work of this Section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.

B. The Contract Documents describe functional criterion of systems to be provided, including dimensions, profiles and visual appearances. Engineering of systems described herein, including modification of and addition to any details as required to provide a fully functional system, is the sole responsibility of the Manufacturer/Contractor.

- 1) Supplementary structural steel shall be coordinated with the project Structural Engineer and the Commissioner within 30 days of contract award.

C. Errors and omissions within the Contract Documents shall not relieve the Contractor and the General Contractor of the responsibility for providing a properly functioning installation of the fall protection system as described herein.

D. All equipment and installation to be the responsibility of the single Contractor, who shall own and operate their own shop for the fabrication the equipment, and be regularly engaged in the fabrication of such equipment.

E. The Contractor shall have a current contractor's license and shall know, understand, and have the required documentation to work in the State of New York. This license shall be maintained throughout the course of the work of this contract.

F. Contractor shall be responsible for proper installation, operation and safety of all components equipment.

G. Metalworking may be done by others. Responsibility in all respects shall be that of the Contractor.

H. The Contractor is responsible for providing fully engineered/stamped documents designed by a professional engineer licensed in the State of New York. All equipment shall be properly installed to meet the obligations of this section.

- 1) The Contractor shall provide all system design loads and structural accommodations not indicated on the drawings. The Contractor shall supply to the Commissioner all system engineering documents and information within 60 days of contract award.
- 2) The contractor must receive authorization to proceed by the Commissioner.

1.8 DELIVERY, STORAGE AND HANDLING

- A. All equipment shall be appropriately and substantially packed for shipment.
- B. All equipment containers shall clearly indicate the equipment contained, "front", "top", "fragile", the project name, and theater site allocation. Include packing and shipping lists for each container.
- C. All shipping costs to the job site are the responsibility of the Contractor. The shipping method/company is at the total discretion of the Contractor in order to meet the published project schedules.
- D. Coordinate responsibility for acceptance of material and equipment at job site with the Contractor representative.
- E. Upon delivery, the materials shall be stored under cover in a dry and clean location, off the ground. Delivered materials which are damaged or otherwise not suitable for installation shall be removed from the job site and replaced with acceptable materials.
- F. Replace, at no expense to the City of New York, all equipment and materials which are damaged during storage or handling.

1.9 VERIFY ALL PROJECT / SITE CONDITIONS

- A. Verify conditions at jobsite. Promptly report variations and obstructions to the Commissioner and City of New York. All additions and or corrections are to be requested prior to fabrications.
- B. Field measurements shall be taken prior to preparations of shop drawings to ensure proper fitting of work. Allow for adjustments during installation whenever taking field measurements.

1.10 SEQUENCING AND SCHEDULING

- A. The installation of the equipment in this section shall begin following the completion of work which may be in conflict with the installation.
- B. The Contractor shall submit a project schedule (critical path), which shall indicate coordinated functions with other trades and project requirements.

1.11 WARRANTY

- A. The warranty period shall not start until the date of substantial completion or until all punchlist items have been rectified, which ever is later.
- B. The Manufacturer shall warrant materials and workmanship of systems and equipment installed as free of defects. The Manufacturer shall guarantee in writing the repair or replacement within 2 days of any item found defective during a period of 2-years following date of final acceptance. Ordinary wear and defects due to improper usage are excepted.
- C. The Manufacturer shall provide a 24 hour / 7 day phone contact for owner to report warranty defects.
- D. During the warranty period, all emergency conditions where systems failures may be

hazardous or may cause severe hardship or cancellation of performances shall be responded to within 24 hours. Immediate action shall be undertaken to ensure the safety of the audience and the performers.

1.12 SYSTEM STARTUP, OWNER'S INSTRUCTIONS AND COMMISSIONING

- A. Provide Letter of Certification for the fall protection system.
- B. Provide two days of staff instruction on system operation, and maintenance of fall protection elements, one day for each of the two theaters. This shall include basic safety in the use of the system as well as the handling of mechanical elements. The staff shall be limited to twenty personnel.
- C. All instruction shall be by technical staff of the Contractor.

1.13 GUARANTEE SERVICE

- A. **Guarantee Service:** One year following date of final acceptance, a factory approved engineer shall be provided to examine, adjust and repair the equipment included in this sections as required. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the Contractor. All labor and materials which are required to perform this service shall meet or exceed these specifications and shall not compromise the performance of the equipment in any way.
- B. **Extra Materials:**
 - 1) Submit an inventory of recommended spare parts for all equipment provided. This shall include, but not be limited to, all expendable mechanical parts.
 - 2) This inventory shall be reviewed by the Commissioner and recommendations made to the City of New York concerning parts and equipment which should be purchased.

PART 2 - - PRODUCTS

2.1 MANUFACTURERS

- A. The basis of design shall be a system by one of the following manufacturers.

Capital Safety
3965 Pepin Avenue
Red Wing, MN 55066
(800) 328-6146

Latchways - PLC
Hopton Park
Devizes, Wiltshire SN10 2JP
44 (0) 1380 732700

Mine Safety Appliances
MSA Fall Protection Division
(800) 672-2222

2.2 INSTALLERS

- A. The system noted above may be installed by one of the following contractors or approved equal.

Sapsis Rigging, Inc.
233 N. Lansdowne Avenue
Lansdowne, PA 19050
(800) 727-7471

Evan Corporation
8 Reise Road
Jamestown RI 02835
(401) 423-2230

Hy-Safe Technologies
960 Commerce Drive
Union Grove, WI 53182
(800) 642-0775

Gravitec Systems, Inc.
21291 Urdahl Road NW
Poulsbo, WA 98370
(206) 780-2898

2.3 MATERIALS

- A. All equipment and components shall be new and complete. No used or reconditioned equipment shall be acceptable unless otherwise noted.
- B. All mounting hardware to be included.
- C. All equipment and components shall be factory tested prior to shipping.
- D. All bolts and fasteners must be Grade 8 or better.
- E. All bolted attachments to have lock washers or other approved self-locking fasteners.
- F. All elements to be designed with a safety factor per industry standard for fall protection systems.

2.4 PERSONNEL SAFETY FALL RESTRAINT SYSTEM

- A. Wire Rope.
- 1) The wire rope shall be sized in accordance with OSHA regulation 1929.502. The complete engineered system shall be designed to support a minimum of two employees working between the same anchorage points at any time.
- B. Intermediate Supports
- 1) System shall be designed to allow the user to move past intermediate supports without disconnecting from the lifeline.
 - 2) Locations of intermediate supports and method of attachment shall be coordinated

with the Commissioner.

C. Terminations

- 1) The termination point for each horizontal lifeline shall be comprised of an engineered connection between the structural steel and the termination of the wire rope. Each specific condition must be engineered. Each of these termination connections shall be submitted to the Commissioner for confirmation of its compatibility with the existing conditions.

D. Cable Tensioner

- 1) Each horizontal lifeline shall incorporate an in-line tensioning device to allow the system to be set to the proper tension at installation and during periodic inspection.

E. Furnish the following fall protection safety devices in quantities specified here and above and as required to provide a complete working system as specified herein

1) Full Body Harness

- a. OSHA compliant harness shall be constructed of 6,000 pound minimum breaking strength nylon or polyester webbing with zinc plated stamped alloy steel D-rings.
- b. MSA 502733 or approved equal.
- c. Provide six (6) standard size male harnesses with back rings
- d. Provide six (6) standard size female harnesses with back rings

2) Restraint Lanyard

- a. OSHA compliant restraint lanyard adjustable in length up to 25 feet and supplied with self-locking snaphooks.
- b. MSA 415088 or approved equal.
- c. Provide twelve (12).

2.5 OPERATIONS AND USER INSTRUCTION MANUAL:

A. Instructor

- 1) After award of contract, the contractor shall provide the name of the safety instructor and his/her qualifications for review by the Commissioner.

B. Seminar syllabus

- 1) Syllabus to be supplied to the Commissioner by instructor during submittal process. The Commissioner to approve and/or amend as required fulfilling the requirements of section above.

C. Operations manual

- 1) Supply all information as presented in the fall protection user instruction seminar. Provide information in a three ring binder format.
 - a. Furnish 6 binders.

2.6 FABRICATION

- A. The work on this section shall be installed by an experienced installer in the employ of the

successful contractor.

- B. Fabricate all work in this section in accordance with the Commissioner's direction, specifications, approved shop drawings, pertinent project drawings. Established trade practices and applicable code requirements.
- C. Machine-finish all operating parts to standard trade tolerance, fits and finishes.
- D. Carry out shop welding in full accordance with the appropriate sections of the "Specifications for the Design, Fabrication and Erection of Structural Steel Building" of the American Institute of Steel Construction (AISC).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: The Contractor shall examine areas and conditions under which the equipment is to be installed and shall notify the General Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 ERECTION, INSTALLATION, APPLICATION

- A. Install all work in this section in accordance with the Commissioner's direction, specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.
- B. Install all work securely; complete with all bolts, nuts, washers, clips, fittings, supports, and other items required for proper installation and operation.
- C. Position all items accurately as indicated on drawings.
- D. Coordinate work with all other trades to avoid causing delays in construction schedule.
- E. All field welding requires prior approval of the Commissioner.
- F. Do all cutting, drilling, tapping and approved welding required to properly install work. Obtain Commissioner's prior approval for cutting and drilling of existing structural work.

3.3 FIELD QUALITY CONTROL

- A. The installation of the equipment indicated in this section shall be supervised by qualified personnel who are regularly employed by the Contractor for supervision of equipment installation similar to that indicated herein.
- B. Arrange for all tests and inspections required by the NYC DDC General Conditions.

3.4 ADJUSTING AND CLEANING

- A. Adjust all equipment and components for operation in accordance with the specifications, approved shop drawings and pertinent project drawings prior to demonstration.

- B. All unnecessary equipment and materials shall be removed from the area(s) of this work upon completion, removed from the job site and disposed of legally at no additional cost to the City of New York.

3.5 DEMONSTRATION

- A. Installed equipment to be operated for approval, and inspected for quality by the City of New York and the Commissioner
- B. Adjustments or modifications shall be made as directed by the Commissioner.
- C. Following the equipment demonstration, inspection and final adjustments, the City of New York's designated staff or representatives shall be instructed in the use, care and maintenance of all items.
- D. Tests and instruction to be scheduled in conformance with project construction schedules and the availability of the City of New York and the Commissioner.
- E. Cost of re-inspection and additional testing by the Commissioner, if required, due to lack of completion and/or errors and omissions shall be paid by the Contractor or the General Contractor respective to the area of work concerned. This work will be conducted on a time and materials basis, including standard hourly rates, and shall be scheduled and approved in writing prior to the re-inspection/testing session between the Commissioner, the City of New York, and the contractor(s). All travel expenses, if required, shall be provided.

3.6 PROTECTION

- A. Suitable precautions shall be taken to protect the equipment in this section from damage after installation and prior to acceptance by the City of New York.
- B. Remove all equipment protection and clean all components thoroughly prior to the demonstration session.
- C. Remove all packaging and installation debris from the site.

END OF SECTION

SECTION 113100

APPLIANCES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the appliances as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Sinks and related plumbing fixtures – Division 22.
- F. Electrical service – Division 26.

1.4 SUBMITTALS

- A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications.
 - 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 - 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
 - 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Commissioner for review.

B. Prior to purchase, submit catalog cuts, product information and technical data for each appliance.

1.5 QUALITY ASSURANCE

A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.

B. 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.

1.6 DELIVERY AND STORAGE

A. Deliver products to project site in manufacturer's undamaged protective containers.

B. Delay delivery until spaces to receive them have been fully enclosed and utility rough ins are complete.

PART 2 PRODUCTS

2.1 APPLIANCE SCHEDULE

A. As indicated on drawings. Provide scheduled products or equivalent products of General Electric, Frigidaire Co., KitchenAid Inc., or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where appliances are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

- B. Install the work of this Section in strict accordance with the original design, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Commissioner, anchoring all components firmly into position for long life under hard use.
- C. Upon completion of installation and hookup to utilities, put each operating component of each appliance through at least five (5) complete operating cycles, adjusting as needed to secure optimum operation level.
- D. Touch up scratches and abrasions to be completely invisible to the unaided eye from a distance of five (5) feet.
- E. Promptly remove from the job site all cartons and packing material associated with the work of this Section.

END OF SECTION

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SECTION 11 61 33

THEATRICAL RIGGING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and NYC DDC General Conditions, apply to this Section.

1.2 SUMMARY

- A. The work in this section includes but is not limited to furnishing and installing the following major elements and associated accessories:

- 1) Dead-hung pipe grids
- 2) Dead Hung Stage portal
- 3) Line operated straight traveler tracks
- 4) Motorized Rigging System
 - a. Motorized grid panel hoists
 - b. "Rigging Control System" (RCS)
 1. Motion Control Rack (MCR)
 2. Motor control cabinets (MCC)
 3. Control points and E-Stop
 4. Hand held control pendant
 5. Control pendant receptacles
 6. Data Logging
 - a) The automation system must keep a log all faults on the system. This data log must be accessible via the internet for review by the manufacturer in case of questions arising from the use of the system or for pre warranty diagnostics
 - c. Square Truss grid panel assemblies
 - d. Pantograph cable management
 - e. System load and safety signage in conformance with ANSI-Z535.
- 5) Front of house rigging strong points
- 6) Temporary mix position platform in Theater 1
 - a. Portable platform unit for temporary mix position in Theater 1
 - b. Step units
 - c. Fascia panels
 - d. Railings
 - e. Storage Carts
 - f. Spare parts

- 7) Owner/End User Instruction
 - a. After substantial completion of the work of this section, provide comprehensive user instruction for the owner/end user of this system.
 - b. Provide an interactive owner instruction DVD that can be repeated by the user, in the safe and effective use of the equipment of this section. See Closeout Activities/User Instruction in this section.

- 8) Provide all material, components, accessories and services required to provide the work as specified herein, elsewhere in the Contract Documents and/or as shown on related Drawings.

- 9) Work Results:
 - a. The equipment installed as a result of this section shall result in a complete and working automated theatrical rigging system which can be monitored from a remote location.

- 10) Engineering:
 - a. Provide design of the means of fastening, suspension and support of the work of this section. Provide drawings and calculations meeting the review requirements of the authorities having jurisdiction, stamped and wet signed by a Professional Engineer licensed in the State of New York for work of the specific type performed.
 - b. Engineered drawings shall be provided to the Commissioner for review of coordination and compliance to this section.
 - c. Engineered drawings shall be provided to the Commissioner. The Commissioner will review the loads imposed on the structure by this equipment and compare those loads to allowable structural loading. In no case can the allowable loads be exceeded.

- 11) Provide all material, components, accessories and services required to provide the work as specified herein, elsewhere in the Contract Documents and/or as shown on related Drawings.
 - a. Refer to the 'TR' series drawings.
 - b. Refer to all other drawings which detail the required coordination of this work

1.3 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. The following equipment supplied under this section shall be installed and/or terminated under Division 26:
 - 1) Motion Control Racks (MCR)
 - 2) Motor Control Cabinets (MCC)
 - 3) Cable Management Pantograph and associated terminal boxes
 - 4) Rigging control system devices including but not limited to control panels, limit switches, detection and safety devices.

- B. Installation of the Cable Management Pantograph and associated terminal boxes shall be

made by Division 26 under the direct onsite supervision of the Contractor performing the work of this section in coordination with the Section 11 6163 Contractor.

- C. If not internal to the equipment, controls, safety and limit switch devices are installed under this section. Final terminations to the devices are made under Division 26.
- D. Consult and coordinate with other affected work and contractors throughout the course of the work contained herein.

1.4 RELATED SECTIONS

- A. All drawings including General Construction, Structural, Theatrical, Mechanical, and Electrical, and General Conditions of the contract, including Supplemental Provisions and NYC DDC General Conditions, apply to this section.
- B. Coordinate with all related sections of the specifications including, but not limited to:
 - 1) Division 03 – Concrete
 - a. Fastener requirements
 - 2) Division 04 - Masonry:
 - a. Fastener requirements
 - 3) Division 05- Metals:
 - a. Structural steel supporting the work of this section
 - 4) Division 09 – Finishes:
 - a. Flooring
 - 5) Division 11 – Equipment
 - a. Section 11 6163 – Theatrical Lighting Systems Dimming and Control
 - b. Section 11 6183 – Theatrical Audio Video Systems
 - 6) Division 23 – Mechanical:
 - a. Air supply/return devices
 - 7) Division 26 – Electrical:
 - a. Theatrical lighting wiring devices

1.5 REFERENCES

- A. References to code, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.
- B. If an applicable code or standard permits work of lesser quality or extent that this specifications, this specification, this specification and the related Drawings will govern.

- C. Comply with prevailing local codes, standards, and applicable Underwriters Laboratory standards.
- D. Comply with national, state and local labor regulations and requirements.

1.6 DEFINITIONS

- A. "Contractor": Installer responsible for the construction and installation of the work contained in this section.
 - 1) Contractors involved with other work shall be indicated with a specific trade preceding the word "Contractor" (i.e. General, Electrical, etc.).
- B. "Furnish": Purchase and/or fabricate and deliver to project site.
- C. "Install": Physically install the items in their proper location (s) on the project site.
- D. "Provide": Furnish and install.
- E. In all cases where a device or a part of equipment is referred to in a singular manner within the contract documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the project documents.
- F. Definitions: Section Specific
 - 1) "Safe Working Load" – The load that can be applied to the system by the end user
 - 2) "System Load" – Sum of the Safe Working Load and the weight of the load carrying device. The maximum load which can be safely handled by the machinery installation under normal operating conditions, not taking dynamic forces into consideration.
 - 3) "Dynamic Force" – Forces exerted on the structure or machine that are the result of the movement patterns of the load and system component parts.
 - 4) "Design Load" – Sum of the System Load and the loads due to dynamic forces
 - 5) "Category 0 Stop" - An uncontrolled stop that immediately removes power from the machine actuators.
 - 6) "Category 1 Stop" - A controlled stop that allows power to the machine actuators to achieve the stop, and then removes power from the machine actuators when the stop is achieved.
 - 7) "Category 2 Stop" - A controlled stop that leaves power available to the machine actuators
 - 8) "Initial Limit" – The mechanical limit switch connected to the electrical system in such a manner as to prevent further movement in the over travel direction. It shall be a Category 2 stop and allow the user to operate the system in the opposite direction.
 - 9) "Ultimate Limit" – The mechanical limit switch is a positive break mechanical limit switch, which executes a Category 1 stop. NOTE: The Ultimate limit switch shall be located in such a manner that should the initial limit fail to operate, and the machinery

strikes the ultimate limit at maximum speed and taking the expected system delay time into consideration – the machinery installation can come to a complete stop before over travel results in mechanical damage.

- 10) "Fleet Angle" – The angle formed between the wire rope and the centerline of a sheave or drum as the wire rope traverses to another sheave or fixed point.

1.7 SYSTEM DESCRIPTION

- A. Provide dead-hung pipe grids as shown on the drawings in Theater 1
 - 1) Each pipe grid is a rectilinear system comprised of 1-1/2" nominal I.D. (1.9" OD) steel pipes for equipment mounting arranged as shown on the drawings.
 - 2) Theatre 1 pipe grid is arranged on 4'-0" centers and is approximately 200 square feet.
- B. Provide portal at the proscenium zone of Theater 1.
 - 1) Framed full width removable header dead hung from rigging beams.
 - 2) Two sets of framed, full height legs mounted on traveler tracks to provide variable stage width openings.
- C. Provide (1) line operated traveler track for the Proscenium Traveler in each Theater.
- D. Motorized Rigging System
 - 1) Provide the Theatrical Automation equipment as indicated on the drawings and as detailed herein
 - 2) Rigging Control System (RCS)
 - a. The Rigging Control System will be a system of components that shall allow the End User to perform operations of all motorized elements in the theatre while providing the maximum level of safety for performers and equipment.
 - b. Emergency stop stations shall be located throughout the stage area. The emergency stop system shall be a stand-alone system that shall function independently of the RCS computer network. Network failure shall not disrupt the emergency stop system.
 - 3) Individual winch
 - a. The individual winch shall receive command instructions from the RCS and it shall move accordingly. This includes, but is not limited to, direction, and position.
- E. Provide front of house strong points above the acoustical cloud in Theater 1.
 - 1) Strong points shall provide a method for connecting temporary rigging to the rigging steel over the seating.
 - 2) Coordinate locations with acoustical cloud.

F. Temporary Mix position system

- 1) System consists of a series of (1) single-sided platform top and leg set for use as temporary mix position located in the balcony of Theater 1.
- 2) Platform height is 22".
- 3) Provide Step Units as shown in the contract documents
 - a. 1 – 15" high
 - b. 1 – 22.5" high
- 4) Leg system shall have adjustable acme-thread feet allowing leveling adjustment of approximately 3".
- 5) Storage cart will allow system to be stored when not in use. Platform shall store vertically on edge when not in use.
- 6) Safety railings will be provided for use at edges as shown in the contract documents.
- 7) Hard fascia closure panels shall be provided between the platform and floor.
- 8) All components in the system shall be portable and shall be designed to minimize setup, take down and transition time.
- 9) Each platform shall have discrete leg understructure and shall not bridge between platforms.
- 10) The platform system is intended for interior use only.
- 11) All components shall meet all state and local applicable fire spread and building code requirements

1.8 SUBMITTALS

A. Product Data

- 1) Where standard manufactured parts are used, submit current product literature describing component, manufacturer's recommended applications, load ratings, safety factors and dimensions.
- 2) Clearly indicate specific component and applicable options.

B. Shop Drawings

- 1) Provide shop drawings on D size minimum (24 X 36) sheets.
- 2) Include a cover sheet with a drawing index including the sheet number and title for each sheet in the set.
- 3) Provide a 4" x 4" area near the title block for review stamps and comments. This area should be in relatively the same location on each sheet.
- 4) Provide 1/4" = 1'- 0" plans of all locations which contain equipment in this contract

based upon AutoCAD backgrounds provided by the Commissioner. Show all equipment properly located dimensioned and labeled. Note all work by others in the vicinity, which may affect work in this contract.

- 5) Provide an inventory of all equipment to be supplied, including quantities, manufacturer's part number, reference to applicable drawings, etc.
- 6) Provide complete, fully dimensioned, large scale detailed fabrication drawings of all major components.
- 7) Provide requisite schematics, plans and sections indicating assembly and installation of components.
- 8) Provide indications by arrow and boxed caption of all variations from contract drawings and specifications, except where variation is indicated as acceptable.
- 9) Indicate all elements with appropriate safety factors and/or safety equipment.
- 10) Indicate recommended load limits for each element in the system with loading requirements.
- 11) All elements shall be engineered, approved and drawings stamped by a professional engineer licensed in the State of New York. The engineer shall verify that the equipment supplied under this section meets or exceeds the design criteria of this specification.
- 12) Indicate Safe Working Load for each element in the system with loading requirements.
- 13) Power requirements, one-line riser diagrams and installation circuit diagrams for electrical equipment. Show all required wire sizes and counts between all components.

C. Samples

- 1) Submit samples for approval within 14 days of written request. These items may include, but are not limited to:
 - a. Samples of pipe grid hanging hardware and connections, pipe grid junction hardware, drapery tracks and associated hardware.

D. Quality Assurance/Control

- 1) Submittals - submit the following in accordance with Division 1.
 - a. All submittals shall be submitted in a timely manner, allowing sufficient time for adequate review and possible resubmittals without jeopardizing the project schedule.
 - b. Submittals will be reviewed, accepted and field dimension verified prior to proceeding with the fabrication of the work in this section. The Commissioner shall only mark one set of reproducible drawings per submittal with comments. Any additional sets of drawings or product data shall be returned unmarked.
 - c. All submittals shall leave space available for review stamps and comments.

d. Provide full insurance against loss or damage during shipment. Furnish certifications of such coverage to the Commissioner.

2) Motorized Rigging -Source Quality Control Submittals

a. The contractor of this section shall supply as part of the submittal process the following Source Quality Control documents which must contain, at minimum the information listed below

1. Serial number of hoist
2. Motor drive serial number
3. Batch number of major components
4. Name of person conducting the test
5. Date the test was conducted
6. List of mechanical tests conducted
7. List of electrical tests conducted

3) Special Procedure Submittals

a. User Instruction

1. To ensure proper instruction of the user group the contractor of this section shall supply as part of the submittal process the following Instruction documentation.
 - a) User Instruction syllabus
 - b) User Instruction guide (bound hard copy)
 - c) User Instruction guide (hands on system instruction)
 - d) Testing document for confirmation of understanding
 - e) DVD/Video instruction tape

E. Closeout Submittals

- 1) Submit documents in accordance with Division 1 – General Requirements.
- 2) At the time of acceptance testing, submit 4 bound copies of parts lists and operations/maintenance instruction sheets.
- 3) Within 60 days of the acceptance testing, submit 1 set of reproducible "as built and approved" drawings showing all equipment as installed. These drawings shall include all adjustments made during the checkout process. In addition, submit all relevant product data sheets, manuals and as-built drawings as Adobe PDF files on a CD.
- 4) Submit operation and maintenance manuals with the "as built and approved" drawings. Each manual shall be bound in an individual binder with the project name on the front cover and system identification on the spine. The manuals shall include:
 - a. Complete parts list for all equipment and telephone numbers for the authorized parts and service distributors.
 - b. Instructions as to the safe operation for all equipment.
 - c. Recommended maintenance schedule for component parts that may need periodic replacement or maintenance.
 - d. Recommendations for cleaning, maintaining and touch-up of all finished surfaces.
 - e. Warranties as required in Division 1 – General Requirements.

- 5) Where specific elements do not require manuals, instruction sheets as to care and handling shall be provided.
- 6) The record documents shall be reviewed by the Commissioner and all modifications to the documents stemming from this review shall be made as required.
- 7) Above submissions are required as a condition for final approval of the work.

1.9 QUALITY ASSURANCE

A. Qualifications

- 1) All equipment and installation of the work in this section shall be the responsibility of a single Contractor, who shall own and operate their own shop for the fabrication of theatrical rigging equipment, and be regularly engaged in the fabrication of such equipment..
- 2) The Contractor shall have a current Contractors License. This license shall be maintained throughout the course of work of this Contract.
- 3) Contractor shall be responsible for proper installation, operation and safety of all components equipment. Equipment must be procured as specified. Non-specified items may be procured from any nationally recognized manufacturer.
- 4) Metalworking may be done by others. Responsibility in all respects shall be that of the Contractor.
- 5) The Contractor shall verify all system design loads.
- 6) Installers
 - 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. Project Manager: The Project Manager shall be qualified and have experience in projects of similar size and scope. The Project Manager shall have binding authority to represent and act for the manufacturer of this equipment. The project manager shall be the primary conduit for all information between the supplier of this equipment and the general contractor. All information given to the Project Manager shall be considered as given to the manufacturer
- 7) Manufacturers
 - a. The manufacturer providing the material or equipment specified in this Section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years. The systems described herein shall be provided by a Theatrical Rigging Contractor who will be responsible for furnishing all services described herein including but not limited to coordination and supervision of the engineering, shop drawings, fabrication and provision for all systems specified herein and shown in the drawings.

- B. To establish comparative standards of quality, the equipment of the theatrical rigging systems shall be by one of the following contractors, or approved equal.

I. Weiss
815 Fairview Ave., Unit #10
Fairview, NJ 07022
(888) 325-7192

Pook, Diemont & Ohl
701 East 132nd Street
Bronx, New York 10454
(718) 402-2677

- C. Contractor may install hardware as manufactured by their own shop, or as manufactured by the following, or an approved equal:

- 1) H & H Specialties Inc.
- 2) J.R. Clancy
- 3) Stage Technologies

- D. Pre-installation Meetings

- 1) Reference NYC DDC General Conditions for pre-installation meeting requirements.

- E. State of the Art Development

- 1) The Contractor shall furnish only the latest developed appropriate product. In cases where product development from a specified manufacturer surpasses the criteria of this specification, the Contractor shall inform the Commissioner and make the newer product available to the project. In no case shall discontinued or obsolete equipment be acceptable. Should a newer product be suggested as a substitution for a discontinued product, or for a product that is in process of being phased out of production, that newer product shall be offered to the City of New York at no additional cost.
- 2) Should product recall by the Manufacturer require temporary or permanent replacement of a product specified under this section, the Contractor shall notify the City of New York at the earliest reasonable time and shall arrange to replace the product in question at the earliest possible time.
- 3) Equipment found defective or subject to recall prior to scheduled installation shall not be delivered to the jobsite.
- 4) Equipment defect or intended recall shall not relieve the Contractor from his contractual obligation with regard to delivery schedule of product. In this circumstance, notification shall be made to the Commissioner by express carrier. Arrangement for alternate product shall be made at this time.
- 5) Under no circumstances shall arrangement for alternate product necessarily require the City of New York to accept superseded equipment except on a temporary basis.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, storage and handling shall be coordinated with the General Contractor and shall meet all requirements described in Division 1.
- B. Packing, Shipping, Handling, and Unloading
 - 1) All equipment shall be appropriately and substantially packed for shipment.
 - 2) All equipment containers shall clearly indicate the equipment contained, "front", "top", "fragile", the project name, and theater site allocation. Include packing and shipping lists for each container.
 - 3) All shipping costs to the job site are the responsibility of the Contractor. The shipping method/company is at the total discretion of the Contractor in order to meet the published project schedules.
- C. Acceptance at Site
 - 1) Coordinate responsibility for acceptance of material and equipment at job site with the General Contractor.
 - 2) The Contractor shall be responsible for acceptance of the Rigging System components at the job site, confirming that all quantities and counts are correct and for keeping accurate logs and records of such information.
- D. Storage and Protections
 - 1) Upon delivery, the materials shall be stored under cover in a clean and dry location, off the ground. Delivered materials which are damaged or otherwise not suitable for installation shall be removed from the job site and replaced with acceptable materials.
 - 2) Replace, at no additional cost to the City of New York, all equipment and materials which are damaged during storage or handling.

1.11 PROJECT CONDITIONS

- A. Existing Conditions
 - 1) Verify all conditions at job site. Promptly report variations and obstructions to the Commissioner. All additions and or corrections are to be requested prior to fabrications.
- B. Field Measurements
- C. Field measurements shall be taken prior to preparation of shop drawings to ensure proper fitting of work. Allow for adjustments during installation whenever taking field measurements.
 - 1) Should field measurement of site conditions alter the design or installation of system elements from the approved shop drawings, revised shop drawings shall be reissued for review.

1.12 SEQUENCING AND SCHEDULING

- A. The installation of the equipment in this section shall begin following the completion of work which may be in conflict with the installation including:
 - 1) Structural upgrades
 - 2) Fire protection
 - 3) Mechanical systems
 - 4) Painting
 - 5) Application of acoustic materials
 - 6) Stage floors
 - 7) Completion of stage floor and balcony seating.
 - 8) Warranty
- B. The Contractor shall warrant materials and workmanship of systems and equipment installed as free of defects. The Contractor shall guarantee in writing the repair or replacement within 14 days of any item found defective during a period of 1-year following date of final acceptance. Ordinary wear and defects due to improper usage are not covered under this warranty.
- C. During the warranty period, all emergency conditions where systems failures may be hazardous or may cause severe hardship or cancellation of performances shall be responded to within 24 hours. Immediate action shall be undertaken to ensure the safety of the audience and the performers.
- D. Refer to Division 1 – General Requirements.

1.13 SYSTEM START UP, OWNER'S INSTRUCTION, AND COMMISSIONING

- A. Operation Instruction
 - 1) Following the equipment demonstration, inspection and final adjustments, the City of New York's designated staff or representatives shall be instructed in the use, care and maintenance of all items.
 - 2) Deliver all copies of approved Operations Manual to the City of New York during instruction session, and review it as part of that session.
 - 3) Provide in-depth instruction of the user's staff in the operation and maintenance of all systems included herein.
 - 4) Provide 8 hours of staff instruction on equipment and systems specified herein. This shall include basic safety in the use of the systems, general trouble shooting of MCC, MCR and hoists.
 - 5) All instruction shall be by technical staff of Theatrical Rigging System Contractor.

1.14 GUARANTEE SERVICE

A. Extra Materials

- 1) Deliver stock of maintenance material to City of New York. Furnish the following to match those installed and taken from the same production run, packaged in drawers of a provided storage unit with protective covering for storage and identified with appropriate labels.
 - a. Furnish 12 compression sleeves of each type in the system.
 - b. Furnish 4 shackles of each type in the system.
 - c. Furnish 12 thimbles of each type in the system.
 - d. Furnish 12 bolts and nylock nuts of each type in the system.
 - e. Furnish 12 lockwashers of each type in the system.
 - f. Furnish 1 master track carrier of each type in the system.
 - g. Furnish 4 other track carriers of each type in the system.
 - h. Furnish 4 turnbuckles of each type in the system.
 - i. Furnish 2 single pin locator plates, if used in system.
 - j. Furnish 2 dual and 2 quad pin locator plates, or eight universal pin locator plates, as applicable.
 - k. Furnish 10 locator hole plugs.
 - l. Furnish 4 threaded foot assemblies.
 - m. Furnish 4 locking pins of each type in the system with cable tethers having un-crimped fittings.
 - n. Furnish 5% spares (minimum of 1) of loose hardware, ie: knobs, capture bolts, etc.
 - o. Furnish heavy duty storage box with hinged interlocking covers to contain all above spare parts

B. Guarantee Services

- 1) One year following date of final acceptance, a factory engineer shall be provided to examine, adjust and repair the equipment included in this sections as required. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the Contractor. All labor and materials which are required to perform this service shall meet or exceed these specifications and shall not compromise the performance of the equipment in any way.
- 2) Following this inspection and guarantee service, the Contractor shall provide the City of New York with a written report itemizing the results of the inspections and the guarantee work, which was conducted. The Contractor shall also include in this written report recommendations for any corrective actions, which the Contractor feels should be taken, with respect to the equipment included in this section, but are outside the scope of the warranty agreement.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General

- 1) In all cases where a device or a part of equipment is referred to in a singular manner within the Contract Documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the Contract

Documents.

- 2) All equipment and components shall be new and complete. No used or reconditioned equipment shall be acceptable unless otherwise noted.
- 3) All mounting hardware to be included.
- 4) All equipment and components shall be factory tested prior to shipping.
- 5) All equipment to have pertinent labels.

B. Materials shall conform to the following minimum standard specifications:

- 1) AISI 1045 for steel shafts
- 2) ASTM A36 for structural steel shapes
- 3) ASTM A47 for malleable iron casting
- 4) ASTM A48 for gray iron casting
- 5) ASTM A1011 for side plates
- 6) ANSI B18.2.1&2 for square and hex bolts and nuts

C. Hardware

- 1) All mounting hardware to be included.
- 2) All bolts and fasteners must be Grade 5 or better.
- 3) All bolted attachments to have lock washers or other self-locking fasteners.

D. Design Factors

- 1) All overhead rigging elements including but not limited to mounting hardware, wire rope, wire rope fittings, and shackles to be designed with a mechanical safety factor of 10X of their rated breaking strength.

E. Staging Materials

- 1) Structural metal elements to be extruded aluminum or equal.
- 2) All corners, joints, etc. to be die-cast aluminum, or equal.
- 3) All elements to be fastened with removable fasteners, no weld, so that platforms may be easily repaired. Decks excepted.
- 4) All exposed surfaces to be finished flat black.

2.2 PIPE GRIDS

- A. Provide pipe grids as shown on the contract drawings. Pipe of 1½" nominal diameter

Schedule 40 black steel pipe as per standard industry practice.

- B. All hardware to be primed and finished with flat black matte epoxy paint.
- C. Pipe splices to be 18" close fitted internal sleeves secured by 2 bolts perpendicular to floor on each side of joint. ¼" x 20 cap screws through-bolted with nylock nuts. Holes 4" on center, 3" from ends.
- D. Provide rigid supports to overhead structure as shown in drawings and as required to meet specified loading criteria as well as local seismic codes. Confirm final support design with the Commissioner.
- E. Provide lateral support to building structure as shown in drawings and as required to meet specified load criteria. Supports designed as sway bracing only are not acceptable. Confirm final support design with the Commissioner.
- F. Load criteria
 - 1) 30 lbs/lin. ft. uniform load.
 - 2) 90# maximum point loads at center of spans.
- G. Pipe grid hangers:
 - 1) Full batten clamp, ADC#2815 or approved equal
 - 2) Rated hot dip galvanized jaw/ open thread turnbuckle with 6" of take-up, locking hardware and safety wire mouse (after adjustment).
 - 3) Threaded rod sized as appropriate for load / safety factor.
 - 4) Rated beam clamp
- H. Pipe grid junction connections:
 - 1) Provide 4½" x 4 ½" x 1/8" steel full cross grid connectors with rated working load of 1500 lbs. minimum at each junction.
 - a. J.R. Clancy 015-100 full cross grid connector or approved equal
 - 2) Pipe grid junction connections shall be located at all pipe intersections.

2.3 STAGE PORTAL

- A. Provide Theater 1 removable portal and legs as indicated in the contract drawings.
- B. Portal panel construction
 - 1) Portal Header shall be designed to attach to 1-1/2" I.D. Schedule 40 pipe at the center of gravity for the header, adjustability is required.
 - 2) Header shall incorporate turnbuckles for fine level adjustment
 - 3) Frame is 1.5" aluminum tube welded with corner blocks at each corner on the back-

side. All welds ground smooth.

- 4) Offstage sides of header shall incorporate adjustable rubber gasket to act as a light seal.
- 5) Frame shall be faced with 1/4" luan plywood faced with black IFR velour on the downstage side.
- 6) Flame retardant painted luan plywood facing to be affixed to tubular frame with flat-head self-tapping screws.
 - a. Screw heads shall be flush with surface or slightly recessed.
 - b. Application of black velour fabric cover shall be smooth, without wrinkles or other protrusions.
- 7) Fabric is inherently flame retardant.
 - a. Provide fabric sample.

C. Portal leg construction

- 1) Portal leg shall be designed to attach to traveler track specified herein at its center of gravity.
- 2) Portal leg shall incorporate turnbuckles for fine level adjustment
- 3) Frame is 1.5" aluminum tube welded with corner blocks at each corner on the back-side. All welds ground smooth.
- 4) Offstage sides and bottom of legs shall incorporate adjustable rubber gasket to act as a light seal.
- 5) Frame shall be faced with 1/4" luan plywood faced with black IFR velour on the downstage side.
- 6) Flame retardant painted luan plywood facing to be affixed to tubular frame with flat-head self-tapping screws.
 - a. Screw heads shall be flush with surface or slightly recessed.
 - b. Application of black velour fabric cover shall be smooth, without wrinkles or other protrusions.
- 7) Fabric is inherently flame retardant.
 - a. Provide fabric sample.

D. Portal Leg Traveler track

- 1) Provide Portal Leg Traveler track as shown in Contract Documents.
 - a. Portal Leg traveler track shall be designed to attach to 1-1/2" ID schedule 40 pipe.
- 2) Portal Leg traveler track shall be:
 - a. Joker 95 by Gerriets

- b. Approved Equal
- 3) Provide Heavy Duty scenery carriers as required to support portal legs.
 - a. Joker 95 HD Carrier
 - b. Approved Equal

2.4 LINE OPERATED STRAIGHT TRAVELER TRACK ASSEMBLIES:

A. Track:

- 1) Track to be heavy-duty channel type, approximately 3" x 3", 14 gauge steel or extruded aluminum formed to provide parallel double tracks for carrier wheels and totally enclosed except for bottom carrier slot.
- 2) Traveler tracks to be in 2 sections, with 4'-0" combined center overlap, fitted for manual line operation.
- 3) Each half of double-section traveler track assemblies to be single piece, free of burrs, dents or irregularities. Halves clamped together by at least 3 lap clamps.
- 4) Hanger fittings and clamps for attachment spaced at 4'-0" on center maximum.

B. Carriers:

- 1) Two master carriers for each double-section traveler track. Each with 4 paired neoprene wheels with ball bearings.
- 2) Master carriers to have 2 clamps for attachment of operating line and 2 plated swivels with 6" of usable trim chains for curtain attachment.
- 3) Single carriers to have 2 neoprene wheels with ball bearing with "hollow center" design to bypass the operating line.
- 4) Each single carrier to have single plated swivels with 6" of usable trim chain.
- 5) One single carrier for each 1'-0" of track length.
- 6) Provide end stacking (rear fold, back pack) devices to stack drapery only at offstage track ends. Provide rubber washers to packing tabs.

C. Traveler Track Pulley Blocks:

- 1) End pulley blocks heavy-duty type with 8" sheaves turned and grooved for 1/2" operating line. Double vertical sheaves on the live end of the tracks; a single horizontal sheave on the dead end. Housings firmly bolted to the track.
- 2) Floor pulley blocks to have 8" sheaves with sealed ball bearings. Sheaves mounted to slide vertically and clamp in a steel frame with full side plates of sufficient height to permit 9" tension and adjustment of operating line. Base drilled for 2 improved stage screws for floor mounting. Supply 2 improved stage screws and plugs.
- 3) All blocks to provide for positive retention of operating cords in grooves of sheaves.

D. Traveler Operating Hand Lines:

- 1) Each handline to be a single length, first quality, ½" diameter fiberglass center, braided cotton cord.
- 2) Rig for curtain operation from the live end of the track.
- 3) Length of hand line to be adjusted for tension with traveler curtains mounted and trimmed.

E. Manufacturers:

- 1) ADC #283-R
- 2) H&H #400
- 3) TRU-ROLL #1000
- 4) Or equal

2.5 MOTORIZED RIGGING SYSTEM

A. Provide a system of motorized truss grid panels as shown in the contract documents. The panels shall be suspended from the structural steel as shown in the drawings. The truss panels shall operate individually or synchronously in groups of up to three. The truss units shall be controlled by the Rigging Control System (RCS) described herein.

B. Truss Winch Line Shaft Units

- 1) Live load hoisting capacity: 2400lbs
- 2) Speed 30 ft/min
- 3) ¼" - 7x19 galvanized aircraft cable
- 4) Travel Distance as shown on the drawings
- 5) Stromag Rotary Limits
 - a. Ultimate up hard struck Limit
 - b. Initial up encoder limit
 - c. Initial down encoder limit
 - d. Ultimate down hard struck limit
- 6) Telemetry shall be by absolute encoder
- 7) Brakes
 - a. Primary Motor Brake
 - b. Secondary Brake - Centrifugal Brake
- 8) Adjustable acceleration and deceleration rates

- 9) Drums shall incorporate cross-groove detection
- 10) Quantity: 5 complete units

C. Lift Lines

- 1) As required to properly support the loads, both dynamic and static, of the truss panel.
- 2) Connections to rigging truss shall be by shackle, thimble, compression sleeves and 5/8" x 12" Crosby jaw and eye forged turnbuckle installed as per manufacturer's recommendation. Dress cable ends with shrink tubing or self fusing tape.

D. Hoist Components

- 1) Hoist motor shall be properly sized to carry the weight of the truss module and rated live load. The motor shall have a minimum NEMA service factor of 1.25 for continuous operation. The motor shall be totally enclosed and fan cooled. Motor shall be C flange type mount. It shall operate on 3 phase, 208 VAC. Brakes shall be an integral part of the motor. Brakes shall be normally closed, direct acting, spring loaded, electrically released, and equipped with a manual release as well. Brakes must stop and hold 200% of the full load.
 - a. SEW or approved equal
- 2) Hoist gearboxes shall have combination helical-bevel reducers, directly mounted by a flange to the motor. Gear reducers shall be selected to safely transmit the required power, torque and impact. All gear reducers shall have a minimum service factor of 1.50 and an AGMA load classification of 1. The gear reducer case shall be high-tensile nickel cast iron. The helical gear shall be centrifugally cast bronze, mounted on a cast iron hub. The input and output shafts shall each be supported by two tapered roller bearings. The gears shall run in an oil bath. The shaft bearings shall be provided with double-lip oil seals to prevent leakage. There shall be a drip pan provided under the gearbox.
- 3) Cable Drums:
 - a. Cable drums shall be designed to properly support the required loads without crushing or deformation. Drums shall have integral hubs, which will accept properly sized drum shafts for the transmission of loads and torque from the drive mechanism to the cable drums. Outboard ends of shafts shall be supported by self-aligning pillow block bearings. Drum shafts shall be continuous passing through both hubs and both bearing mounts. The drum hub shall be keyed to the drum shaft with keys, which are properly sized for the shaft diameter, and set-screwed through the hub. The length of the hubs and keys shall be sized for the torsional load on the drum.
 - b. Drums shall be grooved for the wire rope to be spiral wound. The pitch diameter of the drum groove shall be in accordance with recommendations of the wire rope manufacturer. The groove shall be machined to accept a minimum of 3/8 the rope depth, with 15 degree sloping sides, and spaced for a minimum clearance of 1/32" between cables.
 - c. There shall be a minimum of three dead wraps. Drums shall carry only a single layer of cable. A series of three pressure clamps shall hold the rope to the drum at the termination of the wire rope. These pressure clamps should be easily visible for inspection.
 - d. All drums shall be machined to at least 63 RMS finish with concentricity to a

rotational angle + 1/16".

- e. All stepped-down shaft corners and shoulders shall have proper fleet radius.
- f. Cable drums shall be grooved as noted in the Contract documents.

- 1. Alternating drums are grooved opposite hand.

E. Aluminum Rigging Truss

- 1) Provide aluminum lighting truss to create grid panels as shown in the contract documents.
- 2) All truss shall be powder coated black.
- 3) All hardware shall be finished black
- 4) Provide all necessary hardware to assemble panels.
- 5) Provide integrated lifting points for attachment to hoists as shown in contract documents. Points must allow for adjustment to pick up the unit at the center of gravity.
- 6) 4'x50' Modules and 3'6"x50' Modules shall be comprised of:
 - a. 12"x12" plate style box type truss
 - b. 12"x12" corner blocks as shown on the contract documents
- 7) 3'x50' Modules shall be comprised of:
 - a. 12"x30" spigoted truss
 - 1. Tomcat Ballroom Truss
 - 2. Or Approved Equal

F. Cable Management Pantograph

- 1) Provide a folding pantograph cable management system to contain power and control cables running to the battens as shown on the drawings.
- 2) The pantograph body shall contain and protect the electrical cables and be constructed of an extruded shape with sturdy hinges capable of resisting the stresses and loads of regular operation of the trusses through their full travel.
- 3) The pantograph shall be powder coated flat black and shall match the trusses.
- 4) General Cable Requirements
 - a. Cables to have basket weave strain relief as indicated and/or required.
 - b. Cables to have neoprene bushing to terminal boxes as indicated and/or required.
 - c. Cables to have two 3" clear shrink wrap pieces installed unshrunk for user labeling.
- 5) Multiconductor cables:

- a) Shall be flat multiconductor cables
 - b) No common neutrals.
 - c) Unless otherwise noted multiconductor cable ends shall terminate at terminal block in terminal box enclosure.
 - d) Each cable provided must include additional length:
 - i) At batten end provide 20'-0" of additional length
 - ii) At grid end provide 50'-0" of additional length.
- 6) Ethernet Data Cables
- a) TMB "Proplex" CAT6-HD heavy duty Ethernet extension cables with Neutrik "Ethercon" connectors at either end.
 - b) Each cable provided must include additional length:
 - i) At truss end provide 20'-0" of additional length
 - ii) At grid end provide 20'-0" of additional length
- 7) Mark end of each switched power cable with 3" yellow heat shrink tubing to designate this cable for switched power use.
- 8) Terminal box per Theatrical Wiring Devices.
- 9) Provide track and trolley at grid end of the cable tray for free floating adjustment through the travel of the batten.
- a) Provide custom track stops for limit the travel of the trolley which can be adjusted in the field.
 - b) Track shall be captured
 - c) Track to be:
 - i) Rosco: UniTrack and Unibeam carrier
 - ii) Fisher Technical Services: Fastrack and Skates.
- 10) Provide (1) cable management Pantograph per truss winch unit – 5 total.
- a) Pantograph shall accommodate (36) theatrical lighting circuits and 1 Ethernet Tap.
 - b) Pantograph shall terminate in a terminal box at the grid level and a terminal box on the truss.
 - c) Rigging manufacturer to coordinate with Theatrical Lighting Contractor and Division 26 to facilitate mounting of Theatrical Lighting Devices.

2.6 FRONT OF HOUSE RIGGING STRONG POINTS

- A. Furnish and install rigging strong points as indicated on Drawings complete with all necessary accessories (CWANA).
- B. Provide all attachment hardware to mount strong points as indicated on Drawings.
- C. Each element of the strong point shall be rated for a capacity of 2000 pounds with a 10:1 safety factor, Each shall be labeled with the Safe Working Load.
- D. Each strong point shall consist of:
 - 1) (1) Wide flange beam clamp
 - 2) Forged screw pin shackles as required

- 3) (1) 3/8" wire rope sling with swaged thimble eyes

2.7 TEMPORARY MIX POSITION PLATFORM SYSTEM FOR THEATER 1

- A. Furnish and install platform system as indicated on Drawings complete with all necessary accessories (CWANA).
- B. Provide all attachment hardware to mount platform system as indicated on Drawings.
- C. Platform System Basis of Design:

- 1) Staging Concepts, SC90 platform with SC100 support
- 2) Staging Dimensions, SD5000 Staging
- 3) StageRight, All Purpose Deck with Z-800 support
- 4) Wenger Corp., Versalite Staging

- D. Manufacturers listed as the basis of design:

Staging Concepts
100 N. Sixth St.
Suite 730B
Minneapolis, MN 55403
(800) 337-5339

Staging Dimensions, Inc.
67 Industrial Blvd.
New Castle, DE 19720
(866) 591-3471

StageRight, Corp.
495 Pioneer Parkway
Clare, MI 48617
(800) 438-4499

Wenger Corp.
555 Park Drive
Owatonna, MN 55060
(800) 326-8373

- E. System Criteria:

- 1) The system shall be statically calculated for uniform load-bearing capability of 125 lbs./sq. ft. live load at full height. The deck surface shall support a point load of 1250 lbs./sq. inch. Lateral load-bearing capability shall be 150 lbs./sq. ft. live load. Laboratory confirmation of live load capacity shall be provided by the manufacturer.
- 2) There shall be no lateral movement of the platforms. For height configurations that require cross-bracing for added stability, the manufacturer shall provide an adequate modular bracing device that will satisfy the demands of the live load requirements herein. The cross-bracing members shall not conflict with the legs of adjacent platforms and shall be in keeping with the construction methods described herein.

- 3) Platforms shall be interlocking side-to-side and front-to-back by means of a connection device that cannot be compromised by the rigors of audience loading. Positive interlock shall be assured between adjacent platforms whether they are at equal or dissimilar heights.
- 4) The support system shall be fabricated in such a manner that the platform may be disassembled for repairs. The manufacturer shall be obliged to make all parts available to the purchaser. Mechanically connected construction which cannot be repaired on site is not acceptable.

F. Platform Decks

- 1) Provide portable, single sided platforms with black laminate top finish and black aluminum perimeter.
 - a. Decking shall be laminated matte black: The color shall permeate the surface material. There shall be no irregularities or protrusions beyond the surface plane which shall be completely flat. Holes or permeations shall not exceed 1/8" in any dimension. Surface shall be non-reflective, non-skid and able to withstand mopping. Acceptable surface shall be black vinyl.
- 2) Aluminum perimeter shall have baked on matte black paint and shall accept accessories as specified herein.
- 3) There shall be no irregularities or protrusions beyond the surface plane, which shall be completely flat. Holes or permeation shall not exceed 1/4" in any dimension. Surface shall be non-reflective and able to withstand mopping.
- 4) The total weight of each platform deck shall not exceed 125 lbs.
- 5) Decks shall meet applicable flame spread criteria.
- 6) Provide quantities of platform decks, and all necessary hardware and attachments, as indicated on the drawings.

G. Platform Frames

- 1) Frame shall be constructed of extruded structural aluminum and finished as specified herein. The extrusion shall be a box design for maximum strength and rigidity, with grooves to protect the top surface edge, connect adjacent platforms, and to attach accessories. The overall thickness of the frame shall be not greater than 4".
- 2) Deck units shall be provided with sockets to accept detachable legs.
- 3) All exposed elements of the platform frames shall be finished black.

H. Variable Height Understructure

- 1) Provide independent fixed understructure to support independent platform decks as described above. This system shall be capable of providing tiered seating risers or single elevation stages on level floor.
- 2) Leg sockets shall be permanently attached to the platform frames. Legs shall positively lock in place in sockets on the underside of the platform decks.

- 3) The legs shall be fabricated from structural aluminum tubes in lengths to provide variable platform heights.
- 4) Legs shall be joined and stabilized when required, by cross bracing comprised aluminum tubing and formed steel brackets. Operation of the stabilizer shall not require the use of special tools.
- 5) Removable platform legs shall have leveling feet that provide height adjustment with an Acme threaded sleeve at the bottom of each leg.
- 6) Leveling feet shall evenly distribute loads over a 7 sq. inch (3" diameter if circular) non-abrasive pad of molded urethane or equivalent.
- 7) All components of the understructure shall be finished with baked-on matte black epoxy paint.
- 8) Set up shall be possible by means that do not require tools.
- 9) System shall require no more than 2 persons for setup and take down, and no component requiring manual lifting shall weigh more than 125#.
- 10) Provide quantities of understructure, and all necessary hardware and attachments, as indicated on the drawings.

I. Handrails

- 1) Custom handrails as shown on the construction documents.
- 2) Handrails attach to the step and platform units via socket in decking with bracket below to capture floor length handrail post.

J. Guardrails

- a. Custom guardrails for sound mix platforms attach to platform edge via hand operated clamps in at least two vertical locations per support post.
- b. Guardrail frame shall be completely infilled with plywood panel.
 1. Panel shall match material designation WD-4 as noted in Division 9, Finishes.
 2. Plywood shall be premium grade fir with face veneer.
 3. Face veneer shall be premium clear fir. When finished veneer will not show imperfections or other surface defects.
- c. All components shall be finished with baked-on matte black epoxy paint.
- d. Set up shall be possible by means that do not require tools.
- e. Provide quantities of guardrails, and all necessary hardware and attachments, as indicated on the drawings.

K. Platform Attachments

- 1) Connection between platforms may be by either heavy-duty cam-type locks mounted internally in the deck periphery or by hand-screw clamps applied to the understructure.
- 2) Connection between platform units or step units and adjacent structure shall employ picture sockets and mating picture hooks.

- a. Socket and hook devices shall be bent metal strap of at least 3/4" in width by 2-1/2" in length with a minimum of two countersunk screw holes each.

L. Fascia Panels

- 1) Provide fascia panels for each configuration shown on the drawings.
- 2) When used in seating configurations, fascia panels provide safety and visual closure between audience seating levels.
- 3) Fascia panels shall have positive attachment to extruded platform frame.
- 4) Fascia panels shall be flat black on all sides; finished to match the stage floor on the exposed face and all edges shall leave ply visible with flat black epoxy paint.

M. Custom Step Units

- 1) Provide custom step units as shown on the drawings.
 - a. Step units shall meet same average loading criteria as stage platform system.
 - b. Fabricate from wood top deck with laminate top layer to match adjoining deck.
 - 1. Box construction with finish fascia on all exposed sides.
 - a) Support fascia at perimeter and center of each step
 - c. Provide quantities of step units, and all necessary hardware and attachments, as indicated on the drawings.

N. Side Closure Panels

- 1) The open sides of the assembled risers shall be provided with removable panels similar in construction and attachment as the fascia panels defined above.

O. Storage Carts

- 1) Provide storage carts for all platforms and supports legs
 - a. Carts shall be provided with 8" diameter non-marking casters. At least 2 casters per cart shall be rigid, and at least 2 casters shall be locking swivel.
 - b. Cart shall be provided with a push handle located at a convenient height for use in a standing position.
 - c. Cart shall be provided with a tie down strap.
 - 1. Strap shall be firmly affixed to cart platform if one is provided.

2.8 FABRICATION

- A. Fabricate all work in this section in accordance with the specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.
- B. Machine finish all operating parts to standard trade tolerance, fits and finishes.
- C. Carry out shop welding in full accordance with the appropriate sections of the "specifications for the Design, Fabrication and Erection of Structural Steel Building" of the American Institute

of Steel Construction (AISC).

2.9 SOURCE QUALITY CONTROL

- A. All equipment and components shall be factory tested prior to shipping.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. The work on this section shall be installed by an experienced installer in the employ of the Contractor for the equipment in this section.

3.2 EXAMINATION

- A. Site Verification of Conditions

- 1) The Contractor shall examine areas and conditions under which the equipment is to be installed and shall notify the General Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.

3.3 ERECTION, INSTALLATION, APPLICATION

- A. Install all work in this section in accordance with the Commissioner's direction, specifications, approved shop drawings, pertinent Contract Drawings, established trade practices and applicable code requirements.
- B. Install all work securely, complete with all bolts, nuts, washers, clips, fittings, supports, and other items required for proper installation and operation.
- C. Position all items accurately as indicated on Drawings and true to plumb, line and level. Maintain maximum headroom and clearances at all points.
- D. Coordinate work with all other trades to avoid causing delays in construction schedule.
- E. All field welding requires prior approval of the Commissioner.
- F. Carry out approved field welding in full accordance with the appropriate sections of "Specifications for the Design, Fabrication and Erection of Structural Steel Buildings" of the American Institute of Steel Construction (AISC).
- G. Do all cutting, drilling, tapping and approved welding required to properly install work. Obtain Commissioner's prior approval for cutting and drilling of existing structural work.
- H. Clean structural steel and fabricated steelwork of rust, scale and foreign matter by grinding; prime with 1 coat of chromated primer; finish with 1 coat of first quality machinery enamel free of skips, runs and saps. Touch up all field connections, welds and abraded places with primer and enamel.

3.4 FIELD QUALITY CONTROL

A. Site Tests, Inspection

- 1) The installation of the equipment indicated in this section shall be supervised by qualified personnel who are regularly employed by the Contractor for supervision of equipment installation similar to that indicated herein.
- 2) Arrange for all tests and inspections required by the NYC DDC General Conditions.

3.5 ADJUSTING

- A. Adjust all equipment and components for operation in accordance with the specifications, approved shop drawings and pertinent Contract Drawings prior to the demonstration indicated herein.

3.6 CLEANING

- A. Touch up minor abrasions and imperfections as required.
- B. All unnecessary equipment and materials shall be removed from the area(s) of this work upon completion, removed from the job site and disposed of legally at no additional cost to the City of New York.

3.7 DEMONSTRATION

- A. Installed equipment to be inspected for quality by the Commissioner and the City of New York.
- B. Adjustments or modifications shall be made as directed by the Commissioner.
- C. Following the equipment demonstration, inspection and final adjustments, the City of New York's designated staff or representatives shall be instructed in the use, care and maintenance of all items. Provide 6 hours of staff instruction.
- D. Tests and instruction to be scheduled in conformance with project construction schedules and the availability of the Commissioner and the City of New York.
- E. Cost of re-inspection and additional testing by the Commissioner, if required, due to lack of completion and/or errors and omissions shall be paid by the Contractor or the General Contractor respective to the area of work concerned.

3.8 DEMONSTRATION/COMMISSIONING

A. Compliance Testing Procedures (CTP)

- 1) Using the actual show control console and all other components that are installed as part of this Specification Section, the following tests must be conducted by the contractor under 100% of full load. These tests are designed to help ensure that the hoists function as specified. The following represents a sample of the types of testing that will be conducted. Note this list is not complete see Appendix for complete requirements.
 - a. Validation of E-Stop and limit switches
 - b. Validation of operational speeds
 - c. Validation of load capacity

- d. Validation of travel limits
 - e. Validation of target achievement & repeatability
 - f. Validation of load cell or drive over current detection
 - g. Validation of cross groove detector.
 - h. Primary brake, alone, holds 125%
 - i. Secondary brake, alone, holds 125%
 - j. Observe motion during E-Stop Activation
 - k. Observe motion during instantaneous loss of power (bang stop)
 - l. Verify hoists have been coordinated with other items to be installed
- 2) Provide a CTP testing report to the Commissioner indicating that the above tests have been conducted on each winch. The Commissioner will ask for these tests to be repeated on randomly selected hoist units. Failure to reproduce the tests on two of the units will require complete retesting of all units in the presence of the theatre consultant. See below for costs associated with this retesting.
 - 3) Coordinate the site so as to ensure testing can be done in a well light, clean, safe environment, include barricades to ensure unauthorized persons are not able to interfere with the testing. No temporary wiring or transformers will be allowed during the CTP.
 - 4) All costs associated with the CTP are the responsibility of the contractor/manufacture of this section; this includes items such as equipment necessary to access the hoists to ensure limits and brakes can be tested.
- B. Adjustments or modifications shall be made as directed by the Commissioner.
 - C. Tests and instruction to be scheduled in conformance with project construction schedules and the availability of the Commissioner and the City of New York.
 - D. Cost of re-inspection and additional testing by the Commissioner, if required, due to lack of completion and/or errors and omissions shall be paid by the Contractor or the General Contractor respective to the area of work concerned.

3.9 USER INSTRUCTION

- A. Following the equipment demonstration, inspection and final adjustments, the end user's designated staff or representatives shall be instructed in the use, care and maintenance of all items. Instruction must match the information provided at the time of submittals and shall include, at minimum, those items listed in the submittals:
 - 1) Provide in-depth instruction to the end user's staff in the operation and maintenance of all systems included here-in
 - a. Provide 2 days of staff instruction on system and manipulation of hoists and associated devices and control elements
 - b. The user instruction must be conducted per the submittal information submitted as detailed in Part 1 above. Testing of the participants, at the conclusion of the user instruction, will be required in order to determine if the minimum level of proficiency has been attained

- B. All user instruction shall be by technical staff of the Contractor for the work in this Section
- C. At the conclusion of the user instruction the contractor shall conduct a written and hands on test of the participants that shall demonstrate to the contractor that the participants have reached a level of understanding that will result in safe use of the equipment
 - 1) Provide Certificates of Instruction for each participants. Log the names of those who successfully completed the instruction process. Submit as the first page of the Bound material.

3.10 PROTECTION

- A. Suitable precautions shall be taken to protect the equipment in this section from damage after installation and prior to acceptance by the City of New York.

3.11 APPENDIX

- A. See attached appendix for Compliance Testing Procedure.

SECTION 11 61 33
THEATRICAL RIGGING - APPENDIX

MCC Theater

Compliance Testing Procedure (CTP)

Truss Winch Units

Unit Number: _____

Date of Testing

____/____/____
(month/day/year)

TABLE OF CONTENTS

INTRODUCTION	32
ATTENDEES PRESENT AT TEST	34
TESTING PROCEDURES (test loads in parentheses)	
1.1 REVIEW OF FACTORY QUALITY CONTROL DOCUMENTS	36
1.2 VISUAL INSPECTION	37
1.3 VALIDATION OF E-STOP AND LIMIT SWITCH SIGNALS	38
1.4 VALIDATION OF OPERATIONAL SPEEDS & CYCLE TESTING (110% capacity)	40
1.5 VALIDATION OF OPERATIONAL TRAVEL DISTANCE	41
1.6 VALIDATION OF OPERATIONAL LIMITS (empty & 100% capacity)	42
1.7 VALIDATION OF TARGET ACHIEVEMENT & REPEATABILITY (100% capacity)	44
1.8 OBSERVE HOIST MOTION DURING E-STOP ACTIVATION (110% capacity)	45
1.9 BRAKE VALIDATION (125% capacity)	46
1.10 VALIDATION OF LOAD SENSING (various loads)	47
1.11 ADDITIONAL CTP DISCUSSION ITEMS (TBD)	48

Introduction

The following test procedures are provided to confirm that the hoists meet or exceed the operating parameters as detailed in specification 11 61 33 Theatrical Rigging. The results, generated from the procedures detailed in this document, are also intended to provide a basis for understanding how the hoists respond to specific commands generated by the Rigging Control System (RCS), understanding how the hoists respond to specific fault conditions and understanding how the hoists respond to E-Stop situations.

In all cases the safety of the performers and operating personnel is of prime importance. Safety is followed closely by consistent and reliable movement by the hoists. All deviations from the original specifications, which are due to specific design decisions made by the manufacturer, will be evaluated for overall safety, reliability and performance.

The Hoist

For the purposes of this document the hoist shall be defined as the machine with the properties listed below used to lift theatrical elements above the stage.

Purpose:	Truss Winch Unit
Mounted Location:	Mounted to rigging beams above stage
Mounted Orientation:	Underhung Horizontal, mounted on motor frame
Capacity:	2,400 lbs. live load
Lift Lines:	8
Travel Distance:	25'-0"
Speed:	Fixed Speed (30 fpm)
Manufacturer's Model #	Custom

During the CTP, the hoist shall be driven by the final installed drive cabinet and controller (i.e. no temporary drives or control systems). The drives shall be controlled by the same primary control system intended for the final installation. This shall include the handheld controller and the final version of the control software.

Provide input/output (I/O) monitoring software, laptop, and trained operator for tracing in real-time the inputs and outputs of the winches. These diagnostic features will be used to monitor and document position, velocity, accel/decel, overtravel distances, motor current, calculated torque, and load cell spikes due to E-stop.

Hoist Covers

Remove all hoist covers prior to the start of the CTP. Reinstall all hoist covers after completion of the CTP and any remedial work.

2-way Communication

The rigging contractor must provide 2-way wireless communication devices such as wireless headsets or 2-way radios for conducting CTPs. At minimum, provide three devices for control operator, stage level, and grid level.

Recording of Test Data

The format of the procedures contained in this document requires that a test be conducted and a specific reaction be observed by the complete review team. The reaction must match the intended reaction before the test can be checked "passed". Each member of the review team must concur that the test has passed and any comments by any member are added to the comments section at the end of the test. Each team member will be asked to initial that they have witnessed a successful test.

Variation to the intended reaction must be documented in the comments section and the "passed" box must be left unchecked. If, after careful consideration by the review team, it is determined that a reaction is acceptable a "Deviation Code Number" will be entered in the "passed" box and that deviation code number will reference the Acceptable Deviations document. This document will define the result of the test and the acceptable deviation.

Variation to the intended reactions which are deemed unacceptable by the review team must be retested. The mechanism or software must be adjusted until the reaction defined in the test is achieved. This may require adjustment or modification of the equipment prior to re-testing.

Test Weight

The rigging contractor must provide the test weight. The weight can be in any form the contractor chooses. To expedite the CTP, weight must be easily and quickly added and removed from the batten, such as spansets, carabineers, and sandbags. Provide a scale or calibrated dynamotor to randomly verify test weights during CTP. Provide test weight totaling 3,000 lbs (2,400 lbs capacity plus 25%).

Provide means to quickly bypass capacity-overload detection for tests conducted at 110% capacity.

Final Report

The final Compliance Testing Procedure (CTP) report shall contain the completed test results from this document and an Executive Summary letter. The Executive Summary letter shall indicate whether or not, as of date of the CTP, the results indicated that the machine has a high probability of working correctly.

Personnel Required/Review Team

The tests shall be observed by, at minimum, a representative of the Commissioner, a representative of the City of New York, installer's representative, and a manufacturer's representative for both controls and mechanical systems. These individuals must agree that the hoists have reacted as defined in this test document before the "passed" box can be checked.

At all times during these tests, the project manager for the rigging contractor must be present. The rigging contractor must provide technical assistance by a person or persons properly trained in the electrical/mechanical hardware of the hoists. Provide at least one person dedicated as control operator who is properly trained in the control system including the diagnostic features.

ATTENDEES PRESENT AT TEST

Record attendees present at each day of testing.

DATE: _____

The following persons were present, witnessed, and/or participated in the conduct of this test:

NAME	ORGANIZATION	PARTICIPATION	SIGNATURE

* Example: Commissioner, End-User, Manufacturer, Installer

COMMENTS:

ATTENDEES PRESENT AT TEST

Record attendees present at each day of testing.

DATE: _____

The following persons were present, witnessed, and/or participated in the conduct of this test:

NAME	ORGANIZATION	PARTICIPATION	SIGNATURE

* Example: Commissioner, End-User, Manufacturer, Installer

COMMENTS:

1.1 REVIEW OF FACTORY QUALITY CONTROL DOCUMENTS

PURPOSE:	The review of Factory Quality Control Documents is intended to verify that the manufacturer has an internal quality control procedure which helps ensure the quality of the equipment prior to its installation on site. The review will look for anomalies which could indicate any fundamental issues with specific components. It will also look for "chain of custody" information which helps track the machinery through manufacture and to its final installation.
SETUP:	<p>1) The manufacturer will provide individual tracking sheets which detail at minimum the following for each unit:</p> <ul style="list-style-type: none"> The machine serial number The date of manufacture The date of testing The tests conducted to confirm the physical components The tests conducted to confirm the electrical components. The <u>name and signature</u> of the person who conducted the tests. The date (or likely date) of shipping

STEP	ACTION	REACTION	PASS
1	There is an indication on the sheet of the machine serial number	Serial number is easily visible on the form and the machine	
2	There is an indication of the date when the machine was manufactured on the testing form	Machine manufacture date is clearly visible	
3	There is an indication of the date of testing on the form.	Testing date is clearly visible	
4	Review shipping date documents	Shipping date is clearly visible	
5	There is a series of tests conducted to confirm the physical components of the machine	Testing sheet has a series of tests which indicate how and what physical components have been tested	
6	There is a series of tests conducted to confirm the electrical components of the machine.	Testing sheet has a series of tests which indicate how and what electrical components have been tested	
7	There is a name and signature of the person who conducted the tests.	The name and signature of the person who tested the machines is clearly visible	
8	Review the manufacturer's installation checklist.	The manufacturer's installation checklist is filled out and is signed and dated by the installer.	

COMMENTS:

TEST CONDUCTED BY: _____ DATE: _____ TIME: _____

INITIALS OF REVIEW TEAM: _____

1.2 VISUAL INSPECTION

HOIST: _____

PURPOSE:	The following inspection is conducted prior to movement of the hoist. This visual inspection has two purposes: 1) It is intended to help ensure a safe working environment. 2) It is intended to visually look for components, electrical devices and/or hardware which appear to be possible points of test failure or which could create an unsafe condition.
SETUP:	1) The manufacturer will establish a "Safe Zone". This zone will be corded off from the rest of the space by a barrier of some kind, at minimum there must be yellow "caution" tape around the test area. 2) All High Voltage areas must be marked with signage. 3) Bolts must be tight 4) Cables must be clear of machine travel 5) All loose equipment must be removed from moving parts 6) The host of the CTP must provide safety glasses, hearing protection, hard hats, and any other required personal protection equipment (PPE). 7) The host of the CTP must instruct the participants as to any other known safety considerations.
REF DOCS:	

STEP	ACTION	PASS
1	Is a proper Safe Zone provided for the tests?	
2	Do participants have PPE?	
3	Is proper rigging signage provided?	
4	Are all E-STOP locations clearly labeled and visible?	
5	Is the space clear of any loose cables?	
6	Is the space clear of any loose tools or parts?	
7	Are all welds complete and brushed clean?	
8	Are all bolts the correct length, with washers and tight?	
9	Is rope anchor method to drum visible and is wire rope properly terminated?	
10	Is the overall construction of high quality?	
11	Is the painting completed and of high quality?	
12	Are anchor points completed?	
13	All safety devices installed?	
14	Are power/control drive boxes properly installed?	

COMMENTS: _____

TEST CONDUCTED BY: _____ **DATE:** _____ **TIME:** _____

INITIALS OF REVIEW TEAM: _____

1.3 VALIDATION OF E-STOP AND LIMIT SWITCH SIGNALS

HOIST: _____

PURPOSE:	The following tests are conducted to validate the safety functions prior to any motorized movement.
SETUP:	Provide all 5 functioning E-stops for the duration of the CTP. Provide means to quickly manually activate limit switches for the purpose of confirming their input/output at the motor drive.
REF DOCS:	

STEP	ACTION	REACTION	PASS
1	Verify E-Stop 01 (ES-01) indicates fault at control cabinet	Note fault condition at motor drive cabinet	
2	Verify E-Stop 02 (ES-02) indicates fault at control cabinet	Note fault condition at motor drive cabinet	
3	Verify E-Stop 03 (ES-03) indicates fault at control cabinet	Note fault condition at motor drive cabinet	
4	Verify E-Stop/Control Point 01 (CP-01) indicates fault at control cabinet	Note fault condition at motor drive cabinet	
5	Activate Hoist Initial high limit	Note fault condition at motor drive cabinet	
6	Activate Hoist Ultimate high limit	Note fault condition at motor drive cabinet	
7	Activate Hoist Initial low limit	Note fault condition at motor drive cabinet	
8	Activate Hoist Ultimate low limit	Note fault condition at motor drive cabinet	
10	Run hoist, activate E-Stop 01 (ES-01)	Verify machine has stopped all movement	
10a		Verify all motors have stopped running	
10b		Verify motor power is no longer present	
10c		Verify motor drive output power is no longer present Note Drive output display	
10d		Verify that motion does not resume when E-Stop is reset. i.e. the control system has put the Hoist in a safe state	
11	Run hoist, activate E-Stop 02 (ES-02)	Verify machine has stopped all movement	
11a		Verify all motors have stopped running	
11b		Verify motor power is no longer present	
11c		Verify motor drive output power is no longer present Note Drive output display	
11d		Verify that motion does not resume when E-Stop is reset. i.e. the control system has put the Hoist in a safe state	
12	Run hoist, activate E-Stop/Control Point 01 (CP-01)	Verify machine has stopped all movement	
12a		Verify all motors have stopped running	
12b		Verify motor power is no longer present	

12c		Verify motor drive output power is no longer present Note Drive output display	
12d		Verify that motion does not resume when E-Stop is reset. i.e. the control system has put the Hoist in a safe state	

COMMENTS:

TEST CONDUCTED BY: _____ **DATE:** _____ **TIME:** _____

INITIALS OF REVIEW TEAM: _____

1.4 VALIDATION OF OPERATIONAL SPEEDS & CYCLE TESTING

HOIST: _____

PURPOSE:	The following tests are conducted to validate the lifting capacity and operational speeds of the hoist.
SETUP:	The hoist must be fully loaded with 110% of hoist capacity for cycle and load testing. All moves must be performed at maximum acceleration and deceleration.
Special Note:	

STEP	ACTION	REACTION	PASS
	Description of weight: Quantity: Weight of each:	Total Weight:	
1	Conduct a zero speed enable (i.e. the motor comes to full torque and both brakes are released). Observe the pipe as the brakes are released and applied.	No motion when brakes release/set	
2	Going up - Time the length of a total move at 100% of full speed. This time shall be taken from the time "GO" is depressed until the time the batten has come to a complete stop.	120 fpm Distance: Time:	
2a	Trace max acceleration on control system diagnostic software	Record accel:	N/A
2b	Trace max deceleration on control system diagnostic software	Record decel:	N/A
3	Going Down - Time the length of a total move at 100% of full speed. This time shall be from the time "GO" is depressed until the time the batten has come to a complete stop	120 fpm Distance: Time:	
3a	Trace max acceleration on control system diagnostic software	Record accel:	N/A
3b	Trace max deceleration on control system diagnostic software	Record decel:	N/A
4	Cycle hoist from low dead to high dead 5 times at full load/speed	All 5 cycles are smooth	

COMMENTS:

TEST CONDUCTED BY: _____ **DATE:** _____ **TIME:** _____

INITIALS OF REVIEW TEAM: _____

1.5 VALIDATION OF OPERATIONAL TRAVEL DISTANCE

HOIST: _____

PURPOSE:	The following test shall confirm that the hoist meets the minimum travel distance while maintaining the required 3 wire rope safety wraps and 3 extra drum grooves.
SETUP:	Provide means to demonstrate full travel distance.
Special Note:	Minimum travel required: 26'-0"

STEP	ACTION	REACTION	PASS
1	Take measurement at lowest dead	Low dead measurement:	
2	Count the number of wire rope wraps left on the drum while at lowest dead	Number of wraps:	
3	Move batten to highest dead and take measurement.	High dead measurement: Total Travel achieved:	
	Count the number of empty wire rope grooves left on the drum while at the highest dead	Number of empty grooves:	

COMMENTS:

TEST CONDUCTED BY: _____ **DATE:** _____ **TIME:** _____

INITIALS OF REVIEW TEAM: _____

1.6 VALIDATION OF OPERATIONAL LIMITS

HOIST: _____

PURPOSE:	The following tests are conducted to validate the travel limit functions under dynamic operating conditions.
SETUP:	The test must first be conducted with the batten unloaded in the UP direction as this will likely represent the greatest upward overtravel scenario. The test must then be repeated at 100% capacity in the up and down directions. <u>Provide means to quickly temporarily disable the soft and initial limit switches and to back off of the ultimate limits.</u> If possible, use tracing features to derive overtravel distance.
Special Notes:	At the manufacturer's discretion, tests may be conducted at incremental speeds.

STEP	ACTION	REACTION	PASS
1	Unloaded: At 100% speed attempt to run the hoist UP to a position beyond its set high soft limit	Control system warns operator and prevents the move.	
	<u>Disable Soft Limit.</u> Unloaded: At 100% speed attempt to run the hoist UP to a position beyond its INITIAL hard high limit	Hoist stopped as a result of striking the initial high hard limit.	
		Hoist did not strike ultimate hard limit	
		If available, record actual overtravel distance:	N/A
	<u>Disable Soft and Initial limits.</u> Unnnloaded: At 100% speed attempt to run the hoist UP to a position beyond its ULTIMATE hard high limit	Hoist stopped as a result of striking the ultimate high hard limit.	
		Hoist elements did not reach physical end-of-travel confines	
		Record empty wire rope grooves left on drum:	
		If available, record actual overtravel distance:	N/A
	<u>Disable Soft Limit;</u> Loaded: At 100% speed attempt to run the hoist UP to a position beyond its INITIAL hard high limit	Hoist stopped as a result of striking the initial high hard limit.	
		Hoist did not strike ultimate hard limit	
		If available, record actual overtravel distance:	N/A
	<u>Disable Soft and Initial limits;</u> Loaded: At 100% speed attempt to run the hoist UP to a position beyond its ULTIMATE hard high limit	Hoist stopped as a result of striking the ultimate high hard limit.	
		Hoist elements did not reach physical end-of-travel confines	
		Record empty wire rope grooves left on drum:	
		If available, record actual overtravel distance:	N/A

	Loaded: At 100% speed attempt to run the hoist DOWN to a position beyond its set low soft limit	Control system warns operator and prevents the move.	
	<u>Disable Soft Limit:</u> Loaded: At 100% speed attempt to run the hoist DOWN to a position beyond its INITIAL hard low limit	Hoist stopped as a result of striking the initial low hard limit.	
		Hoist did not strike ultimate hard limit	
		If available, record actual overtravel distance:	N/A
	<u>Disable Soft and Initial limits:</u> Loaded: At 100% speed attempt to run the hoist DOWN to a position beyond its ULTIMATE hard low limit	Hoist stopped as a result of striking the ultimate low hard limit.	
		Hoist elements did not reach physical end-of-travel confines	
		Record wire rope wraps left on drum:	
		If available, record actual overtravel distance:	N/A

COMMENTS:

TEST CONDUCTED BY: _____ **DATE:** _____ **TIME:** _____

INITIALS OF REVIEW TEAM: _____

1.7 VALIDATION OF TARGET ACHIEVEMENT & REPEATABILITY

HOIST: _____

PURPOSE:	The following tests are conducted to validate the target achievement and repeatability of the hoist load within +/- .125" (1/8")
SETUP:	Conduct test with pipe loaded to100%. Program a high and low Dead for test.
Special Note:	

STEP	ACTION	START POS	END POS	VARIANCE	PASS
1	From low dead, run the hoist UP to the high dead at 50% of full speed			N/A	
1a	From high dead, run the hoist DOWN to the low dead at 50% of full speed				
2	From low dead, run the hoist UP to the high dead at 50% of full speed				
2a	From high dead, run the hoist DOWN to the low dead at 50% of full speed				
3	From low dead, run the hoist UP to the high dead at 100% of full speed				
3a	From high dead, run the hoist DOWN to the low dead at 100% of full speed				
4	From low dead, run the hoist UP to the high dead at 100% of full speed				
4a	From high dead, run the hoist DOWN to the low dead at 100% of full speed				

RESULTS			
4b	During the above tests trace motor drive current draw and record maximum current	Current:	
4c	During the above tests trace motor torque and record maximum torque	Torque:	
4d	Both the Maximum torque and current are within the name plate capacity of the motor	Maximums are within manufacturers range	
4e	The maximum torque is within the name plate capacity of the gear box	Maximum is within manufactures given range	

COMMENTS:

TEST CONDUCTED BY: _____ **DATE:** _____ **TIME:** _____
INITIALS OF REVIEW TEAM: _____

1.8 OBSERVE HOIST MOTION DURING E-STOP ACTIVATION

HOIST: _____

PURPOSE:	The following tests are conducted to evaluate how the hoist responds to dynamic E-stop situations.
SETUP:	The hoist must be fully loaded with 110% of capacity. Program a high and low Dead for test. Use diagnostic graphing feature to derive overtravel distance.
Special Note:	Rigging contractor may wish to conduct this test at incremental speeds.

STEP	ACTION	ACTIVATION POSITION	END POSITION	TRAVEL DISTANCE	PASS
1	From low dead, run the hoist at Full speed. Depress E-stop during move. Record the actual travel distance after the E-Stop was depressed.				
1a	Record dynamic load spike during E-stop from diagnostic system				N/A
2	From high dead, run the hoist DOWN at Full speed. Depress E-stop during move. Record the actual travel distance after the E-Stop was depressed.				
2a	Record dynamic load spike during E-stop from diagnostic system				N/A

COMMENTS:

TEST CONDUCTED BY: _____ **DATE:** _____ **TIME:** _____

INITIALS OF REVIEW TEAM: _____

1.9 BRAKE VALIDATION

HOIST: _____

PURPOSE:	The following tests are conducted to validate the primary and secondary brake integrity of the hoist.
SETUP:	The hoist must be fully loaded with 125% of capacity. Provide means to comfortably release and hold the primary and secondary brakes individually.
Special Note:	

STEP	ACTION	REACTION	PASS
1	Description of weight: Quantity: Weight of each:	Total Weight:	
2	Verify the test weight		
3	Static: Release the secondary brake and observe the primary brake holding the load for 10 minutes	Primary brake system holds the load.	
4	Static: Release the primary brake and observe the secondary brake holding the load for 10 minutes	Secondary brake system holds the load.	
5	Observe the motor/gearbox assembly	Motor/gearbox assembly appears to be functioning properly during the brake tests	

COMMENTS:

TEST CONDUCTED BY: _____ **DATE:** _____ **TIME:** _____

INITIALS OF REVIEW TEAM: _____

1.10 VALIDATION OF LOAD SENSING

HOIST: _____

PURPOSE:	Tests shall document load sensing resolution (smallest detectable weight) variance, shall verify under/overload function, and shall demonstrate how the system responds to specific load sensing fault conditions:
SETUP:	Conduct tests loaded and unloaded as described below. Provide means to force an overload condition by providing a means to pick up additional weight while moving up. Provide means to force an under load condition by providing a fixed object to obstruct batten while moving down.

STEP	ACTION	REACTION	PASS
1	Unloaded: Move batten to low dead. Record static weight readout from control desk.	Record low dead static weight readout from control desk: Does system display zero or does it display batten weight?	N/A
2	Unloaded: Move batten to high dead. Record static weight readout from control desk.	Record high dead static weight readout from control desk: Does system compensate for wire rope weight? YES or NO	N/A
3	Unloaded: With batten static at low dead. Record weight readout from control desk	Record weight readout:	N/A
4	Add weight in 5 lbs increments and record smallest amount detected	Average smallest amount detected:	
5	At an intermediate low dead, load pipe with approx. 400 lbs & set (teach) this as the current normal weight.	Weight loaded: Weight description:	
6	Conduct under/overload test at 10% of current load (.10*400 lbs = 40 lbs)	Record sensitivity settings:	N/A
7	Loaded with 400 lbs at Full speed/accel, run the hoist UP. After reaching full speed pickup an additional weight of 50 lbs	System detected overload and stopped. System prevented further UP movement, but allowed DOWN movement.	
8	Loaded with the weight from previous test (450) lbs at Full speed/accel, run the hoist Down. After reaching full speed land the additional weight of 50 lbs on the floor.	System detected underload and stopped. System prevented further DOWN movement, but allowed UP movement.	

COMMENTS:

TEST CONDUCTED BY: _____ **DATE:** _____ **TIME:** _____

INITIALS OF REVIEW TEAM: _____

SECTION 11 61 63

THEATRICAL LIGHTING DIMMING & CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. The work in this section includes, but is not limited to, furnishing and commissioning the following major elements and associated accessories:
- 1) Theatrical and Architectural dimmers and equipment racks
 - 2) Auxiliary equipment/electronics racks
 - 3) Theatrical lighting relay panels with integrated branch circuit breakers
 - 4) Architectural lighting emergency transfer panels
 - 5) Lighting systems computers
 - 6) Theatrical lighting Ethernet data networks
 - a. Network racks
 - b. Network components
 - c. Network devices
 - d. Network receptacles
 - 7) Theatrical lighting control consoles and peripherals
 - a. Wireless focus remote systems
 - b. Theatrical control panels and receptacles
 - c. Video display monitors
 - 8) Architectural lighting control systems
 - a. House lighting controls
 - b. House panic systems
 - c. Architectural control panels and receptacles
 - d. Portable house light control console and receptacles
 - 9) Theatrical lighting wiring devices
 - 10) Extension cables
 - 11) All materials, components and services required to provide the work as specified herein, elsewhere in the project documents and/or as shown on the related drawings.
 - 12) Consult and coordinate with other affected work and contractors throughout the course of the work contained herein.
 - 13) Refer to 'TL' series drawings.

1.2 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- A. The work of this section includes supervision of the termination of all control wiring in panels and racks. All control cabling related to this section shall be installed under Division 26.

1.3 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. All other equipment shall be installed and terminated under Division 26, except as noted above in paragraph 1.2A

1.4 RELATED SECTIONS

- A. All drawings including General Construction, Structural, Theatrical, Mechanical, Electrical, and the NYC DDC General Conditions of the contract, including Supplemental Provisions apply to this section.

- B. Coordinate with all related sections of the specifications including, but not limited to:

- 1) Division 03 – Concrete
 - a. Fastener requirements
- 2) Division 04 - Masonry:
 - a. Fastener requirements
- 3) Division 05- Metals:
 - a. Structural steel supporting the work of this section
- 4) Division 09 – Finishes
- 5) Division 11, Equipment
 - a. Section 11 6133 – Theatrical Rigging
 - b. Section 11 6183 – Theatrical Audio Video Systems
- 6) Division 23 – Mechanical
- 7) Division 26 – Electrical
 - a. Conduit, wire, pull boxes, junction boxes and miscellaneous hardware and components as required for a complete electrical installation.
 - b. Terminations and testing of system continuity
 - c. Section 26 5561, Theatrical Systems Electrical Installation

1.5 REFERENCES

- A. References to code, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.
- B. If an applicable code or standard permits work of lesser quality or extent that this specification and the related drawings will govern.
- C. Comply with prevailing local codes and applicable Underwriters Laboratory standards.
- D. Comply with City of New York Fire Regulations for places of assembly.

E. Comply with applicable national, state and local labor regulations and requirements.

- 1) NEC: National Electric Code
- 2) UL: Underwriters Laboratories
- 3) IEEE: Institute of Electronic and Electrical Engineers
- 4) IESNA: Illuminating Engineering Society of North America
- 5) ANSI: American National Standards Institute
- 6) AISC: American Institute of Steel Construction

F. Equipment shall have pertinent labels.

1.6 DEFINITIONS

A. "Contractor": Installer/Integrator responsible for the construction and installation for the work contained in this section.

- 1) Contractors involved with other work shall be indicated with a specific trade preceding the word "Contractor" (i.e. General, Electrical, etc.).

B. "Furnish": Purchase and/or fabricate and deliver to project site.

C. "Install": Physically install the items in their proper location (s) on the project site.

D. "Provide": Furnish and install.

E. In all cases where a device or a part of equipment is referred to in a singular manner within the contract documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the project documents.

1.7 STATE OF THE ART DEVELOPMENT

A. The successful Contractor shall supply only the latest developed appropriate product. In cases where product development from a specified manufacturer surpasses the criteria of this specification, the Contractor shall inform the Commissioner and make the newer product available to the project. In no case shall discontinued or obsolete equipment be acceptable. Should a newer product be suggested as a substitution for a discontinued product, or for a product that is in process of being phased out of production, that newer product shall be offered to the City of New York at no additional cost. The same requirement applies to control console programs developed/updated during the warranty period.

B. Should product recall by a specified manufacturer require temporary or permanent replacement of a product specified under this section, the Contractor shall notify the City of New York at the earliest reasonable time and shall arrange to replace the product in question at the earliest possible time.

- 1) Equipment found defective or subject to recall prior to scheduled installation shall not be delivered to the jobsite.
- 2) Equipment defect or intended recall shall not relieve the Contractor from his

contractual obligation with regard to delivery schedule of product. In this circumstance, notification shall be made to the Commissioner by fax and express carrier. Arrangement for alternate product shall be made at this time.

- 3) Under no circumstances shall arrangement for alternate product necessarily require the City of New York to accept superseded equipment except on a temporary basis.

1.8 SUBMITTALS

- A. All submittals shall be submitted in a timely manner, allowing sufficient time for adequate review and possible resubmittals without jeopardizing the project schedule.
- B. All submittals shall leave space available for review stamps and comments.
- C. Submittals will be reviewed and accepted prior to proceeding with the fabrication of the work in this section. The Commissioner shall only mark one set of documents per submittal with comments. Any additional sets of drawings or product data shall be returned unmarked.
- D. Review all pertinent project Contract Documents. Following this review, provide to the Commissioner and Construction Manager any additional information required to make a fully functioning system. In addition, the Contractor shall indicate the maximum accepted wire size as it relates to termination points on the specified equipment.
- E. Product Data: Submit catalog or standard data sheets for component parts as part of the shop drawing submittal. The data shall include all information, which indicates compliance with the specifications herein. Clearly indicate the manufacturer of each component and part.
- F. Bill of Materials: Submit a full Bill of Materials indicating quantity, products, manufacturer and manufacturer's part numbers.
- G. Verify wire type, count and routing for all required low voltage wire sizes between all components for conduit sizing and routing by Division 26. Verify and coordinate all line voltage power input required by systems components that shall be provided under Division 26.
- H. Shop Drawings
 - 1) Provide shop drawings on C size minimum (24 X 36) sheets.
 - 2) Include a cover sheet with a drawing index including the sheet number and title for each sheet in the set.
 - 3) Provide an inventory of all equipment to be supplied, including quantities, manufacturer's part number, reference to applicable drawings, etc.
 - 4) Provide complete, fully dimensioned, large-scale detailed drawings of all major components.
 - 5) Provide requisite schematics, plans and sections indicating assembly and installation of components.
 - 6) Provide indications by arrow and boxed caption of all variations from contract drawings and specifications, except where variation is indicated as acceptable.

- 7) Provide detailed one-line riser diagrams and installation circuit diagrams indicating all control and/or data electrical requirements and point to point connections. These shall be provided within 30 days of Contract Award.

I. Samples:

- 1) Submit samples for approval of the following.
 - a. Panel engraving or silk screen
 - b. Distribution device engraved lamacoid label showing attachment method.

J. Additional samples will be submitted within 14 days of Commissioner's written request.

K. Project Record Documents:

- 1) Submit documents in accordance with the NYC DDC General Conditions and as specified herein.

1.9 QUALITY ASSURANCE

A. Provision of all equipment and services under this section shall be the responsibility of a single Contractor as specified herein.

- 1) Contractor shall provide a complete organization chart listing engineering and project management staff including resumes of proposed staff.
- 2) Contractor shall provide a bill of materials listing products and manufacturer(s) of key systems components and major secondary components including but not limited to all Ethernet distribution components.

B. Qualifications:

- 1) Contractor: 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) Manufacturer: The manufacturer furnishing 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.
- 3) The Contractor shall own and operate their own facility for the servicing and integration of theatrical lighting dimming and control equipment, and be regularly engaged in the servicing and integration of such equipment.
- 4) The Contractor shall maintain a full-time factory employed field engineering staff available in the New York, New York area on an emergency basis of at least two people trained in electronic lighting control systems and Ethernet systems services.

1.10 DELIVERY, STORAGE AND HANDLING

A. Delivery, storage and handling shall be coordinated with the Commissioner and shall meet all requirements described in the New York City DDC General Conditions.

B. Packing, Shipping, Handling & Unloading:

- 1) All equipment shall be appropriately and substantially packed for shipment.
- 2) All equipment containers shall clearly indicate the equipment contained, "front", "top", "fragile", and the project name and theatre site allocation. Include packing and shipping list for each container.
- 3) All shipping costs to the job site are the responsibility of the Contractor. The shipping method/company is at the total discretion of the Contractor in order to meet the published project schedules.

C. Acceptance at Site

- 1) Delivery of all materials shall be coordinated with the General Contractor.
- 2) The Contractor shall be responsible for acceptance of the Lighting System components at the jobsite, confirming that all quantities and counts are correct and for keeping accurate logs and records of such information.

1.11 PROJECT / SITE CONDITIONS

A. Existing Conditions

- 1) Verify all conditions at jobsite. Promptly report variations and obstructions to the Commissioner. All additions and or corrections are to be requested prior to fabrication.

B. Field Measurements

- 1) Field measurements shall be taken by the Contractor prior to fabrication to ensure proper fitting of work. Allow for adjustments during installation whenever taking field measurements.
- 2) Should field measurement of site conditions alter the design or installation of system elements from the approved shop drawings, revised shop drawings shall be reissued for review.

1.12 SEQUENCING AND SCHEDULING

- A. The installation of the lighting system wiring devices shall not occur until all painting in the area has been completed.
- B. The installation of computer grade network components, dimmer rack processors and modules, and any other equipment sensitive to construction debris and dust shall not be installed in any space until doors and any windows are installed, all dust producing construction and finishing is completed and all debris and dust has been removed. Typical "office" cleanliness shall be required in rooms in which computer grade equipment is to be installed.
- C. The unpacking and installation of theatrical lighting consoles and peripheral devices shall not occur until the control room is secure and climate controlled.

1.13 1 YEAR GUARANTEE

A. Manufacturer 1 Year Guarantee:

- 1) The Manufacturer shall warrant materials and workmanship of systems and equipment installed as free of defects. The Manufacturer shall guarantee in writing the repair or replacement within 14 days of any item found defective during a period of 1-year following date of final acceptance. Ordinary wear and defects due to improper usage are excepted and are not covered under Contractor's warranty.
- 2) During the warranty period, all emergency conditions where systems failures may be hazardous or may cause severe hardship or cancellation of performances shall be responded to within 24 hours. Immediate action shall be undertaken to ensure the safety of the audience and the performers.

B. Correction Period:

- 1) One year following the date of final acceptance, an engineer in the employ of the Manufacturer will examine, adjust, and repair the equipment included in this Section as required. This service will not cover adjustments, repairs, or replacement of parts due to negligence, misuse, abuse, or accidents caused by persons other than the Contractor. Labor and materials required to perform this service will meet or exceed these specifications and will not compromise the performance of the equipment.
- 2) Following this inspection and warranty service, provide the City of New York's Representative with a written report itemizing the results of the inspections and the warranty work conducted. Include in the written report recommendations for any corrective actions that the Manufacturer feels should be taken with respect to the equipment included in this Section, but are outside the scope of the warranty agreement.

1.14 SOFTWARE UPDATES

- A. Provide, at no cost to the City of New York, any software updates of the operating programs of any specified control consoles through end of the warranty period.
- B. Provide, at no cost to the City of New York, through the end of the 1 year guarantee, any software updates of the operating programs of any specified control consoles issued to correct "bugs" identified in the console operations.
- C. The City of New York shall be allowed a 60-day trial of each new software package with option to reject the new operating program for any reason.

1.15 SYSTEM STARTUP, END USER'S INSTRUCTIONS & COMMISSIONING

A. Operation Instruction:

- 1) Supply instruction to City of New York's operating personnel on operation and care of system for not less than eight hours total in 2 separate sessions. Instruction shall include, but not be limited to, proper general maintenance of the system, replacement procedures for user replaceable parts and operating procedure to obtain maximum usage of system.
- 2) Deliver all copies of approved Operations Manual to City of New York prior to first instruction session, and review it as part of that session.
- 3) The first session shall take place in the presence of the, and shall occur directly after

finish of Completion Checkout. If the Commissioner judge that any work inspected fails to conform to the specification, or is not substantially complete at time of Completion Checkout, postpone instruction session until Commissioner judge the entire Lighting System to conform with specification.

- 4) The second session shall occur at a time arranged by the City of New York no sooner than 1 day and no later than 1 month after first session.

B. Console Operator Instruction:

- 1) Provide instruction to City of New York's selected key Lighting Control Console Operators on the detailed operation of Console. This training shall take place in two separate sessions. Each session shall be no less than four hours and shall take place on site.

C. Timing for all sessions shall be scheduled by the City of New York at their convenience.

D. Instruction must be by qualified expert operators who have actual experience with systems in performance conditions. Submit instructor's qualifications to the Commissioner for approval at least 2 weeks prior to Completion Checkout. If the Commissioner rejects instruction personnel, schedule new instruction sessions with instructor(s) pre-approved by the Commissioner.

1.16 WARRANTY MATERIAL SUBMITTALS

A. Extra Materials: Deliver stock of warranty material to City of New York. Furnish the following to match those installed and taken from the same production run, packaged with protective covering for storage and identified with appropriate labels.

- 1) Provide four spare dimmer modules for each type of dimmer module in the system.
- 2) Provide one spare node or complete internal components of each type of node in the system.
- 3) Provide four circuit breakers of each size in the system.
- 4) Provide a package of spare parts for all user serviceable portions of the dimmer and control systems and distribution apparatus.
 - a. Provide 10% of total quantity of each type of small component or part in system as spare parts (minimum of one).
 - b. Label all spare parts with Manufacturer's part number, designation and description, and location(s) where used.
 - c. Provide durable, clearly labeled, storage containers for all spare parts, including special static free containers for electronically sensitive parts.
 - d. Quantity - Package shall include, but not be limited to:
 1. Five 4GB USB flash drives or other appropriate data storage medium.
 2. One spare of each type of pushbutton, pushbutton lamp, pushbutton caps of each color, key switches.
 3. Knobs, handles, nuts, bolts, screws, fuses, fuse holders, indicator lights and SSR assemblies.
 4. Caps, screws, crimp connectors and crimping tool, stage pin plugs, multipin connector spare parts, nuts and washers.
 5. Provide six pilot lights, two LED arrays of each type in the system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The systems described herein shall be provided by a Theatrical Lighting Manufacturer who will be responsible for furnishing all services described herein including but not limited to coordination and supervision of the engineering, shop drawings, fabrication and provision for all systems specified herein and shown in the drawings.

B. Primary dimming and theatrical control shall be by a single manufacturer.

C. The Manufacturer's services may be provided through a Contractor who shall be a dealer and servicer of all of the equipment specified herein.

1) The Contractor shall maintain a full-time Manufacturer trained field engineering staff of at least two people available via telephone and email on a 24/7 basis. Staff shall be employed by the dealer and be trained in electronic lighting control systems and Ethernet systems services.

2) To establish comparative standards of quality, the equipment of the theatrical lighting systems shall be by one of the following:

Barbizon Lighting Company
456 West 55th Street
New York, New York 10019
(212) 586-1620

4 Wall Entertainment
75 State Street
Moonachie, NJ 07074
(201) 329-9878

Production Resource Group
7777 West Side Avenue
North Bergen, New Jersey 07047
(210) 758-4000

Candela Controls
751 Business Park Boulevard
Suite 101
Winter Garden FL 34787
(407) 654-2420

D. Manufacturer shall provide the Warranty specified herein.

2.2 GENERAL

A. All equipment and components shall be new and complete. No used or reconditioned equipment shall be acceptable.

B. All mounting hardware shall be included.

1) All bolts and fasteners required to mount equipment to mounting hardware shall be Grade 5 or better.

- C. All equipment and components shall be factory tested prior to shipping.
- D. All bolted attachments shall have lock washers or other approved self-locking hardware.
- E. All internal wiring shall be factory completed and clearly marked. All field connections shall be by connector, terminal strip or other device specified herein. Any terminal strip connections shall be clearly labeled as to terminal designation.
- F. All wire sizes and insulation shall comply with NEC, NFPA and UL standards and all other applicable national and local codes.
- G. All wiring to be harnessed and bound. No loose or randomly routed wires shall be permitted.
- H. All control wire counts shall include 10% spares.
- I. All microprocessor controls shall utilize a non-volatile memory. System configuration, operating parameter, preset, etc. shall be protected against system power failure for a minimum of 48 hours.
- J. Systems components shall be modular in nature. Individual dimming modules shall slide in and be easily disconnected from power and removed from the rack without disturbing adjacent components and shall require no special tools for these tasks. Control circuitry shall be contained on plug-in printed circuit cards. Plug-in circuit cards shall be individually removable without disturbing adjacent components.
- K. All fixed components including dimmer modules, non-dim modules, circuit breakers, and cabinets shall be labeled sequentially for ease of maintenance.
- L. No manufacturer's logo shall appear on control station faceplates or any other device located in public areas.
- M. Any supplementary or auxiliary equipment necessary for the operation of the system shall be supplied with overload and short-circuit protection

2.3 DIMMER RACKS AND DIMMER MODULES

- A. Basis of design:
 - 1) The basis of design for the theatrical dimmer racks is the ETC Sensor + Racks and system with 500 microsecond rise AF dimmers.
- B. Product:
 - 1) Provide theatrical dimming equipment as indicated on the drawings, drawing schedules and specified herein
 - 1. ETC Sensor+ Racks and 500 microsecond rise AF dimmers.
 - 2. Approved equal.
- C. Dimmer Equipment Racks:
 - 1) The entire dimmer rack assembly shall be UL listed. Rack finishes shall be manufacturer's standard baked enamel color.
 - 2) Dimmer racks shall be floor mounted, dead front switch boards complete with all

dimmers, control electronics, timers, circuit breakers, and wiring terminations. No external components shall be required.

- 3) Dimmer slots shall be sequentially numbered and labeled on both sides of the dimmer slots.
- 4) Each dimmer rack shall be labeled as indicated on the drawings or as listed in dimmer schedules. Engrave and fill or silk-screen labels.
- 5) Dimmer racks shall be completely wired internally by the Manufacturer. The Electrical Contractor shall provide input feed wiring, load wiring, low voltage wire pulls and individual cabinet disconnects. All terminals shall be clearly and permanently marked and numbered.
- 6) Dimmer racks shall be constructed of #14 or #16 US gauge cold rolled sheet steel.
- 7) Access panels or knockouts shall be provided for bottom feed and top load/control wires.
- 8) All internal components shall be accessible from the front for testing and adjusting while system is operating. No rear access shall be needed for installation or future service.
- 9) Power distribution shall be by copper buss bars. Aluminum buss bars are not acceptable.
- 10) Theatrical and Architectural dimmer racks shall be 120/208 volt, 3 phase, 4 wire, size for minimum 600-amp feeds, as indicated on Division 26 contract documents.
- 11) Theatrical and architectural dimmer rack load, neutral and ground terminals shall accept up to #2 AWG wire.
- 12) Individual rack disconnects shall be provided under Division 26. Coordinate fault current requirements with the Commissioner.
- 13) All internal wiring shall terminate in pressure wire or clamp type terminals for installation of Electrical Contractor's wiring. No wire nuts or crimps shall be acceptable.
- 14) All wiring provided by the Electrical Contractor under Division 26 shall be individually labeled at both ends of wire and at all splice locations.
- 15) Each branch load circuit must have an individual neutral to the dimmer cabinet terminals. Common neutrals shall not be acceptable for any load wire from the load to the dimmer cabinet terminals. Clearly note this requirement on all documentation.
- 16) Standard advertised product dimensions are to be considered maximum and are not to be increased. Reduced sizes are acceptable with prior approval of Commissioner.
- 17) Location of dimmer racks shall be as shown on drawings. Provide quantities of cabinets dictated by dimmer quantity indicated herein.
- 18) Provide requisite ancillary, current modifying, regulating, and monitoring devices required for operation of a complete fully functioning system.

- 19) Dimming panels may be cooled by free convection without the use of cooling fans or by fans or blowers with screened air inlet and outlet grilles. Regardless of cooling method, dimming panels shall operate within a maintained ambient room temperature range of no less than 0°C/32°F and no more than 35°C/95°F degrees.
- 20) Provide cabinet overheat sensor and pilot light for each cabinet mounted in face of cabinet. Automatic shut off of the dimming system components shall occur should maximum safe operating temperatures of the cabinet be exceeded. Over heat sensor shall be duplicated to provide remote-warning messages located on the theatrical lighting control console.
- 21) The interior construction of the entire electrical assembly shall be designed for a minimum standard fault current of 50,000 AIC with the capability for increased protection to 100,000 AIC, if required.
- 22) Noise generated shall not exceed 55dbc per cabinet, as measured with a type two sound level meter at a distance of three feet from the cabinet in installed dimmer location.
- 23) The racks shall be mounted on Neoprene Isolation Mounts, Type "W" as manufactured by Mason Industries, "Sheer-Flex" by Vibration Mounting or approved equal.
- 24) Dimmer bank shall accept USITT standard DMX-512/1990 protocol digital control signal or Category 5, or greater Ethernet control signal in addition to any proprietary protocol control signal supported by the Manufacturer. Ethernet dimmer rack shall provide two data inputs functioning on a Highest Takes Precedence basis.
- 25) Selection of signal protocol shall be automatic and shall not require use of mechanical transfer relays.
- 26) Control signal input of each individual dimmer rack shall be fully opto-isolated from control signal input of any other rack, and fully opto-isolated from any control signal output.

D. Dimmer Modules:

- 1) Quantities and capacities of dimmers shall be as indicated on the drawings and specified herein. Dimmers shall meet all dimming performance criteria as listed in this section.
- 2) Dimmer Doubling:
 - a. Dimmer electronics shall support the independent control of the positive and negative half of the AC cycle.
 - b. In conjunction with back-to-back diode adapters the dual dimmer module shall be capable of providing (4) channels of 77V dimmed power from a single dimmer module.
- 3) Dimmer electronics shall be completely solid state. Silicon controlled rectifiers shall be used to control AC power supplied to the loads.
- 4) Dimmers shall operate properly on 60 Hz, 120 - 140 volts AC input. Dimmer output shall be AC, containing less than 1% DC component. At maximum input signal, the dimmer shall produce a full sine wave. With the input signal at zero, the dimmer

output shall be zero voltage at any load with regulation set OFF. Output shall be symmetrical to the zero voltage axis at any control setting prior to any electronic enhancement.

- 5) Dimmer efficiency shall be at least 97% at any voltage and with any load to maximum capacity.
- 6) AC voltage control components shall be rated at a minimum of 2 times the rated capacity of the dimmer and shall sustain a total short circuit for a sufficient length of time to open primary circuit protection.
- 7) Incandescent dimmers (line and low voltage) shall be capable of hot patching cold tungsten loads up to full rated capacity without malfunction or change in operating characteristics regardless of control setting.
- 8) Speed of response of system processor modules to control signal changes shall be no more than 25 milliseconds.
- 9) Dimmer output shall repeat with respect to the control signal input unit value without hysteresis.
- 10) Dimmers set to equivalent control signals with equal types and amperage of loads shall not vary from one to another by more than 1% at any place in the control signal range from full-off to full-on. Dimmer response shall not be phase sensitive with respect to control signal. There shall be exact tracking from one dimmer to the next with no variation.
- 11) There shall be no visible dimming resolution stepping or flickering regardless of length of fade time or control fader settings.
- 12) Protection shall be provided from overloads, short-circuiting, and transient voltage. Protection devices requiring reset or replacement must be accessible on the face of the dimming module or dimming cabinet.
- 13) Circuit Breakers:
 - a. Provide input fully magnetic circuit breaker(s) mounted on the face of each dimmer module or cabinet faceplate. One input breaker shall be provided for each individual dimmer within a module (e.g. one for single module, two for dual modules, etc.).
 - b. Input breakers must be rated for full load of the dimmer and must trip at 125% of rated capacity. Input breakers shall be rated for a minimum fault current of 10,000 AIC (120V) or 14,000 AIC (277V).
 - c. Acceptable manufacturers:
 1. Airpax or approved equal
- 14) Dimmers shall be provided with a ferrous core toroidal filter choke. This filter choke shall suppress lamp filament or transformer hum and vibration, prevent electromagnetic interference in professional quality audio, video, and computer equipment and limit objectionable harmonics. Laminated E.I. or C.I. type chokes are not acceptable.
 - a. Theatrical and House Lighting Dimmers:
- 15) Rise Time Full Load: Voltage rise time shall not be less than 500 microseconds measured and installed on site at 90 degree conduction angle from 10% to 90% of output wave form with dimmer operating at maximum load.

- 16) **Fluorescent dimmer modules compatible with the dimming system specified above may be substituted as necessary to control architectural lighting fixtures.**

E. Dimmer Control Electronics:

- 1) Dimmers shall utilize two silicon-controlled rectifiers in back-to-back electrical configuration and all required gating circuitry on high voltage side of an integral optocoupled control voltage isolator.
- 2) Rectifiers shall be mounted on ceramic substrate, and encapsulated along with other components in epoxy-filled high-impact plastic case.
- 3) All dimmer modules shall be able to operate as "non-dims" with selection of this function through dimmer rack and control console software.
 - a. When selected as a "non-dim", incoming control signal level is interpreted as either full on or full off signal.
 - b. Level of control signal required to initiate turn-on and turn-off shall be user selectable from 0% to 100%.
 - c. Non-dim function shall operate regardless of load type or wattage.
- 4) Control electronics shall use digital electronic circuitry, be microprocessor based, and designed specifically for the control of dimming systems. All user operated controls shall be low voltage; use Class II wiring and be electrically isolated from power wiring by means of a UL listed Class II transformer. Appropriate analog to digital conversion shall be acceptable provided circuitry is integral to the control system and not a stand-alone component.
- 5) System configuration, operating parameters, presets, levels and fade times shall be able to be field modified and shall not require components to be returned to the Manufacturer for such modifications.
- 6) System configuration, operating parameters, presets, levels and fade times shall be protected against system power failure for a minimum of 10 years. The state of the system status upon restoration of power shall be user selectable.
- 7) The dimmer control electronics may be capable of being addressed by the IEEE 802.3 Ethernet protocol.
 - a. The dimmer control electronics shall be capable of being addressed by the USITT DMX512/1990 protocol when any lighting control console utilizing the same protocol is plugged into a DMX In Node.
- 8) Dimmers shall regulate output voltage to remain constant output RMS voltage as long as input remains over 120V per phase.
- 9) Dimmer output RMS voltage versus control input signal shall have not more than 0.5% variation from the modified square law dimming curve as defined below. The dimmer curve shall be stable and shall not require individual curve adjustment devices. The dimming curve shall be predetermined and shall not vary unless modified through control device software.
 - a. Modified square law curve shall be as listed in the Acceptable Curve Settings Schedules included with this specification Section as a relationship of control signal output setting to dimmer output voltage:
 - b. Other optional curves shall be available for installation through rack and/or control console operations software.

- c. Field adjustment of dimming curve shall not be required.

F. Theatrical and House Lighting Dimmer Quantities:

- 1) Provide theatrical dimmer modules in types and quantities as shown in the appendix.
- 2) Provide house lighting dimmers as specified herein. Coordinate exact quantities and type with architectural lighting / electrical drawings.
- 3) Provide the spare modules as called out in this specification section 1.16, B, Extra Materials.

2.4 AUXILIARY EQUIPMENT RACKS

A. Provide fully enclosed self-standing Auxiliary racks, as required for miscellaneous system components, located in control or dimmer rooms as indicated in the drawings. Construction and finish shall be generally as described for dimmer racks. In no case shall loose equipment be permanently mounted outside of a protective equipment rack or cabinet. Equipment racks shall be provided with knockouts as required on top, bottom and sides to allow conduit connection as required. The equipment mounted in auxiliary racks shall include but not be limited to:

- 1) Control switching devices, as required.
- 2) Network devices, including network nodes, network taps, as required.
- 3) DMX Combine Merger and Splitter Units, as required.
- 4) Architectural processors, as required.
- 5) Architectural branch circuit sub-breakers as required.

2.5 RELAY PANELS WITH INTEGRATED BRANCH CIRCUIT BREAKERS

A. Construction and finish shall be generally as described for dimmer racks. In no case shall loose equipment be permanently mounted outside of a protective equipment enclosure. Relay Panels shall be provided with knockouts as required on top, bottom and sides to allow conduit connection as required. The equipment mounted in Relay Panels shall include but not be limited to:

- 1) DMX512 Controlled Relays for switched power located in theatrical devices and backstage work lighting circuits.
 - a. Provide double pole 20 amp 208V and single pole 20 amp 120V relays as required by drawings and schedules. Coordinate with Division 26 for work lighting circuit quantities and designations.
- 2) Branch circuit breakers for DMX512 controlled relays
 - a. Provide double pole 20 amp 208V and single pole 20 amp 120V circuit breakers as required by drawings and schedules. Coordinate with Division 26 for work lighting circuit quantities and designations
- 3) Branch circuit breakers and DMX controlled relays shall be provided in a single enclosure. Separate Relay and Branch circuit panels are unacceptable.

- B. Relay panels shall be low voltage type signal relays controlled via a DMX512 interface. Branch load circuit breakers shall be provided with the relay panel as required for branch load terminations.
- 1) Relays shall be capable of simultaneous on/off within a given relay cabinet enclosure. Sequenced on/off are not acceptable.
 - 2) Multiple relays shall be capable of assignment to a single DMX channel to allow functional grouping of relays. Assignment shall be easily field modified.
 - 3) Cabinets shall monitor relay duty cycles and shall indicate through a monitoring device when duty cycle life is approaching rated cycle life.
 - 4) All relays shall be capable of continuous operation at full rated load.
- C. Provide relay panels that shall include Class II lighting control relays and micro-processor based programmable lighting controller(s) capable of interface with DMX/USITT protocol theatrical lighting console for the control of switched (non-dimmed) loads. Refer to the drawings for quantities and control schedules.
- 1) The Class II lighting relays and programmable control equipment shall be listed under either UL section 916 or 508.
- D. Provide lighting relays that control 120 and 208 VAC circuits loaded to a maximum of 20 amps. When required, the relays in addition to the Class II switching leads, will be equipped with a set of normally open auxiliary contacts which work in tandem with the high voltage contacts and be used as mechanisms for status feed back or pilot light indicators. Each Class II relay is a split coil-latching relay powered from a central transformer. Electrically held relays are NOT acceptable.
- E. Acceptable Manufacturers:
- 1) Strand – Contact Relay Panel.
 - 2) Cooper Controls – SC-RPB
 - 3) ETC – Echo Relay Panel
 - 4) Or approved equal.

2.6 EMERGENCY TRANSFER PANELS

- A. Provide Emergency Transfer Panel for the automatic transfer of branch circuits from normal to emergency power when normal power fails. The system shall consist of power transfer switches and a control circuitry interconnected to provide complete, automatic protection.
- B. The Emergency Transfer Panel shall have the following characteristics.
- 1) The Emergency Transfer Panel shall be mounted in a NEMA 1 type enclosure. It shall be equipped with a hinged locking door. Material shall be no less than 14 gauge steel.
 - 2) The Emergency Transfer Panel shall transfer designated lighting load branch circuits from dimmers control outputs to a second power source in the event of a loss of

power to the dimmer rack, a normal system failure, and a panic condition.

- 3) The system shall comply with ANSI/UL1008, NFPA 110 and ANSI/NFPA 70 (NEC), including Article 700 and 701, safety standards. The system shall be UL Listed 1008.
- 4) The Emergency Transfer Panel shall contain no more than 24 transfer poles and shall be 36" H. x 30" W. x 9" D.
- 5) The Emergency Transfer Panel shall provide power distribution and branch circuit protection for all emergency power circuits.
- 6) The transfer switch shall be electrically-operated and mechanically held. The electrical operator shall be a single-solenoid mechanism transfer switch unit.
- 7) The switch shall be positively locked and unaffected by voltage variations or momentary outages so constant contact pressure is maintained and temperature rise at the contacts is minimized.
- 8) The switch shall be mechanically interlocked to ensure only one of the two possible positions, either Normal or Emergency.
- 9) All switch main contacts shall be silver plated.
- 10) Overload and endurance testing of the transfer switch shall comply with UL1008 Tables 25.1, 25.2, 27.1, and 27.2 for mixed loads.
- 11) The transfer switch shall be rated to withstand the RMS symmetrical short circuit current without welding contacts.
- 12) Switch contacts shall withstand transfer without welding, with 180° phase displacement between Normal and Emergency power sources, both sources energized and 100% load.
- 13) Transfer switch contacts shall be rated for mixed loads, including high intensity discharge lamps and tungsten filament lamps.
- 14) The control circuitry shall direct the operation of the transfer switch.
- 15) Interfacing relays shall be a covered industrial control grade plug-in type.
- 16) 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. These settings shall be adjustable in increments of 1%. Repetitive accuracy of settings shall be 2% or better over a temperature range of -20°C to 70°C. Factory set to pickup at 90% and dropout at 85%.
- 17) 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. Frequency sensing shall be provided with pickup adjustable from 90 to 100% and dropout fixed at 7 to 89% of pickup. Repetitive accuracy of settings shall be 2% or better over a temperature range of -20°C to 70°C. Factory set to pick up at 90% voltage and 95% frequency.
- 18) The control module shall include four time delays that are 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 sec. Factory set at 1 sec.
 - b. Transfer to Emergency time delay, from 0 to 5 min. Factory set at 0 min.
 - c. Retransfer to Normal time delay. Time delay is automatically bypassed if Emergency source fails and Normal source is acceptable. Adjustable from 0 to 30 min. Factory set at 1 min.
 - d. Emergency generator cool-down cycle. Adjustable from 0 to 60 min. Factory set at 5 min.
- 19) Control power for all logic and transfer functions shall always seek the acceptable power source. This shall prevent the system from locking up in one position if either of the power sources is available, regardless of the sequence of failure events.
- 20) A self-supervising isolated signal input shall be provided for connection to the facility fire alarm. It shall automatically transfer loads to the Emergency power source when the facility fire alarm is activated.
- 21) A key-operated double-throw, momentary test switch shall be provided to manually control the Emergency Transfer Panel. All automatic functions shall override this control. Two indicator lights shall be provided to show the position of the transfer switch.
- C. All automatic functions shall override remote control functions. Any combination of open or shorted wiring to remote stations shall not affect automatic functions, or disable the local switch.
- D. Provide an emergency transfer system for designated architectural circuits connecting to dimmer panels as called out on Electrical drawings.
- 1) ETC – ELTS
 - 2) Strand – Emergency Transfer Switch
 - 3) Union Connector – Emergency Transfer Panel

2.7 LIGHTING SYSTEMS COMPUTER

- A. The lighting systems computer serves as both the network and Architectural lighting programming device.
- B. Provide one laptop PC with 15" diagonal 16:9 format screen, minimum 2 GHz Intel i3 processor (Microsoft Windows 7 compatible) with 4GB of RAM and 500 GB hard drive, CD/DVD-RW drive, 3-USB ports, Wireless-N card. The Computer shall have the following:
- 1) Theatrical system
 - a. Network interface card for direct use over the lighting Ethernet data network.
 - b. Provide fifteen foot cable for plug-in to the network receptacle.
 - 2) Architectural system
 - a. Provide fifteen foot cable for plug-in to the network receptacle.

- 3) Acceptable Manufacturers:
 - a. Lenovo
 - b. Toshiba
 - c. Hewlett Packard
 - d. Dell

- 4) Operating System Software
 - a. Provide one boxed set of the most current Windows based operating system compatible with the proprietary application software and system configuration.
 - b. Provide networking software complete with manuals, technical support resources and CDROM as required allowing on line and off line End User configuration and operation of all system parameters and dimmer rack configuration setting.

- 5) Provide Architectural lighting system software:
 - a. ETC Unison Light Manager

C. Network Components:

- 1) Provide network switches as required for operation of the network system. Switches shall have the following characteristics and functions:
 - a. Switches shall contain (8) dual speed auto-sensing ports, supporting both 100BASE-T and 10BASE-T and PoE per IEEE 802.3af.
 - b. Switches shall support IEEE 802.3i Type 100BASE-T standard.
 - c. Switches shall be rack-mounted in standard 19" racks.
 - d. Switches shall be of fanless design.
 - e. Switches shall have front panel LED's that shall report switch traffic, collisions and expansion status. Per port LED's shall indicate link and partition status for individual connections.
 - f. Switches shall have UTP ports on its front face for connecting to nodes and taps via standard 19" patch panel.
 - g. Should Ethernet wire runs exceed 90 meters, provide switches with fiber ports equal to the number of fiber runs in the system.
 - h. Acceptable manufacturers:
 1. Cisco SF302-08MP
 2. Approved equal

- 2) UTP network patch panels
 - a. Provide Category 5E Patch Bay (or bays as required) for termination of Category 5E wire runs.
 - b. All terminations of Category 5E cable shall be under the responsibility of this Section.
 - c. Provide Category 5E patch cords as required for connection between the patch bay (or bays), switches and Ethernet Power Supply.
 - d. Patch bays shall be rack-mounted in standard 19" racks.
 - e. Provide rack mounted standard 19" cable management system for each patch panel.
 - f. Patch bays and cable management panels shall be finished in a black anodized finish and shall contain black Category 5E connectors as required.
 - g. Acceptable Manufacturers:
 1. Hubbell
 2. Or approved equal.

D. Network Cabling:

- 1) Fiber Optic Cable (as required for all runs greater than 90 meters)
 - a. Contractor to confirm all cable routing distance to determine appropriate use of fiber runs.
 - b. Contractor shall specify 62.5/125 μ m fiber optic cable as required to support network components.
 - c. The cable must exceed the IEEE802.3z Gigabit Ethernet Fiber specification for 62.5/125 μ m Fiber.
 1. For Gigabit Ethernet 1000sx over 62.5/125 μ m fiber, a modal bandwidth of 500MHz per km in the 850nm wavelength with 500m minimum distance is required.
 2. For Gigabit Ethernet 1000lx over 62.5/125 μ m fiber, a modal bandwidth of 500MHz per km in the 1300nm wavelength with 500m minimum distance is required.
 - d. The cable must exceed the TIA/EIA 568B Fiber specification.
 - e. Acceptable Manufactures:
 1. Berk-Tek GIGAlite 62.5 Fiber Optic Cable – 2 Fiber
 2. Belden 225362
 3. Or approved equal (for non-plenum rated applications).
- 2) UTP Cable
 - a. The copper cabling and connecting hardware must fully comply with the existing TIA/EIA 568B Standard and with the standard installation of Category 5E products.
 - b. The copper cabling should also comply with the TIA/EIA Category 5E standard.
 - c. Acceptable Manufacturers:
 1. For non-plenum rated applications:
 - a) CommScope 55N4 Ultra II Enhanced Category 5 UTP cable
 - b) Belden 1583A
 2. For plenum rated applications;
 - a) CommScope 5504M Ultra II Enhanced Category 5 UTP cable or approved equal (for plenum rated applications).
 - b) Belden 1585A

E. Network Devices

- 1) All DMX Nodes:
 - a. DMX nodes will be located as noted on drawings. Nodes shall be connected via the Ethernet data network on Category 5E wire.
 - b. XLR connectors at each node shall be able to be configured to output or allow input for any one frame of DMX 512 with normal assignment being sequential. All nodes indicated in the system shall be able to operate simultaneously without data collision or corruption while maintaining recommended minimum and maximum DMX-512/RS485 frame length, packet size and refresh rates.
 - c. DMX distribution over the data network shall be independent of all devices on the system. Regardless of dedicated theatrical lighting devices that may be connected to the various nodes, the DMX distribution system shall be configurable from a PC or other independent control device. The PC or other independent control device shall be provided under this section. Saving and loading of the system configuration to disk shall be supported.

- 2) Portable Network Full function Node
 - a. Provide Portable Network Node and Remote Video to provide for connection of Designer remote consoles, remote video monitors, focus remote and other DMX devices as required.
 - b. 120-volt power
 - c. All other network features as described above
 - d. Provide quantity per appendix
 1. ETC Net 3 Gateway and Remote Video Interface

- 3) Portable 2 Port DMX In/Out Nodes
 - a. DMX In/Out Nodes shall be capable of translating Ethernet based protocol into usable signal for output to plug in peripheral devices employing USITT standard DMX-512/1990 and shall have (2) female five pin XLR connectors within one node box. These nodes shall comply with all IEEE 802.3 standards.
 1. Label each receptacle with appropriate designations. All labels to be engraved with white core fill. Provide white acrylic write on surface as shown.
 - b. Each node shall be powered via its Ethernet connection using Power Over Ethernet (IEEE 802.3af).
 - c. DMX In/Out Nodes shall be portable.
 1. Connection of Category 5 at nodes shall be via a RJ-45 connector or what is accepted as industry standard at the time of the installation.
 2. Internal components shall be modular in nature and easily replaced as a unit in case of failure.
 3. Provide an enclosure and faceplate with appropriate labeling.
 4. Provide 5'-0" Category 5 cable extension for each node.
 5. Provide appropriate mounting hardware to mount node onto 1.5" Schedule 40 pipe.
 - d. Provide quantity per appendix
 1. Electronic Theatre Controls Net 3 2-Port Gateway

- 4) CC panels:
 - a. Provide device with four XLR-style RJ-45 receptacles, one dual strand XLR-style fiber receptacle, one double duplex "clean power" receptacle, and a portable house light control receptacle.
 - b. XLR-style RJ-45 receptacles shall be connected via Category 5E cable to the Ethernet network and shall allow full function nodes or other peripheral portable nodes to be connected to the network.
 - c. XLR-style fiber receptacles shall be connected via 6-strand multimode cable to the fiber patch panel located in the Network Control Rack.
 - d. Portable house light control receptacle shall allow full function of portable house lighting controller including panic and normal functions.
 - e. Label each receptacle with appropriate designations. All labels to be engraved with white core fill.
 - f. CC panels shall be mounted at fixed locations and wired as indicated on the drawings.
 1. Back box and faceplate shall be finished flat black.

- 5) Network Taps (ET):
 - a. Network taps will be mounted in specific locations as indicated on drawings. Taps shall contain two XLR-style RJ-45 receptacles, and a "clean" power duplex receptacle. Taps shall be connected via Category 5E cable to the

- Ethernet network and shall allow full function nodes or other peripheral portable nodes to be connected to the network.
- b. Network tap RJ-45 receptacles must comply with all Category 5E or greater standards.
 - 1. Network Tap Receptacles shall be surface mounted and wired to Category 5E cable.
 - c. Network tap receptacle should have the following information permanently attached to the faceplate (silk-screened or engraved lamacoid).
 - 1. Location of tap (name of Tap).
 - 2. Indication of which equipment rack to which it is connected.
 - 3. Maximum length of external Category 5E cable that can be connected without violating the Category 5E Standard.
 - d. ET panels shall be mounted at fixed locations and wired as indicated on the drawings.
 - 1. Receptacles shall have sheet metal back box and faceplate.
 - 2. Back box and faceplate shall be finished flat black.
- 6) Network Taps (ET2):
- a. Network taps will be mounted in specific locations as indicated on drawings. Taps shall contain two XLR-style RJ-45 receptacles, one dual strand XLR-style fiber receptacle, and a "clean" power duplex receptacle. Taps shall be connected via Category 5E cable to the Ethernet network and shall allow full function nodes or other peripheral portable nodes to be connected to the network as well as via multimode fiber to the Network Control Rack.
 - b. Network tap RJ-45 receptacles must comply with all Category 5E or greater standards.
 - 1. Network Tap RJ-45 Receptacles shall be surface mounted and wired to Category 5E cable.
 - c. Network tap receptacle should have the following information permanently attached to the faceplate (silk-screened or engraved lamacoid).
 - 1. Location of tap (name of Tap).
 - 2. Indication of which equipment rack to which it is connected.
 - 3. Maximum length of external Category 5E cable that can be connected without violating the Category 5E Standard.
 - d. ET2 panels shall be mounted at fixed locations and wired as indicated on the drawings.
 - 1. Receptacles shall have sheet metal back box and faceplate.
 - 2. Back box and faceplate shall be finished flat black.

2.8 THEATRICAL LIGHTING CONTROL CONSOLES

- A. Provide one desktop Theatrical Lighting Control Main Console for Theater 1 and one for Theater 2.
 - 1) Console shall be microprocessor-based system designed specifically for theatrical lighting control application. Consoles shall be engineered for ease and clarity of operation and shall incorporate visual display to assist operator in modes of operation.
 - 2) The console shall be capable of operation in blind (preview/non-live) and shall also be capable of operation in live (stage) mode.

- 3) Console shall be able to organize data for channels other than those associated with dimmer levels through the use of special grouping or numbering schemes. Simply flagging channels with a new color in the video display shall not be acceptable.
- 4) Console, particularly for automated luminaires, must be graphically organized to allow easy identification of the large groups of channel numbers involved with such fixtures. Assignment of pan and tilt functions of automated luminaires shall be supported by either rotary encoder, track pad or a mouse associated with the console. In addition, the pan and tilt axis of multiple luminaires shall be able to be assigned to a single device, such as a rotary encoder, track ball or mouse, to allow multiple automated fixtures to track together to a single point on stage.
- 5) Console shall be capable of pan and tilt operation through external devices with virtual focus software (such as WSYWIG) or automated tracking devices (such as BlackTrax).
- 6) The console shall allow cues to be modified while they are running. The console shall support color print outs to mimic colors displayed on video screens.
- 7) Console shall have MIDI In/Thru/Out, and USB ports.
- 8) The Console and central processors (if needed in the system) shall be connected through uninterrupted power supplies as needed to protect console and network operations for at least 30 minutes in the event of power failure.
- 9) The console shall be provided with all currently advertised features and components indicated in the most recently published product literature plus features described in Part 1, System Performance.
- 10) The console shall be capable of controlling the lighting network by being plugged directly into any network tap.
- 11) Furnish for Theater 1
 - a. ETC – Ion 1000 with 2 x 20 wing panel
- 12) Furnish for Theater 2
 - a. ETC – Element 60 with 500 Channels

2.9 WIRELESS REMOTE FOCUS UNIT

- A. Provide Wireless Remote Focus Unit system with all currently advertised features and components indicated in the most recently published product literature.
 - 1) System shall consist of a handheld personal digital assistant equipped with a wireless access card and a corresponding network access point that connects to the theatrical lighting Ethernet network.
 - 2) Remote shall "call up" dimmers and channels from remote locations for lamp or focus checks without an operator at the main console.
 - 3) Remote shall be capable of calling up and running through pre-recorded cues and triggering macros.
 - 4) Remote shall be capable of configuring 2-port DMX nodes attached to the network.

- 5) Remote shall operate on an 802.11b wireless Ethernet network.
- 6) Remote shall not lose data if its battery becomes depleted.
- 7) Remote shall operate with the main console.
- 8) Remote shall be provided with a charging cradle.
- 9) Network Access Point shall be IEEE 802.11af compliant and shall have the option of being powered by either Power-Over-Ethernet or 120v power supply.
- 10) Network Access Point shall be provided with pipe mounting hardware, power supply and 25' Ethernet cable.

B. Remote focus access unit shall connect to the network via cable to the network taps.

- 1) Quantity:
 - a. Handheld wireless hand-held unit
 1. Quantity per Appendix.
 - b. Network access point
 1. Quantity per Appendix.

2.10 VIDEO MONITORS

A. Portable monitors shall be high resolution; 17" or larger color flat-screen LCD monitors capable of displaying all console video display information. Monitors shall have connectors to mate directly with Net3 Remote Video Interface and shall have front mounted controls for contrast, brightness, vertical hold, and horizontal hold.

B. Provide: quantity per Appendix.

- 1) Furnish 1 - 10' and 1 - 25' video extension cable for each monitor.
- 2) Furnish 1 - 10' and 1 - 25' power extension cable for each monitor.
- 3) Protective Cover:
 - a. Provide one protective cover for each monitor.

2.11 ARCHITECTURAL CONTROL SYSTEMS

A. House lighting control system

- 1) Description: House lighting control system shall be a microprocessor-based control system that works in conjunction with the theatrical lighting control console to set and control auditorium house lighting levels. The system shall also control the remote switching of work lighting circuits throughout the auditorium and backstage spaces by interfacing with the DMX controlled worklight relay system. The system shall operate through master control panels located in the stage right technical area and a series of preset recall stations and key switch operated stations located through out the auditorium. The system shall also be controlled remotely with a portable master station (Auxiliary console specified herein) with plug-in locations through out the auditorium and backstage spaces.

- 2) The house lighting control system shall have the following characteristics and functions:
 - a. When in use, the theatrical console shall override preset levels on a highest takes precedence basis and shall directly control only those dimmed architectural circuits within the Auditorium.
 - b. The dimmed circuits in the Auditorium shall operate independently of the dimmed circuits in the Lobby.
 - c. Switching between panels shall not cause flicker or change in lighting levels when setting on panels or Auxiliary control console are identical.
 - d. The system shall be a microprocessor based lighting control system. System operating program shall be stored in electrically erasable programmable read only memory (EEPROM).
 - e. Data storage facilities shall retain memory for an indefinite period of time. In case of power failure, the control module shall retain preset memory for minimum of 72 hours.
 - f. The House lighting control system allows programming and selection for playback a minimum of 99 different preset lighting states and control of the fade time between presets.
 - g. The System shall be configured to allow multiple active presets to control work lights, concert lights, and theatrical lights simultaneously through the use of multiple room assignments.
 - h. Provide control system configuration software operating on a PC platform to allow configuration and preset level setting.
 - i. Provide the quantity of system processors to have the ability to "snapshot" DMX levels from Theatrical lighting console and record in to architectural preset for all DMX assigned values including dimmed circuits, relay circuits, moving lights and scrollers in the system.
 - j. Provide:
 1. ETC Paradigm Architectural System
 - a) Provide LightDesigner Software
 - b) Provide ControlDesigner Software

B. House Light Panic System

- 1) The House Panic Control System instantly brings the dimmed house lights to full with the push of one button. The system is always enabled at every location, regardless of the state of other control systems. The system must operate independently of emergency power transfer relays.
- 2) House Light Panic System shall include a separate power supply and DMX driver so that house lights can be brought on in the event of failure of primary supply and/or electronics.
- 3) House Light Panic control shall be included in the Main House Light Control Panels and in the Auxiliary Control Console.
- 4) Operations:
 - a. The NORMAL push button is illuminated at all locations whenever Panic System is not activated.
 - b. Depressing any PANIC push button illuminates the PANIC push button and turns off illumination of the NORMAL push button at all locations, and causes a control signal from a dedicated set of control electronics and a dedicated power supply to be applied to selected house light dimmers. This causes those house light dimmers to output full line voltage to loads. This state remains until any NORMAL push button is depressed. Depressing any

NORMAL push button illuminates the NORMAL push button and turns off illumination of the PANIC push- button at all locations, and returns the system to exact state it was in prior to depression of the PANIC push button.

2.12 ARCHITECTURAL LIGHTING CONTROL PANELS

A. General:

- 1) Control electronics shall use digital electronic circuitry, be microprocessor based and designed specifically for the control location, overall dimensions, and quantities of control devices shall be as shown on drawings.
- 2) Control device back boxes, where required, shall be standard deep masonry boxes by Square D or equal.
- 3) Controls shall be low voltage type and use N.E.C. Class II, low-voltage wiring.
 - a. Only Belden control cables or approved equal shall be acceptable.
 - b. Faceplates shall attach to the device with no visible mounting screws. No manufacturer's logo or other marking shall appear on faceplates unless otherwise noted.
 - c. Faceplate finishes shall be manufacturer's standard finish unless otherwise noted by the Commissioner or in the design documents. Selection of finish, custom or standard color shall be by the Commissioner.
 - d. Control devices shall be provided with appropriate zone and/or scene descriptions. These descriptions shall be furnished to the Manufacturer prior to fabrication by the Commissioner and shall be engraved and filled with color to be selected by Commissioner. Any silk screened borders, logos, potentiometer graduations, etc. shall use a chemically bonded graphic process which resists removal by scratching, cleaning, or other light abrasive scouring.
 - e. All slider potentiometers shall have a minimum travel of one (1) inch and shall have a graduated scale marked adjacent to the slider.

B. House lighting panel 'HL'

- 1) Architectural lighting control panels shall include the following:
 - a. Back lit user customizable 7" color liquid crystal display with user interface touch screen face-plate.
 - b. The panel shall have multiple pages as follows to allow control of:
 1. Master levels of each recorded preset.
 2. Individual dimmed channel and switched work light channel levels/status.
 3. Preset, level and fade time recording.
 4. Preset selection and playback.
 5. Recording of Theatrical lighting console output into architectural system presets.
 - c. Architectural lighting control panels shall be recessed, flush mounted panels, surface mounted panels in custom backboxes or rack mounted in standard 19" panels as indicated on drawings.
 - d. Provide black sheet metal back box for flush mounted panels. Do not exceed 4" in depth without prior approval.
 - e. Provide standard 19" black anodized panels for rack mounting.

- 2) Acceptable Manufacturers:
 - a. ETC "Paradigm 7" Touchscreen"
- C. Architectural entry stations 'EP'
- 1) Provide single lighted pushbutton entry stations in flush or surface mounted box in locations as shown on the drawings. Station shall recall designated preset and may be disabled by the main system control.
 - a. Lighted pushbutton color to be selected by Commissioner from standard colors.
 - b. Provide black sheet metal back box. Do not exceed 4" in depth without prior approval.
 - c. Provide anodized sheet metal cover plate with chamfered edges, color as per Commissioner
- D. Architectural entry stations 'EP2'
- 1) Provide dual pushbutton entry stations in flush mounted box in locations as shown on the drawings. Station shall recall designated preset and may be disabled by the main system control.
 - a. Lighted pushbutton color to be selected by Commissioner from standard colors.
 - b. Provide black sheet metal back box. Do not exceed 4" in depth without prior approval.
 - c. Provide anodized sheet metal cover plate with chamfered edges, color as per Commissioner.

2.13 AUXILIARY CONTROL CONSOLE

- A. Provide portable Auxiliary Control Console capable of the following operations:
- 1) Random playback of House Light presets as described herein.
 - 2) Control of relay controlled work lighting circuits as described herein.
 - 3) House Light Panic system control as specified herein.
 - 4) Provide Auxiliary Control Console consisting of a ruggedized hand-held touch screen device..
 - 5) Front Panel: Provide front panel containing all controls as required to operate, House, House Panic, and Work, Lighting Systems as specified herein.
 - 6) .Provide dedicated pushbutton switches as specified above for PANIC (Pushbutton shall have a latching cover), NORMAL controls.
- B. Cables
- 1) Provide 1 – 10', and 1 – 25' male to female combined power and control cable to mate with associated connection panels.
- C. Mating Connectors

- 1) Provide mating female multi-pin connector in the panels shown on the drawings.

D. Quantity:

- 1) Provide quantity per Appendix.

2.14 NETWORK CONTROL RACKS

A. Provide Network Control Racks with the following characteristics.

- 1) Production Control rack shall be 19" standard racks, freestanding, wall-anchored swing frame type. Enclosure shall provide adequate space for all network components as specified above.
- 2) Provide finished, blank panels, complete with rack-mounting holes and hardware as necessary.
- 3) Label all controls that are contained within this contract as indicated on related drawings or as appropriate. All labels to be engraved and white filled.

2.15 THEATRICAL WIRING DEVICES

A. Provide all theatrical wiring devices as indicated on the drawings and as specified herein, for installation by Division 26. All wire termination shall be by Division 26.

- 1) Coordinate size of device, orientation of circuits and mounting detail to suit site condition.
- 2) Devices constructed of sheet metal, finished flat black. Provide requisite mounting holes, conduit knockouts, etc.
- 3) All 20 amp and 60 amp stage pin receptacles shall be of the same manufacture.
- 4) Flush mounted female receptacles shall have a screw driven locking spring to ensure firm fit on face panel.
- 5) Provide for 20A stage pin connectors:
 - a. Union Connector 20-2P&G series.
 - b. Rosco 2000 series.
 - c. Bates Connectors.
- 6) Provide all requisite mounting hardware for installation of theatrical wiring devices. Coordinate all device mounting requirements with Division 26.
- 7) Provide all wiring devices with either internal terminal strips or exterior terminal boxes for interconnection to the dimming system. All wiring devices may be internally wired at the factory prior to shipping.
 - a. Size all terminals as required based on wire sizes indicated on the Electrical Documents. Terminal strips shall be grounded to the device enclosure.
 - b. Sheet metal construction, finish flat black. Reinforce base of terminal boxes as required to take load from multicable.
 - c. Back box to be clearly labeled with circuit numbers.

- 8) Terminal Boxes
 - a. Provide terminal boxes factory assembled with numbered terminal blocks for field connection by others, as indicated in the drawings and schedules. All terminal boxes regardless of quantity of circuits shall be the same size. Provide six spare terminals in each terminal box in addition to the spare circuits indicated in the schedules. Provide 4 ground lugs per box. Size all lugs and terminal box as required based on wire sizes indicated on the Electrical Documents.

- 9) Labeling:
 - a. Label each receptacle with appropriate circuit designation indicated on distribution schedule and drawings. All labels to be engraved on black (with white core) lamacoid tags with chamfered edges. Tags to be securely mechanically fastened to wiring device.

- 10) Mounting:
 - a. Devices shall be surface, flush or recess mounted at locations and mounting heights as called out on drawings.
 - b. All holes in mounting bracket to have 1" minimum slotted hole to enable adjustment for field conditions. Provide lock washers on bolts.

- 11) The Manufacturer is responsible for providing all wiring devices to meet all requirements as stated by the National Electrical Code and local code in reference to separation, isolation, and clearances for all different voltages specified, as well terminal sizes for all the different cable sizes, cable entry sizes and exit routes and standoff.

B. Multicable plug boxes - type "MBR".

- 1) Provide multicable plug boxes with female 6-circuit, heavy-duty, locking multipin receptacles. See drawings for locations of devices and distribution device schedule for device type and circuit quantity.
- 2) Provide labels on each box, with circuit numbers corresponding to the schedules, at the location of the multicable entry.
- 3) Provide ½" high wire number labels within six inches of the female multipin receptacle covered with clear heat shrink. Circuit numbers to correspond to the schedules.
- 4) Provide boxes with forged shouldered eye-bolts for multi-cable strain relief.
- 5) Provide brackets and hardware for mounting boxes. All holes in mounting bracket to have 1" minimum slotted hole to enable adjustment for field conditions. Provide lock washers on bolts.

C. Plugging Strip with Pigtail Receptacles – Type "PSP".

- 1) Provide plugging strips of standard plug batten construction. These shall have pigtail mounted, 20A and 60A grounded stage pin female receptacles as shown on the drawings. See drawings for locations of devices and distribution device schedule for device type and circuit quantity.

- 2) Pigtail length shall be as indicated on drawings.
- 3) Label each connector strip and pigtail connector on both sides, with appropriate circuit designation as indicated on drawings and distribution schedule.
- 4) Provide brackets and hardware for mounting boxes. All holes in mounting bracket to have 1" minimum slotted hole to enable adjustment for field conditions. Provide lock washers on bolts.

D. Plug Boxes with Pigtail Receptacles – Type "PBP".

- 1) Provide plug boxes with pigtail mounted, 20A and 60A grounded stage pin female receptacles as shown on the drawings. See drawings for locations of devices and distribution device schedule for device type and circuit quantity.
- 2) Pigtail length shall be as indicated on drawings.
- 3) Label each plug box and pigtail connector on both sides, with appropriate circuit designation as indicated on drawings and distribution schedule.
- 4) Provide brackets and hardware for mounting boxes. All holes in mounting bracket to have 1" minimum slotted hole to enable adjustment for field conditions. Provide lock washers on bolts.
- 5) Provide boxes with forged shouldered eye-bolts for multi-cable strain relief as indicated on the drawings.

E. Plug Boxes with Flush Receptacles - Type "PBR".

- 1) Provide plug boxes with flush mounted 20A stage-pin grounded female receptacles. See drawings for locations of devices and distribution device schedule for device type and circuit quantity.
- 2) Receptacles shall be provided with a screw driven mounting clamp mechanism to provide secure mounting regardless of metal thickness.
- 3) Back boxes and faceplates of sheet metal, finished flat black. Provide requisite mounting holes, conduit knockouts, etc.
- 4) Label each receptacle with appropriate circuit designation indicated on distribution schedule and drawings.
- 5) Provide brackets and hardware for mounting boxes. All holes in mounting bracket to have 1" minimum slotted hole to enable adjustment for field conditions. Provide lock washers on bolts.

2.16 FABRICATION

- A. Fabricate all work in this section in accordance with the Commissioner's direction, specifications, approved shop drawings, pertinent project drawings, established trade practices and applicable code requirements.
- B. Machine finish all operating parts to standard trade tolerance, fits and finishes.

- C. Carry out shop welding in full accordance with the appropriate sections of "Specifications for the Design, Fabrication and Erection of Structural Steel Buildings" of the American Institute of Steel Construction (AISC).
- D. Fabrication, assembly and wiring shall be neat and workmanlike throughout.
- E. Control desks, racks and cabinets shall be welded assemblies of sheet steel or aluminum or of bar size angles, channels and tees or aluminum extrusions forming rigid enclosures to support internal components.
- F. All face panels shall be fully supported on all edges, either internally or by rolling interior edges of panels.
- G. Wood furniture/cabinet work for control desks acceptable with prior approval.
- H. Operating elements shall be mechanically safe and electrically "dead".
- I. All steel parts and panels shall be cleaned and primed with rust inhibiting primer. Exterior finishes shall be epoxy resin or baked enamel in matte black or in anodized black aluminum where approved.
- J. Control element working face panels shall be heavy aluminum or bakelite. Legends and control and protective device designations shall be engraved in panels, or in permanently attached plates, and located for ready identification.
- K. Operating instructions shall be similarly engraved and appropriately located on designated equipment.
- L. All panel engraving shall be in Helvetica Regular, height as indicated herein. Engraving shall be 1/4" or 3/16" as shown in drawings. In no case shall the engraving be less than 3/16" high without Commissioner's approval.
- M. All internal wiring shall be factory completed and clearly marked.
- N. Field connections shall be made by connector devices and cables as specified in preceding sections.
- O. Dimmer modules, dimmer controllers and other plug-in components may have spade lug and/or receptacle devices for connection.
- P. Control relays wherever possible shall be the glass or polycarbonate enclosed plug-in type. Relays shall be acoustically damped.
- Q. Uniform components shall be used throughout the system. All dimmer, fader and preset controllers shall be physically similar; they may vary in voltage according to the Theatrical Lighting Manufacturer circuit requirements.
- R. All wire sizes and insulation to comply with UL standards and local codes and meet or exceed electronics industry standards.
- S. All wiring to be harnessed and bound. No loose or randomly routed wires permitted.
- T. All printed circuit cards to be suitably racked with numbered and indexed guides. Legends to be provided on panel door.

- U. Key all components in this section with locks or key switches alike. Provide six keys minimum.
- V. Each receptacle within a wiring device must have a home run to the dimmer racks of its hot and neutral. Circuits with more than one receptacle must be paralleled at the dimmer rack. The method of termination must not void UL listing. Circuits with more than one receptacle within a single wiring device may be paralleled within the device and require only one home run of the hot and neutral to the dimmer racks.
- W. Minimize feeder inductance by twisting the hot and neutral conductors in long connector strips. Neutral conductor must be at least the same size or greater than the hot conductor.
- X. All wiring to be harnessed and bound. No loose or randomly routed wires permitted.

2.17 SOURCE QUALITY CONTROL

- A. Assemble in factory any and all system assemblies and subassemblies at Commissioner's request, for testing in presence of Commissioner, prior to shipment. Notify Commissioner at least 3 weeks prior to date when equipment is complete and ready for testing. Make equipment available to Commissioner in Manufacturer's factory for period of at least 2 weeks for testing prior to shipment.
- B. During the test provide test equipment for all testing required and any other testing requested by the Commissioner.
 - 1) Test Equipment shall consist of any item that is proprietary to the testing of manufacture's equipment. Meters and oscilloscope need not be supplied.
- C. Control Testing:
 - 1) Theatre Lighting Control Console and Network system shall be assembled in factory and tested for control console update time, video refresh rate, remote video picture quality, and any other function requested by the, typical where applicable, Commissioner.
 - 2) The Commissioner shall be sole judge of extent of testing necessary and sole judge of acceptability of any system tested.
- D. Verification of Performance:
 - 1) Provide Commissioner with all test results for verification of system performance.
 - 2) For equipment that requires in house testing, do not ship any piece of equipment without either written verification of factory testing or written waiver of factory testing from Commissioner for that particular piece of equipment.

PART 3 - EXECUTION

3.1 SITE RESPONSIBILITIES

- A. Provide site supervision during the installation of electrical work associated with the

Theatrical and Architectural Lighting system elements.

- B. Field verify all dimensions prior to fabrication.

3.2 EXAMINATION

- A. Verification of Conditions: The Manufacturer shall examine areas and conditions under which the equipment is to be installed and shall notify the Commissioner in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.

3.3 ADJUSTING AND CLEANING

- A. Adjust all equipment and components for operation in accordance with the specifications, approved shop drawings and pertinent project drawings prior to the demonstration indicated herein.
- B. Touch-up minor abrasions and imperfections as required.
- C. All unnecessary equipment and materials shall be removed from the area(s) of this work upon completion, removed from the job site and disposed of legally at no additional cost to the City of New York.

3.4 DEMONSTRATION

- A. Installed equipment to be operated for approval, and inspected for quality by the Commissioner and the City of New York.
- B. Adjustments or modifications shall be made as directed by the Commissioner.
- C. Following the equipment demonstration, inspection and final adjustments, the City of New York's representatives shall be instructed in the use, care and maintenance of all items.
- D. Tests and instruction to be scheduled in conformance with project construction schedules and the availability of the Commissioner and the City of New York.
- E. Cost of re-inspection and additional testing by the Commissioner, if required, due to lack of completion and/or errors and omissions shall be paid by the Contractor or the General Contractor respective to the area of work concerned.

3.5 PROTECTION

- A. Suitable precautions shall be taken to protect the equipment in this section from damage after installation and prior to acceptance by the Commissioner.
- B. Remove all equipment protection and clean components thoroughly prior to the demonstration session

3.6 SCHEDULES

- A. Refer to 'TL' drawings for distribution and control device schedules related to the work in this section.
- B. Refer to attached appendix for quantities.

Theatrical Lighting Dimming and Control Appendix

ITEM #	ITEM DESCRIPTION	THEATER 1	THEATER 2	TOTAL
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Dimmers & Racks

1	Full Size Dimmer Rack	4	2	6
	6 Module Dimmer Rack		1	1
2	2.4 kw Dual Dimmer Modules (500ms) Std Rise	192	102	294
3	Blank Module	AR	AR	AR
4	Controlled Relay Panels with breakers (for 36 relays)	1	1	2
5	Relays	26	24	50
6	Circuit Breakers for Relay Panel	26	24	50
7	24 Circuit Emergency Transfer Panel	1		1
8	6 Circuit Emergency Transfer Panel		1	1

Theatrical Control

9	Ion 1000 w/Fader Wing and 2 Monitors	1		1
10	Element 60 with 500 Channels w/ 2 monitors		1	1
11	Extra LCD Monitor	2	2	4
12	Wireless Focus Remote Unit	1	1	2
13	Wireless Focus Remote Access Point	1	1	2

Theatrical Network

14	Network Rack	1	1	2
15	Network Equipment	AR	AR	AR
16	Rack Mount UPS/Power Conditioning	1	1	2
17	Portable Network Full-function Node with Remote Video	1		1
18	Portable 2-Port DMX Node	9	5	14
19	Lighting System Computer	1		1

House Lighting Control

20	House / Work Light - Processor	1	1	2
21	Work / House LCD Station	1	1	2
22	Single Button Preset Station	7	4	11
23	2 Button Preset Station	1		1
24	Auxiliary Control Console	1	1	2

Distribution & Faceplates

25	Performance Lighting Distribution Faceplates as shown on Drawings	AR	AR	AR
26	Performance Lighting Control Faceplates as shown on Drawings	AR	AR	AR

Note:

This equipment list specifies major systems components and equipment, and should not be interpreted as a "bill of materials". This list may not detail all equipment required for complete, working systems. It is the Lighting Systems Contractor's responsibility to provide complete, working systems regardless of the completeness of this list.

END OF SECTION

SECTION 11 61 83

THEATRICAL AUDIO VIDEO SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including DDC General Conditions and Supplementary Conditions and General Requirements

1.2 SUMMARY

- A. The work in this section includes Theatrical Audio Video (AV) systems and support infrastructure within the following spaces and associated support areas:

- 1) Theater 1
- 2) Theater 2
- 3) Rehearsal Room 1
- 4) Rehearsal Room 2
- 5) Support Spaces
- 6) Public Lobby Spaces

- B. Section Includes:

- 1) Sound reinforcement/playback system
- 2) ADA assistive listening system
- 3) Production intercom (headset communication) system
- 4) Program monitor / paging system
- 5) Production video system
- 6) Infrastructure to accommodate future video projection systems
- 7) Infrastructure to accommodate future digital signage systems
- 8) Base system portable equipment package

- C. Work Results:

- 1) The equipment installed as a result of this section shall result in complete and working audio video systems.

- 2) Provide fully coordinated and engineered equipment, installation, supervision and commissioning for the following major systems and associated accessories as required for each space.
- 3) Provide supervision of AV Systems low voltage signal cable pulling, termination and testing by the Division 26 Electrical Contractor.
- 4) Provide coordination of empty conduit, backboxes and AC power wiring provided by the Division 26 Electrical Contractor.

D. Engineering:

- 1) Provide the services of a Licensed Engineer to engineer all means of support and fastening of the work of this section to the building structure.

E. Provide all material, components, accessories and services required to provide the work as specified herein, elsewhere in the project documents and/or as shown on related drawings.

F. Consult and coordinate with other affected work and contractors throughout the course of the work contained herein.

1.3 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Furnish all AV Systems low voltage signal cable for installation, termination and testing by the Division 26 Electrical Contractor.
- B. Furnish all AV Systems equipment for installation by the Division 26 Electrical Contractor. AV equipment installation shall be under the direct supervision of AV Contractor.
- C. Furnish all non-standard panel and device back boxes; including custom panel back boxes, floor boxes, recessed and surface mounted loudspeaker back boxes, etc. as specified for installation under Division 26.
- D. Furnish connector panel floor boxes as specified, for installation under Division 26.
- E. Furnish all AC power receptacles within system equipment racks for termination under Division 26.

1.4 RELATED SECTIONS

- A. All drawings including General Construction, Structural, Theatrical, Mechanical, Electrical, and NYC DDC General Conditions of the contract, including Supplemental Provisions and NYC DDC General Conditions Specifications Sections, apply to this section.
- B. Coordinate with all related sections of the specifications including, but not limited to:
 - 1) DDC General Conditions
 - 2) Division 03 - Concrete
 - 3) Division 05 - Metals
 - 4) Division 09 - Finishes

- 5) Section 11 6133 - Theatrical Rigging
- 6) Section 11 6163 - Theatrical Lighting Dimming and Control
- 7) Section 12 6100 -- Seating
- 8) Division 21 – Fire Suppression
- 9) Division 23 – Heating, Ventilating and Air Conditioning
- 10) Division 26 – Electrical
 - a. General requirements for all Electrical work, including installation of system cable trays, terminal cabinets, empty conduit, junction/pull boxes and back boxes for system devices and panels (Division 26).
 - b. Electrical terminations (AC power and grounding only) to all equipment racks and isolated ground AC power receptacles (Division 26).
 - c. Provision and installation of all conduit and back boxes (Division 26).
 - d. Electrical services and main circuit protection (Division 26).
 - e. Distribution system equipment (Division 26).
 - f. Conduit, wire, pull boxes, junction boxes and miscellaneous hardware and components as required for a complete electrical installation.
 - g. Terminations and testing of system continuity
 - h. Section 26 5561, Theatrical Systems Electrical Requirement
- 11) Division 27 – Communications
 - a. Structured cabling systems
 - b. At common facility panels, coordinate receptacles for building standard communications systems.

1.5 REFERENCES

A. Abbreviations or Acronyms in addition to those defined in elsewhere in the specifications:

- 1) A/R – As Required
- 2) ATP – Acceptance Test Procedure
- 3) AV – Audio Video
- 4) Cat – Category
- 5) DSP – Digital Signal Processor. Unless noted it refers to the Main Audio System processor.
- 6) FAT – Factory Acceptance Test
- 7) FBO – Furnished by Owner
- 8) HD – High-Definition
- 9) HD-SDI – High-Definition Serial Digital Interface
- 10) MATV – Master Antenna Television

- 11) MPEG – Moving Picture Experts Group
- 12) OFCI – Owner Furnished Contractor Installed
- 13) QAM – Quadrature Amplitude Modulation
- 14) RF – Radio Frequency
- 15) RU – Rack Unit. One Rack Unit (1RU) equals 1.75 inches of vertical panel height.
- 16) SAD – See Architectural Drawings
- 17) SD – Standard Definition
- 18) TSE – Theatre and Stage Equipment

B. Definitions

- 1) "Contractor": Installer responsible for the construction and installation for the work contained in this section.
 - a. Contractors involved with other work shall be indicated with a specific trade preceding the word "Contractor" (i.e. General, Electrical, etc.).
- 2) "Furnish": Purchase and/or fabricate and deliver to project site.
- 3) "Install": Physically install the items in their proper location (s) on the project site.
- 4) "Provide": Furnish and install.
- 5) In all cases where a device or a part of equipment is referred to in a singular manner within the contract documents, it is intended that such a reference shall include all devices required to complete the installation in accordance with the project documents.

C. Reference Standards, in addition to those defined in Section– Site Standards

- 1) Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.
- 2) If an applicable code or standard permits work of lesser quality or extent than this specification, this specification and the related drawings will govern.
- 3) Comply with National and New York codes, and applicable UL standards.
- 4) Comply with national, state and local labor regulations and requirements.
- 5) If an applicable code or standard permits work of lesser quality or extent than this specification, this specification and the related drawings will govern.

D. American National Standards Institute (ANSI):

- 1) ANSI S1.4-1983 (R2001) American National Standard Specification for Sound Level Meters.
- 2) ANSI S1.11-1986 (R2001) American National Standard Specification for Octave-Band and Fractional Octave-Band Analog and Digital Filters
- 3) ANSI S1.42-1986 (R2001) American National Standard Design Response of Weighting Networks for Acoustical Measurements

E. Audio Engineering Society Incorporated (AES):

- 1) AES2-1984 (r2003) AES Recommended Practice - Specification of Loudspeaker Components Used in Professional Audio and Sound Reinforcement
- 2) AES3-2003 AES standard for digital audio engineering – Serial transmission format for two-channel linearly represented digital audio data (Revision of AES-1992, including subsequent amendments)
- 3) AES3-4-2009 Annex D (Normative) - AES standard for digital audio coaxial transmission and AES- 2id Annex C - AES standard for digital audio coaxial cable adapters and equalizer characterization
- 4) AES5-2003 AES recommended practice for professional digital audio – Preferred sampling frequencies for applications employing pulse-code modulation (Revision of AES5-1997)
- 5) AES11-2003 AES recommended practice for digital audio engineering – Synchronization of digital audio equipment in studio operations (Revision of AES11-1997)
- 6) AES14-1992 (r2004) AES standard for professional audio equipment – Application of connectors, part 1, XLR-type polarity and gender
- 7) AES20-1996 (r2002) AES recommended practice for professional audio – Subjective evaluation of loudspeakers
- 8) AES26-2001 (r2006) AES recommended practice for professional audio interconnections – Conservation of the polarity of audio signals (Revision of AES26-1995)
- 9) AES48-2005: AES standard on interconnections – Grounding and EMC practices – Shields of connectors in audio equipment containing active circuitry
- 10) AES10-2003: AES recommended practice for digital audio engineering – Serial Multichannel Audio Digital Interface (MADI) (Revision of AES10-1991)
- 11) AES-2id-2006: AES information document for digital audio engineering – guidelines for use of the AES3 interface
- 12) AES-R2-2004: AES project report for articles on professional audio and for equipment specifications – Notations for expressing levels (Revision of AES-R2-1998)
- 13) AES TD1001.1.01-10 Multichannel surround sound systems and operations

- F. Consumer Electronics Association (CEA):
 - 1) CEA 310-E (2005) Racks, Panels and Associated Equipment
- G. Electronics Industries Association of America (EIA):
 - 1) EIA-160 Sound Systems
 - 2) EIA-101-A Amplifiers for Sound Equipment
 - 3) SE-103 Speakers for Sound Equipment
 - 4) SE-104 Engineering Specifications for Amplifiers for Sound Equipment
- H. Institute of Electrical and Electronics Engineers (IEEE):
 - 1) IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms
- I. Insulated Cable Engineers Association (ICEA):
 - 1) ICEA S-83-596 (2001) Fiber Optic Premises Distribution Cable
 - 2) ICEA S-90-661 (2002) Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cable for Use in General Purpose and LAN Communications Wiring Systems
- J. International Electrotechnical Commission (IEC)
 - 1) IEC 268-3 (1988) Sound system equipment – Part 3: Amplifiers
 - 2) IEC 268-5 (1989) Sound system equipment – Part 5: Loudspeakers
 - 3) IEC 268-12 (1987) Sound system equipment – Part 12: Application of Connectors for Broadcast and Similar Use
 - 4) IEC 60268-12-am1:1991 Amendment 1 - Sound system equipment – Part 12: Application of Connectors for broadcast and similar use
 - 5) IEC 60268-12-am2:1994 Amendment 2 - Sound system equipment – Part 12: Application of Connectors for broadcast and similar use
 - 6) IEC 651 (1979) Sound level meters
- K. International Organization for Standardization (ISO)
 - 1) ISO 1996-1 Acoustics – Description and measurement of environmental noise – Part 1: Basic quantities and procedures. 1982
- L. National Electrical Manufacturers Association (NEMA)
 - 1) NEMA WC 63.1 (2005) Twisted Pair Premise Voice and Data Communications Cables
 - 2) NEMA WC 66 (2001;Errata 2003) Category 6 and Category 7 100 Ohm Shielded and

Unshielded Twisted Pairs

- M. National Cable And Telecommunications Association (NCTA)
 - 1) NCTA RP (2003) NCTA Recommended Practices for Measurements on Cable Television Systems
- N. National Fire Protection Association (NFPA)
 - 1) NFPA 70 - National Electrical Code
- O. Society of Motion Picture and Television Engineers (SMPTE)
 - 1) SMPTE 12M-1999 television, Audio and Film – Time and Control Code
 - 2) SMPTE 170M-1999 Television – Composite Analog Video Signal – NTSC for Studio Applications
 - 3) SMPTE 202M-1998 Motion Pictures – B Chain Electroacoustic Response – Dubbing Theaters, Review Rooms and Indoor Theaters
 - 4) SMPTE 272M-2004 Television – Formatting AES/EBU Audio and Auxiliary Data into Digital Video
 - 5) SMPTE 292-2006 1.5 Gb/s Signal/Data Serial Interface
 - 6) SMPTE 272M-2005 Television – 1920 x 1080 Image Sample Structure, Digital Representation and Digital Timing Sequences for Multiple Picture Rates
 - 7) SMPTE 293M-2003 Television – 720 x 483 Active Line at 59.94-Hz progressive Scan
 - 8) SMPTE 296M-2001 Television – 1280 x 720 Progressive Image Sample Structure – Analog and Digital Representation and Analog Interface (R2006)
 - 9) SMPTE 297-2006 Television – Serial Digital Fiber transmission System for SMPTE 259M, SMPTE 344M, SMPTE 292 and SMPTE 424M
 - 10) SMPTE 303M-2002 Television – Color Reference Pattern
 - 11) SMPTE 305M-2005 Television – Serial Data Transport Interface
 - 12) SMPTE 377M-2004 Television - Material Exchange Format (MXF) File Format Specification (Standard)
 - 13) SMPTE 424M-2006 Television – 3 Gb/s Signal/Data Serial Interface
 - 14) SMPTE RP 145-2004 SMPTE C Color Monitor Colorimetry
 - 15) SMPTE RP 155-2004 for Motion Pictures and Television – Reference Level for Digital Audio Systems
- P. Telecommunications Industry Association (TIA)

- 1) TIA J-STD-607-A (2002) Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
- 2) TIA-222-G (2005) Structural Standards for Antenna Supporting Structures and Antennas
- 3) TIA-455-21-A (1988) FOTP-21 – Mating Durability of Fiber Optic Interconnecting Devices
- 4) TIA 492AAAA-A (1998; R 2002) 62.5-um Core Diameter/125-um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers
- 5) TIA 492AAAB (1998; R 2002) 50-um Core Diameter/125-um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers
- 6) TIA-492CAA (1998; R2002) Class IVA Dispersion-Unshifted Single-Mode Optical Fibers
- 7) TIA-526-14-A (1998) OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- 8) TIA-526-7 (2002) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant OFSTP-7
- 9) TIA/EIA-568-B.1 (2001, Addendums 2001, 2003, 2003, 2003, 2003, 2004, 2007) Commercial Building Telecommunications Cabling Standard – Part 1: General Requirements.
- 10) TIA/EIA-568-B.2 (2001) Commercial Building Telecommunications Cabling Standard – Pat 2: Balanced Twisted Pair Components
- 11) TIA/EIA-568-B.3 (2000, Addendum 2002) Optical Fiber cabling Components Standards
- 12) TIA/EIA-569-A (1998, Addenda 200, 2001) Commercial Building Standards for Telecommunications Pathways and Spaces
- 13) TIA/EIA-598-B (2001) Optical Fiber Cable Color Coding
- 14) TIA/EIA-604-2 (2004) FOCIS 2 Fiber Optic Connector Intermateability Standard, Type ST
- 15) TIA/EIA-604-3A (2000) FOCUS 3 Fiber Optic Connector Intermateability Standard
- 16) TIA/EIA-606-A (2002) Administration Standard for the Telecommunications Infrastructure

Q. Underwriters Laboratories Incorporated (UL)

- 1) UL 813 Commercial Audio Equipment 1996
- 2) UL 1419 Professional Video and Audio Equipment 1997

- 3) UL 1492 Audio-Video products and Accessories 1996
- 4) UL 1666 (2000; Rev thru Jul 2002) Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
- 5) UL 1863 (2004) Communication Circuit Accessories
- 6) UL 444 (2002; Rev Thru Sept 2006) Communication Cables
- 7) UL 467 (2004) Standard for Grounding and Bonding Equipment
- 8) UL 50 (2003; R 2005) Standard for Enclosures for Electrical Equipment
- 9) UL 514C (1996; Rev thru Dec 2006) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
- 10) UL 910 (1998) test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air
- 11) UL 969 (1995; rev Thru Dec 2006) Marking and Labeling Systems
- 12) UL 6500 Audio/Video and Musical Instrument Apparatus for Household, Commercial and Similar General Use 1999

R. Comply with guidelines and practices outlined in the following texts:

- 1) Audio Systems -- Design and Installation, Giddings, Focal Press, 1997.
- 2) Sound System Engineering (3rd Edition), Davis and Davis, Focal Press, 2006.
- 3) Dashboard for Control guidelines – InfoComm International.

1.6 SUBMITTALS

- A. All submittals shall be submitted in accordance with NYC DDC General Conditions.
- B. All submittals shall be submitted in a timely manner, allowing sufficient time for adequate review and possible resubmittal without jeopardizing the project schedule.
- C. All submittals shall leave space available for review stamps and comments.
- D. Submittals will be reviewed and accepted, containing verified field dimensions, prior to proceeding with the fabrication of the work in this section.
- E. Review all pertinent project Electrical and Theatrical series drawings. Following this review, provide to the Commissioner and the City of New York any additional information required to make a fully functioning system. In addition, the Manufacturer shall confirm that all systems components are compatible with conduit sizes and wire gauge sizes as shown in the drawings and that the interconnectivity of components is as required to make a fully functioning system. This confirmation shall be in writing within 30 calendar days of contract award. All costs associated with additions to the scope of the electrical work because of insufficient wire count and/or sizes after this confirmation shall be borne by the Manufacturer/Contractor.

F. Product Data

- 1) Where standard manufactured parts are used, submit current product literature describing component, manufacturer's recommended applications, load ratings, safety factors and dimensions.
- 2) Clearly indicate specific component and applicable options.

G. Shop Drawings

- 1) Provide shop drawings on D size minimum (24" x 36") sheets.
- 2) Include a cover sheet with a drawing index including the sheet number and title for each sheet in the set.
- 3) Provide a 4" x 4" area near the title block for review stamps and comments. This area should be in relatively the same location on each sheet.
- 4) Provide 1/4" = 1'- 0" plans of all locations which contain equipment in this contract based upon AutoCAD backgrounds provided by the Commissioner. Show all equipment properly located dimensioned and labeled. Note all work by others in the vicinity, which may affect work in this contract.
- 5) Provide an inventory of all equipment to be supplied, including quantities, manufacturer's part number, reference to applicable drawings, etc.
- 6) Provide complete, fully dimensioned, large scale detailed fabrication drawings of all major components.
- 7) Provide complete conduit riser diagrams detailing all AV systems cable pulls, conduit runs and sizes.
- 8) Provide complete wiring block diagrams, based upon the Contract Documents but including cable types, identification and color codes, and detailed wiring of connections, both at equipment and between equipment racks and wiring in conduit.
- 9) Provide plans detailing schematic drawings of any custom circuitry or equipment modifications, including connector pinouts and component lists. Show all required wire sizes and counts between all components.
- 10) Provide plans detailing patch panels, custom connector panels and wall plates, with dimensions.
- 11) Provide plans detailing all consoles, equipment enclosures, supports, brackets, tables, etc.
- 12) Provide plans detailing location of all equipment in racks, consoles or on tables, with dimensions; wire routing and cabling within housings; AC power outlet and terminal strip locations.
- 13) Provide plans detailing loudspeaker location, orientation and support and aiming systems.
- 14) Provide indications by arrow and boxed caption of all variations from contract

drawings and specifications, except where variation is indicated as acceptable.

- 15) Indicate all elements with appropriate safety factors and/or safety equipment.
- 16) Indicate recommended load limits for each element in the system with loading requirements.
- 17) Indicate length of all Category 5/5e/6 cables in the system.
 - a. No data/network cable of this type shall exceed 90M / 295ft.
 - b. Contractor is responsible to structure data/network cabling to ensure this length restriction is not broken.
- 18) Power requirements, one-line riser diagrams and installation circuit diagrams for electrical equipment. Show all required wire sizes and counts between all components.
- 19) Engineer and draft all shop drawings to represent actual fabrication and installation drawings and details.
- 20) Copies or tracings of the Contract Drawings are NOT acceptable as shop drawings and shall be rejected.
 - a. The layouts of the various items of equipment, accessories, specialties and wiring on the Contract Drawings are diagrammatic, unless specifically dimensioned, and do not necessarily indicate every item required for a complete installation.

H. Control System screens

- 1) Provide preliminary control system screen layouts and menu structure.
- 2) Screen layouts and menu structure shall be approved prior to any programming.

I. Samples

- 1) Label samples to indicate product, characteristics and location. Samples will be reviewed for color and appearance only. Compliance with all other requirements is the exclusive responsibility of the Contractor. Provided samples may be used within the actual systems once its use has been accepted.
- 2) Submit samples of the following for approval within 14 days of written request:
 - a. Samples of a typical AV panel faceplate showing details of finishing, engraving and connector mounting. This plate shall contain one of each type of connector and switch used on the project.
 - b. A typical gang-box faceplate.
 - c. Additional samples will be submitted within 14 days of Commissioner's written request.

J. Engineering Submittals:

- 1) All mounting systems requiring the combining of multiple manufacturer mounting systems or where all hardware is not provided as a single rated system shall be engineered, approved, and drawings stamped by a professional engineer licensed in the State of New York. The engineer shall verify that the equipment supplied under this section meets or exceeds the design criteria of this specification.

K. Test and Evaluation Reports

- 1) Supervise testing of Theatrical AV Systems low-voltage cabling as identified in Article 3.3.A.5 below. Submit hardcopies and electronic copies of all documentation and raw data as identified.

L. Site Quality Control Submittals:

- 1) Confirm all site dimensions prior to installation of the equipment for this section. Provide drawings of site conditions which are NOT the same as the contract documents.
- 2) Confirm that all, power feeds and receptacles, backboxes and raceways are installed per electrical and theatrical drawings, bulletins and RFI responses released during the construction phase of the project. CAREFUL COORDINATION WITH THE ELECTRICAL CONTRACTOR IS REQUIRED.
- 3) Confirm structural steel locations and configurations within 14 days of contract award. Steel locations are intended to support the systems specified but due to variations in product form factor some adjustment to steel locations may be necessary due to the mounting requirements of a particular product. CAREFUL COORDINATION WITH THE STRUCTURAL STEEL CONTRACTOR IS REQUIRED.
- 4) Commissioning documents will be provided at the conclusion of the commissioning process. These documents will repeat the tests as detailed in "source quality control submittals" and include additional testing as required to confirm the installation is compliant with this section.

M. Special Procedure Submittals:

- 1) To ensure proper instruction of the user group the contractor of this section shall supply as part of the submittal process the following user instruction documentation.
 - a. User instruction syllabus
 - b. User instruction guide (bound hard copy)
 - c. User instruction guide (hands on system instruction)
 - d. Testing document for confirmation of understanding
 - e. DVD / Video user instruction file

1.7 CLOSE OUT SUBMITTALS

- A. Submit documents in accordance with NYC DDC General Conditions.
- B. At the time of acceptance testing, submit electronic and two bound hardcopies of parts lists and operation/maintenance instruction sheets.
- C. Within 60 days of the acceptance testing, submit one set of reproducible "as built and approved" drawings showing all equipment as installed. These drawings shall include all adjustments made during the checkout process.
- D. Submit operation and maintenance manuals with the "as built and approved" drawings. Each manual shall be bound in an individual binder with the project name on the front cover and system identification on the spine. The manuals shall include:
 - 1) Complete parts list for all equipment and telephone numbers for the authorized parts

and service distributors.

- 2) Instructions as to the safe operation of all equipment.
 - 3) Recommended maintenance schedule for component parts which may need periodic replacement.
 - 4) Recommendations for cleaning, maintaining and touch-up of all finished surfaces.
 - 5) Hardcopies of AV Cable testing documentation and raw data.
 - 6) Warranties as required herein and in NYC DDC General Conditions.
- E. Where specific elements do not require manuals, instruction sheets as to care and handling shall be provided.
- F. The record documents shall be reviewed by the Commissioner and all modifications to the documents stemming from this review shall be made as required.
- G. Above submissions are required as a condition for final approval of the work.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements:

- 1) Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.
- 2) If an applicable code or standard permits work of lesser quality or extent than this specification, this specification and the related drawings will govern.
- 3) Comply with requirements of NYC DDC General Conditions and Codes and Standards referenced therein.
- 4) Comply with applicable national, state and local labor regulations and safety requirements.

B. Qualifications:

1) Manufacturers:

- a. The manufacturer providing the material or equipment specified in this Section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years. The systems described herein shall be provided by a Theatrical Rigging Contractor who will be responsible for furnishing all services described herein including but not limited to coordination and supervision of the engineering, shop drawings, fabrication and provision for all systems specified herein and shown in the drawings.
- b. The system shall be comprised of components that are of professional

quality. Manufacturers shall be as listed per item in Appendix or approved equals.

- c. Items which are not listed in Appendix but are required for completion of the work in this section may be procured from any industry recognized manufacturer or fabricated in the shop of the contractor supplying the work of this section. The contractor of this section is solely responsible for the equipment provided to complete the work of this section.

2) Integrator:

- 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. Work of this Section shall be the responsibility of the single contractor, who shall own and operate their own shop for the fabrication of audio, video and communication systems, and be regularly engaged in the construction of such systems.
- c. The contractor must have the ability to undertake the work within the time available, judged against other currently contracted work.
- d. The contractor must have the ability to meet specifications and project requirements.
- e. The contractor must have the technical expertise as demonstrated by past projects and manufacturing / engineering capability to meet the specifications as detailed herein and project requirements.
- f. Project Manager:

- 1. The Project Manager shall be qualified and have experience in projects of similar size and scope. The Project Manager shall have binding authority to represent and act for the contractor supplying the work of this section. The project manager shall be the primary conduit for all information between the supplier of this equipment and the general contractor. All information given to the Project Manager shall be considered as given to the contractor of this section.

C. State Of The Art Development:

- 1) Contractor shall provide only the manufacturer's latest developed product as of the date of procurement as reasonably required to comply with the Project Schedule. In no case shall discontinued or obsolete equipment be acceptable.
- 2) Should product recall by the manufacturer require temporary or permanent replacement of a product specified under this section, the Contractor shall notify the Commissioner at the earliest reasonable time and shall arrange to replace the product in question at the earliest possible time.
- 3) Equipment found defective or subject to recall prior to scheduled installation shall not be delivered to the jobsite.
- 4) Equipment defect or intended recall shall not relieve the manufacturer from his contractual obligation with regard to delivery schedule of product.
- 5) Under no circumstances shall arrangement for alternate product necessarily require the City of New York to accept superseded equipment except on a temporary basis.

- 6) Provide the manufacturer's most recent software version available as of the start of the equipment testing process.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, storage and handling shall be coordinated with the Commissioner and shall meet all requirements described in the NYC DDC General Conditions.
- B. Packing, Shipping, Handling, and Unloading
 - 1) All equipment shall be appropriately and substantially packed for shipment.
 - 2) All equipment containers shall clearly indicate the equipment contained, "front", "top", "fragile", the project name, and theater site allocation. Include packing and shipping lists for each container.
 - 3) All shipping costs to the job site are the responsibility of the Contractor. The shipping method/company is at the total discretion of the Contractor in order to meet the published project schedules.
- C. Acceptance at Site
 - 1) Coordinate responsibility for acceptance of material and equipment at job site with the Contractor.
 - 2) The Contractor shall be responsible for acceptance of the equipment and components at the jobsite, confirming that all quantities and counts are correct and for keeping accurate logs and records of such information.
- D. Storage and Protections
 - 1) Upon delivery, the materials shall be stored under cover in a dry and clean location, off the ground. Delivered materials which are damaged or otherwise not suitable for installation shall be removed from the job site and replaced with acceptable materials.
- E. Replace, at no additional cost to the City of New York, all equipment and materials which are damaged during storage or handling.

1.10 SITE CONDITIONS

- A. Existing Conditions
 - 1) Field measurements shall be taken prior to preparation of shop drawings to ensure proper fitting of work. Allow for adjustments during installation whenever taking field measurements.
 - 2) Should field measurement of site conditions alter the design or installation of system elements from the approved shop drawings, revised shop drawings shall be reissued for review.
- B. Environmental Requirements
 - 1) Equipment is classified according to its susceptibility to construction conditions that

may affect its operation. Classes shall be defined by the following paragraphs:

a. Class 1:

1. Cable and distribution apparatus, structural elements, electrical back boxes, face plates, terminal boxes, and empty equipment rack frames may be stored in weather protected spaces under "normal" construction site conditions provided that no electronic components are contained within devices, that storage boxes are sturdy and well sealed, and that equipment is protected with imperforate inner plastic sheeting.
2. Contractor may install this class of equipment in weather-protected spaces under "normal" construction site conditions provided that equipment is protected from dust and moisture by sturdy imperforate plastic sheeting and completely covered with corrugated cardboard held securely in place by duct tape. Cardboard covers shall not be removed until area is broom cleaned. Under no circumstances shall equipment remain uncovered overnight during installation or while work which causes high dust or moisture levels in area of placement is taking place.

b. Class 2:

1. Control panels, spare parts, test and other equipment (except as listed under Class 3), not subject to damage by concrete dust or dirt shall be stored and protected per Class 1 devices.
2. Contractor shall not install equipment in this class until area of installation is broom cleaned, "blown" clean with pressurized air, mopped, air conditioned and secure. Contractor may install control panels with electronic components under Class 1 conditions, but electronic components must be removed and not installed until area of installation meets Class 2 conditions.

c. Class 3:

1. Mixing consoles, filled equipment racks and other electronic equipment shall not be shipped to site until the rack and control rooms are finished, air conditioned, dust free, broom and mop cleaned, secure, and in all respects complete and ready for occupation. This class of equipment shall not be unpacked until the system is complete in all other respects. Under no circumstances may any equipment in this class be removed from the rack and control rooms into or through spaces which are not cleaned, air conditioned, and complete.

1.11 SEQUENCING AND SCHEDULING

A. The installation of the equipment in this section shall begin following the completion of work which may be in conflict with the installation including:

- 1) Installation of structural steel.
- 2) Electrical and mechanical work in ceiling.
- 3) Principal foundation work.
- 4) Installation of associated electrical work.

- 5) Installation of floor and machine room structure.
 - 6) Construction sequencing for the delivery of large elements to the site must be coordinated with the Commissioner. It is the responsibility of the AV Contractor to coordinate with the Commissioner to arrange for a means to deliver large component of the systems described herein.
- B. The Contractor shall submit a project schedule (critical path) which shall indicate coordinated functions with other trades and project requirements.
 - C. The installation of the AV Systems equipment, panels and devices shall not occur until all painting in the area has been completed.

1.12 WARRANTY

- A. Comply with the warranty requirements of NYC DDC General Conditions and the following.
- B. The Contractor shall warrant materials and workmanship of all equipment supplied under the work of this specification as free of defects. The Contractor shall guarantee in writing the repair or replacement within 14 days of all items found defective during a period of 1 year following the date of final acceptance. Ordinary wear and defects due to improper usage are excepted.
- C. During the warranty period above, all emergency conditions where system failures may be hazardous or may cause severe hardship or cancellation of events shall be responded to within 24 hours. Immediate action shall be undertaken to ensure the safety of the audience and presenters.
- D. During the Warranty Period, for each product that uses software, furnish manufacturer's software updates to the City of New York for installation.
- E. Guarantee Services
 - 1) One year following date of final acceptance, a factory engineer shall be provided to examine, adjust and repair the equipment included in this sections as required. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the Contractor. All labor and materials which are required to perform this service shall meet or exceed these specifications and shall not compromise the performance of the equipment in any way.
 - 2) Following this inspection and guarantee service, the Manufacturer shall provide the City of New York and the Commissioner with a written report itemizing the results of the inspections and the warranty work, which was conducted. The Manufacturer shall also include in this written report recommendations for any corrective actions which the Manufacturer feels should be taken, with respect to the equipment included in this section, but are outside the scope of the warranty agreement.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Theatrical Audio Video Systems Equipment

- 1) REFER TO APPENDIX 116183 FOR MAJOR COMPONENT AND EQUIPMENT LIST.
 - a. Appendix 116183 equipment list specifies major systems components and equipment, and shall not be interpreted as a "bill of materials". Appendix 116183 may not detail all equipment required for complete, working AV Systems.
 - b. The AV Systems Contractor shall provide complete, working systems regardless of the completeness of the Appendix 116183 equipment list.
- 2) Refer to Article 2.5 - EQUIPMENT AND COMPONENTS below for additional audio video systems requirements.

2.2 INTEGRATION CONTRACTORS

- A. To establish comparative standards of quality, the provision of the systems, equipment and services of this Section shall be one of the following audio video systems integration contractors or approved equal:

Atel Systems, Inc.
601 North Main Street
Brewster, NY 10509
Tel. (845) 278-4400
Fax. (845) 278-2824

AVI-SPL, Inc.
10-40 45th Avenue
Long Island City, NY 11101
Tel: (718) 806-4040
Fax: (718) 806-4041

Diversified Systems, Inc.
363 Market Street
Kenilworth, NJ 07033
Tel: (908) 245-4833
Fax: (908) 245-0011

Masque Sound & Recording Corp.
21 East Union Avenue
East Rutherford, NJ 07073
Tel: (201) 939-8666
Fax: (201) 939-4704

Specialized Audio-Visual Inc (SAVI.)
14 Solar Drive
Clifton Park, NY 12065
Tel: (518) 383-6501
Fax: (518) 383-6506

- B. Standards of Acceptance:

- 1) Refer to Paragraph 1.8.B.2 - Quality Assurance/Qualifications above.

2.3 SYSTEMS DESCRIPTION

A. Theaters 1 and 2:

- 1) Sound reinforcement & playback system:
 - a. The sound reinforcement system shall be used for the reinforcement and monitoring of live stage sound, archival recording, lecture/narration, amplification and for the distribution of prerecorded sound throughout the audience environment.
 - b. Coverage of the seating area shall be provided by self-powered loudspeakers.
 1. Theater 1 shall be provided with a fixed center array. Additional wiring infrastructure and structural support shall accommodate future or rented left-right stereo arrays.
 2. Theater 2 shall utilize portable loudspeaker located by the end user as necessary for individual production needs.
 - c. The primary sound control position shall be located in the Control Room. A secondary house sound mix position will be accommodated at the crossaisle.
 - d. Additional monitor or "foldback", and surround effects loudspeakers may be placed as necessary, connecting to loudspeaker outlets around the stage, and backstage areas.
 - e. A small-format digital mixing system shall provide minimal live source mixing, digital signal processing and sound playback control. Playback, recording and signal processing equipment shall also be provided.
 - f. Additional self-powered loudspeakers shall be provided for surround sound playback capabilities. System will accommodate future or rented computer controlled multi-channel sound playback systems as required for specific production needs.
 - g. An audio patching system shall be located in the control booth equipment racks to allow connection of audio signals from the stage area to the mixing console and signal processing equipment.
 - h. The sound system shall also be configured to accommodate inputs from sources that are purchased in the future, rented, or brought in by outside performers.
 - i. System control wiring accommodation shall consist of standard CAT-6 control tie lines.
 - j. All sound system loudspeakers shall be configured to be automatically muted by the building life safety system in the event of an emergency (life safety system provided under Division 26). Muting shall be initiated upon receipt of a dry contact closure signal from the building life safety system. Coordinate requirements with Division 26.
- 2) ADA assistive listening system:
 - a. This system shall assist patrons with a hearing impairment to better hear the performance by means of wireless receivers.
 - b. Receivers totaling 4% of the total available seating shall be supplied to meet current Americans with Disabilities Act (ADA) requirements.
 - c. Program signal shall be normally derived from the program monitor microphone. Additional signal sources shall be patched as required.
 - d. Receivers shall be in the form of wireless headsets, which shall provide additional capability to interface to individual induction-loop and other devices to permit more direct coupling of the received signal to a patron's compatible hearing aid device.
 - e. The system shall transmit the audio signal via a remote FM antenna located

in the Theater. Coordinate FM transmitter frequency selection to ensure that a clear channel is used.

B. Rehearsal Studio 1

- 1) Sound playback system Infrastructure:
 - a. Connection panels for wall-mounted loudspeakers with wiring infrastructure back to wall plates to support a **future** portable equipment rack housing playback sources, mixer and connection panel as located on the drawings.
- 2) Tie-line connections to the main AV rack room shall also be provided.

C. Rehearsal Studio 2

- 1) Empty conduit for future tie-line connections to the main AV rack room shall be provided.

D. Building-wide Audio Video systems:

- 1) Production intercom (headset communication) system:
 - a. The system shall provide up to 12-channels of wired, party-line headset intercommunication for stage technicians and related personnel in all performance spaces. This system shall also serve as the master control for paging functions, feeding signals and contact closures to the program monitor / paging system.
 - b. The system consists of a power supply and a network of wiring and receptacles to which portable "belt-pack" stations and headsets may be connected. These stations shall provide local amplification, call-light signaling circuitry and microphone on/off and headset loudspeaker volume control. All stations shall operate in full-duplex mode (simultaneous listen/talk).
 - c. A remote intercom station shall be provided within portable stage manager station for use within the Theaters. Connections for the portable stage manager control station shall be provided in various control areas. The stage manager station shall contain production intercom remote station, rack-light panel and custom control panel, as indicated on the Drawings
- 2) Program monitor / paging:
 - a. This system shall feed the program signal from a permanently-mounted microphone within each performance space, or shall be fed from other program sources as required, both to the back-of-house (BOH) areas including dressing rooms, lounges, and other backstage areas.
 - b. The program signal shall feed a digital signal processor which will provide multiple outputs to program/paging amplifiers, as well as other systems that require a program audio feed including the production intercom and assistive listening systems.
 - c. Back-of-house paging capability shall be provided at the portable stage manager stations. Paging shall be via the production intercom remote station's microphone and integral "announce" button. Paging shall automatically duck the program monitor signal (priority muting) and actuate the local volume control override relay for back-of-house paged areas.
 - d. The portable stage manager stations shall be provided with program audio "mute" switches for back-of-house (BOH) zones. These momentary switches shall connect to the digital signal processor to toggle between a preset

"mute" or "audio" condition. Whenever the system is in a "mute" condition, the appropriate switches on all portable stage manager control stations shall remain illuminated until the mute condition is released.

- e. Ceiling- or wall-mounted loudspeakers and local autotransformer-type volume controls shall be located in the various areas as indicated on the Drawings.
- f. All program monitor / paging system loudspeakers shall be configured to be automatically muted by the building life safety system in the event of an emergency (life safety system provided under Division 26).

3) Production video system:

- a. This system shall permit the distribution of composite video signals over coax cabling to the stage, technical backstage areas, control positions, and other locations as shown on the Drawings.
- b. Video patch panels and distribution amplifiers shall be located in the AV rack room & control booth video equipment rack.
- c. The main production video signal source shall be provided by one color camera located at the front-of-house lighting pipe. The camera shall be mounted by means of a C-clamp, and shall utilize an industry standard safety cable. Additional future video cameras, including infrared-light cameras, may connect at various places around the Theatre as required.
- d. Production video monitors shall be provided within portable stage manager station to allow connection at various locations.
- e. Wiring accommodation of front-of-house lobby latecomer video monitors shall be provided within the lobbies as shown on the Drawings.

4) Video Projection and Digital signage system wiring infrastructure:

- a. CAT-6 copper and fiber optic cabling shall be provided to support digital and high definition video distribution via the use of appropriate twisted-pair or fiber transmitters/receivers. This type of transmitter/receiver equipment shall be rented or future furnished by the City of New York.
- b. The front-of-house lobby latecomer video monitor plate locations shall be provided with additional infrastructure to support a future digital signage system. Future digital signage content may be distributed to video displays located throughout the lobby space, entry and other public areas as shown on the Drawings.

E. Low-voltage audio video device and wiring infrastructure:

- a. Contractor shall provide a series of low voltage connection plates and panels providing a flexible wiring plant for audio video equipment to support theatrical productions. The wiring system will comprise microphone and line level audio, wireless microphone antenna distribution, production video, video projection, program monitor/paging, production intercom and network cabling including fiber optic cabling.
- b. Network and control wiring:
 - 1. Category-6 and fiber optic distribution equipment shall be located as shown to provide an overall AV systems network & control infrastructure. This distribution system shall accommodate all Ethernet, RS-422, GPI/O system needs.
 - 2. Contractor shall coordinate with electrical contractor to ensure all Category-6 cabling runs are less than 90 meters as required. Contractor shall coordinate with electrical contractor to organize conduit routing to limit overall cable lengths. Unless otherwise noted Category-6 cabling is not required to be run under 90 meters.

3. Audio video distribution equipment and patch panels to support building-wide paging, intercom, and lobby digital signage equipment shall be located within the AV rack rooms. This rack will also provide tie-line interconnection points between the theaters, lobby and primary rehearsal room.

2.4 MATERIALS

- A. All equipment and components shall be new and complete. No used or reconditioned equipment shall be acceptable.
- B. All mounting hardware is to be included.
- C. All equipment and components shall be factory tested prior to shipping.
- D. All bolts and fasteners must be Grade 5 or better.
- E. All bolted attachments to have lock washers or other approved self-locking hardware.
- F. All microprocessor controls shall utilize a non-volatile memory. System configuration, operating parameters, presets, etc. shall be protected against system power failure for a minimum of 48 hours.
- G. All internal wiring shall be factory completed and clearly marked. All field connections shall be by connector, terminal strip or other device previously specified. Any terminal strip connections shall be clearly labeled as to terminal designation.
- H. All wire sizes and insulation to comply with UL standards and local codes.
- I. All wiring to be harnessed and bound. No loose or randomly routed wires shall be permitted.
- J. All analog control wire counts to include 10% spares.
- K. No manufacturer logo shall appear on control station face plates or any other device located in public areas.
- L. Any supplementary or auxiliary equipment necessary for the operation of the system shall be supplied with overload and short-circuit protection.
- M. Do not purchase or fabricate any materials, components or items to be used in the audio video systems prior to review of shop drawings, unless otherwise directed by Commissioner.
- N. Use only materials, components and items that conform with industry practice and applicable code standards. Use only components which are new and never previously used. Take care during installation to prevent scratches, dents, chips, etc.
- O. Install all rack-mounted equipment with 10-32 button head machine screws with Phillips head.
- P. Custom rack panels shall be 3/16" thick aluminum, standard EIA sizes, brushed black anodized finish unless otherwise noted. (Brush in direction of aluminum grain only.) Custom connector plates (loudspeaker, microphone, video, etc.) are typically stainless steel. It is the responsibility of the Contractor to verify plate finish with the Commissioner. Plastic plates will not be accepted.

- Q. All engraving shall be 1/8" block unless noted otherwise. Except where noted to the contrary, on dark panels or pushbuttons, letters shall be white; on stainless steel or brushed natural aluminum plates, or light-colored pushbuttons, letters shall be black.
- R. Connections shall be made with approved connectors and/or terminal blocks equal to Cinch 140 series or as indicated. Mount trim potentiometers, custom circuit cards, relays and transformers (except large 70V units) in shielded enclosures, and mark their function and connections with engraved lamacoid labels.
- S. Per IEC-268 standard, all XLR connectors, within equipment or out, shall be wired pin 2 hot (high), pin 3 low, and pin 1 shield (screen).
- T. Unless otherwise stated, all rack-mounted electronic and electrical equipment and components shall conform to EIA 19" standard. Any devices not specifically designed to be rack mountable shall be adapted, by professionally acceptable methods, to meet the EIA standard.
- U. The rack height of all equipment and components in this specification is in 1.75" (44mm) units denoted "U", i.e., a 5.25" device, which is three rack spaces high is denoted as "3U".
- V. All components shall be factory tested prior to shipping.
- W. All wire sizes and insulation shall comply with UL standards and local codes.
- X. All wire shall be harnessed, bound and routed neatly with no loose or randomly routed conductors.
- Y. All internal wiring shall be factory dressed and clearly marked. All field connections shall be by connector, terminal strip or other approved method specified herein. All terminal strips connection shall be clearly labeled.
- Z. All switches used in these systems (whether or not mentioned or shown in this specification) shall have sufficient voltage and amperage rating to cover the use for which they are required with a safety factor of at least 2. All switches handling audio circuits shall use gold contacts and shall meet JAN-S-23 or MIS-S-3950A specifications or equivalent.
- AA. Audio transformers shall be of appropriate impedance ratio and power-handling capacity for the function intended and, unless otherwise noted herein, shall have a frequency response within ± 1 dB from 20-20,000 Hz.
- BB. A -10dB to +4dB balancing transformer shall be provided for any unbalanced audio equipment used within the system.

2.5 EQUIPMENT AND SYSTEMS

A. General

- 1) Provide Theatrical Audio Video (AV) Systems described herein and on the Drawings.
- 2) Regardless of the length or completeness of the device descriptions herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required. Where two or more acceptable products are listed, the Contractor may use either at his option. Equipment other than that listed shall not be substituted without specific written approval of the Commissioner.

- 3) Equipment quantities, if not specifically called out below, shall be as indicated on the Drawings, unless otherwise noted. The Contractor shall provide the higher quantity should a discrepancy between the Drawings and this Section exist.
- 4) Certain equipment is shared among multiple systems. Such equipment is listed here only once, in the system that constitutes the primary use of such equipment.

B. AV Equipment mounting - General Requirements

- 1) All mounting hardware to be included.
- 2) All bolts and fasteners must be Grade 5 or better.
- 3) All bolted attachments to have lock washers or other self-locking fasteners.
- 4) Provide all required mounting brackets and framing, hardware and components, safety systems and rigging systems using the following minimum design factors (given as ratio of working load limit (WWL) : rated breaking load):
 - a. 5:1 – Minimum design factor for all mounting components regardless of mounting condition.
 - b. 5:1-8:1 – Minimum design factor for manufacturer provided mounts & assemblies where engineered stamped documentation and destructive testing data is provided by manufacturer.
 - c. 10:1 – For all hardware and connecting assemblies between manufacturer rated assemblies when AV equipment is hung above the general public. This includes but is not limited to wire rope, bolts, shackles, turnbuckles, beam clamps, supplemental steel provided by AV contractor and other connecting hardware.
 - d. Design factor calculations to be provided with all equipment mounting details.
- 5) Provide all integral redundancy components, including safety cables, rated at 10:1 for all equipment mounted above head height. This includes but is not limited to loudspeaker arrays, ceiling loudspeakers, wall loudspeakers, video monitors, video projectors, video cameras etc.
- 6) Provide loudspeaker field adjustments and alignments after installation. All component orientations must be within + 5-degrees of the specified angles, with an allowable adjustment range of + 10-degrees.
- 7) AV Contractor shall coordinate required additional blocking, supplemental steel or unistrut supports with General Contractor & specific trade contractors.
- 8) All mounting systems requiring the combining of multiple manufacturer mounting systems or where all hardware is not provided as a single rated system shall be engineered, approved, and drawings stamped by a professional engineer licensed in the State of New York. The engineer shall verify that the equipment supplied under this section meets or exceed the design criteria of this specification.

C. Racks, patching panels and other permanent equipment

- 1) Microphone / Line Level Patch Panel
 - a. 2 x 24, 1/4" phone jack programmable audio patch panel.
 1. Provide programmable patchbay to allow field-selection of normals

and grounding. Normals shall have the option of full-normal, half-normal and non-normal. Grounding shall have the option of bussed, isolated, or looped.

2. Provide non-normalling patch panel phone jack for use with isolation transformers, multiples, combining networks, tie lines; and microphone & line level circuits from AV panels and wall receptacle plates as shown on schematic drawings.
 3. All patch jack contacts (tip, ring and sleeve) shall be wired to E3 style 3-pin molded connectors. Normalling shall be internally selected via jumper connections on front of patchbay.
 4. Provide patch panel jacks with tip & ring normalling and an isolated switching "break" circuit which shall be used for sleeve normalling. This jack will be used for all normalling applications of microphone & line level circuits as shown on schematic drawings.
 5. Provide paper designation strips above or below each patch row with both the appropriate signal level and circuit location description for each patch jack, and the consecutive circuit numbers; 1 through 24 for both the top and bottom rows.
 6. Legends shall correspond with AV receptacle panel legends where applicable. Refer to detail drawings.
 7. Provide plastic laminate designation labels at left and right of the patch panel to indicate reference letter (A, B, C, etc.) of the individual patch panel. Labels mount on the steel rack ears.
 8. Color shall be black.
 9. See drawings for additional information. All patch jack contacts (tip, tip normal, ring, ring normal, sleeve, and sleeve normal) shall be wired to a terminal strip mounted on the rear of the equipment rack. All connections to the patch panel (including normalling) shall be made at this terminal strip, whether internal to the rack or from external devices. The Contractor shall propose a method of patch panel termination for approval by the Commissioner.
- b. Manufacturers
1. Bittree
 2. ADC
 3. Switchcraft
 4. Or approved equal
- c. Basis of Design
1. Basis-of-design for is Bittree 489 Series (B48DC-FNPITE3M20U7L). Comparable products by one of the manufacturers listed above shall also be acceptable.
- 2) Video Level Patch Panel
- a. Video jack patch panel.
1. Provide non-normalling patch panel video jack for tie lines and video circuits from AV panels and wall receptacle plates as shown on schematic drawings.
 2. Provide patch panel jacks with normalling for all normalling applications of video circuits as shown on schematic drawings.
 3. Provide self-terminating patch jacks to facilitate termination of the unused side of a normalling jack when a patchcord is in place.
 4. Provide paper designation strips above or below each patch row, with both the appropriate signal level and circuit location description for each patch jack, and the consecutive circuit numbers; 1 through

- 26 for both the top and bottom rows.
 - 5. Legends shall correspond with AV receptacle panel legends where applicable. Refer to detail drawings.
 - 6. Provide plastic laminate designation labels at left and right of the patch panel to indicate reference letter (A, B, C, etc.) of the individual patch panel. Labels mount on the steel rack ears.
 - 7. Color shall be black.
 - 8. See drawings for additional information.
 - b. Manufacturers
 - 1. Canare
 - 2. ADC
 - 3. Switchcraft
 - 4. Or approved equal
 - c. Basis of Design
 - 1. Basis-of-design for is Canare 261U-DVJAW 2x26. Comparable products by one of the manufacturers listed above shall also be acceptable.
- 3) Data/Network Copper Patch Panel (Cat 6 - RJ-45)
- a. Manufacturers
 - 1. Leviton
 - 2. Blackbox
 - 3. Switchcraft
 - 4. Or approved equal
 - b. Basis of Design
 - 1. Basis-of-design for is Leviton Extreme 6+ QuickPort Patch Panel, 2RU (69270-U48). Comparable products by one of the manufacturers listed above shall also be acceptable
 - c. Patch panels shall be UL listed, meet or exceed TIA/EIA-568-B Category 6 requirements, and meet FCC Part 68. Panels shall be 19" wide to fit standard racks and wall mount brackets, and have a rolled edge design for rigidity.
 - d. Connections shall comply with TIA/EIA 568-B instructions for Category 6 termination practices.
 - e. Provide paper designation strips above or below each patch row with both the appropriate signal level and circuit location description for each patch jack, and the consecutive circuit numbers; 1 through 24 for both the top and bottom rows.
 - f. Legends shall correspond with AV receptacle panel legends where applicable. Refer to detail drawings.
 - g. Provide plastic laminate designation labels at left and right of the patch panel to indicate reference letter (A, B, C, etc.) of the individual patch panel. Labels mount on the steel rack ears.
 - h. Provide 1RU of horizontal cable management for every 24 patch points. Leviton 492RU-HFO 2RU front cable management or equal.
 - i. Color shall be black.
 - j. See drawings for additional information. All patch jack contacts (tip, tip normal, ring, ring normal, sleeve, and sleeve normal) shall be wired to a terminal strip mounted on the rear of the equipment rack. All connections to the patch panel (including normalling) shall be made at this terminal strip, whether internal to the rack or from external devices. The Contractor shall propose a method of patch panel termination for approval by the Consultant.

- 4) Data/Network Fiber Patch Panel (Multimode & Singlemode – Duplex LC)
 - a. Manufacturers
 1. Hubbell
 2. Blackbox
 3. Panduit
 4. Or approved equal
 - b. Basis of Design
 1. Basis-of-design for is Hubbell Fiber Interconnection Shelf, 1RU (FEUR24LCM). Comparable products by one of the manufacturers listed above shall also be acceptable
 - c. Patch panels shall be UL listed, 19" wide to fit standard racks and wall mount brackets and include internal cable management.
 - d. Patch panels shall be populated with (24) LC Duplex Multimode per row.
 - e. Provide paper designation strips mounted on 1RU blank panel above each patch row with both the appropriate signal level and circuit location description for each patch jack 1-24, and the consecutive circuit numbers.
 - f. Legends shall correspond with AV receptacle panel legends where applicable. Refer to detail drawings.
 - g. Provide plastic laminate designation labels at left and right of the patch panel to indicate reference letter (A, B, C, etc.) of the individual patch panel. Labels mount on the steel rack ears.
 - h. Provide 1RU of horizontal cable management for every 24 patch points. Leviton 481RU-HFO 1RU front cable management or equal.
 - i. Color shall be black.
 - j. See drawings for additional information.

- 5) XLR General Purpose Patch Panel
 - a. Manufacturers
 1. AVP
 2. Switchcraft
 3. Whirlwind
 4. Or approved equal
 - b. Basis of Design
 1. Basis-of-design for is AVP Universal Bulkhead. Comparable products by one of the manufacturers listed above shall also be acceptable
 - c. Patch panel shall be populated with connectors per system block diagrams. Unused Bulkhead spaces are to be provided with blank cover insert.
 - d. Provide designation strips above each patch row engraved with both the appropriate signal level and circuit location description for each patch jack, and the consecutive circuit numbers; 1 through X for both the top and bottom rows.
 - e. Provide plastic laminate designation labels at left and right of the patch panel to indicate reference letter (A, B, C, etc.) of the individual patch panel. Labels mount on the steel rack ears.
 - f. Legends shall correspond with AV receptacle panel legends where applicable. Refer to detail drawings.
 - g. Color shall be black.
 - h. See drawings for additional information.

- 6) Equipment Racks and panels
 - a. Manufacturers

1. Middle Atlantic
 2. Chief
 3. Atlas Sound
 4. Or approved equal
- b. Basis of Design
1. Basis-of-design for is Middle Atlantic MRK and SR series. Comparable products by one of the manufacturers listed above shall also be acceptable
- c. Floor Mount racks shall be Middle Atlantic Products MRK-4031 or MRK-4431 series or approved equal as identified in 11 61 83-A Appendix A equipment list.
1. EIA 19" standard rack providing 40 rack units of panel space (overall height: 76-1/8"), or 44 rack units of panel space (overall height: 83-1/8") 22" of width, and 31-1/2" of depth, minimum. This rack frame is supplied with rear door and adjustable front mounting rails.
 2. Provide optional Middle Atlantic Products MV-RR40 or approved equal rear rack rails for each 40U modular rack frame. Provide optional Middle Atlantic Products MV-RR44 or approved equal rear rack rails for each 44U modular rack frame.
 3. Provide optional Middle Atlantic Products MW-ST or approved equal solid top for each modular rack frame.
 4. Provide optional Middle Atlantic Products SPN-40-312 or approved equal side panels, one pair per 40U rack group. Provide optional Middle Atlantic Products SPN-44-312 or approved equal side panels, one pair per 44U rack group
- d. Swing-Out racks shall be Middle Atlantic Products SR-40-22 series or approved equal.
1. EIA 19" standard modular rack frames providing 40 rack units of panel space (overall height: 90-3/4"), 23.5" of width, and 22-3/4" of depth, minimum. This rack is supplied with adjustable front mounting rails.
 2. Provide optional Middle Atlantic Products DWR-RR40 or approved equal rear rack rails for each rack.
- e. Provide the following (as applicable):
1. Provide (1) switched incandescent light bulb per rack with magnetic base to provide work light in back of rack. Middle Atlantic WL-60 or approved equal.
 2. Provide matching blank panels in all spare rack spaces. See "blank panels" section. Maximum individual blank panel height shall be 3RU.
 3. Provide matching 1U ventilation panels above and below all DSP units.
 4. Amplifiers should be stacked on top of each other, without spacing between. *Do not* provide ventilation panels above and below amplifiers unless required by manufacturer.
 5. Provide two Middle Atlantic Products CLAW or approved equal patch cord holders for each rack group containing mic/line level or loudspeaker patch panels.
 6. Provide one (1) rack mount AC power receptacle strip for each rack group. Receptacle strip shall mount to the front of one rack and be connected to an unswitched AC power circuit. Hammond 1582T8A1BK or approved equal.

7. Approved pan or truss head type panel mounting screws with non-metallic flat washers shall be used to secure all rack-mounted equipment.
 8. In racks containing amplifiers or digital signal processors and NOT located in public areas or control booths provide temperature controlled exhaust units. Middle Atlantic MW-#FT###CFM series or approved equal. Contractor to determine fan CFM after completing individual thermal management calculations.
 9. Provide Middle Atlantic Products BB-40 or approved equal 2" wide heavy copper busbar in each rack for connection of isolated ground circuits. Bond busbars together with grounding conductor in a "star" configuration equal in AWG to conductor provided by Electrical Contractor to local AV panel board for interface with the sound system isolated ground network. Refer to AC power grounding detail on drawings for further information.
 10. All racks shall have the same color finish (Textured Black).
- 7) AV Receptacle Panels and Wall Plates Custom Fabrication:
- a. Methods and materials:
 1. Single or multiple signal level and circuit receptacle panels for connection of AV Systems devices throughout the facility. Panels may include any combination of circuits and connectors for these signal levels: microphone, line level audio, video, intercom, control, and low volt/impedance loudspeaker. Connectors shall be identified as to signal level, circuit type, and circuit number by clearly engraved and coordinated legends on each panel. Exceptions as noted.
 2. Refer to device plans for locations.
 3. Refer to AV Systems Connector Panel Schedule for back box type, size, and depth, and mounting information.
 4. Conduit and AV back boxes shall be supplied and installed by others.
 5. AV panel faceplates shall be provided and installed by the AV Contractor, except as noted.
 6. Wire shall be supplied, pulled, and terminated by the Contractor.
 7. Circuit/connector quantity: As shown on detail drawings and as specifically indicated in the AV Panel Schedule. Exceptions as noted.
 8. Connector: Panel or chassis types, as indicated below. Mount on AV Panel as shown on drawings and fasten with stainless steel machine screws, hex nuts, and lock washers (screw head style, color, and thread size to match connector body; slot or phillips drive to match wall plate screws). Refer to connector specification paragraph below. Exceptions as noted.
 9. Microphone level ("M" series): Female XLR-3.
 10. Line level ("L" series): Male & female XLR-3 pairs.
 11. Production party-line intercom ("PL" series): Male XLR-3.
 12. Network line ("N" series): Locking XLR-style Female RJ-45 CAT-6.
 13. Production video coax ("V" series): Female BNC.
 14. RF antenna coax ("RF" series): Female BNC.
 15. Low volt/impedance loudspeaker ("LS" series): NL4 "speakon" series.
 16. Fiber Optic ("F" series): Locking XLR-style female LC fiber.
 - b. Laser etched/engraved legend: Details as indicated below. Locate legends on AV Panel as shown on drawings. Characters shall be laser etched/engraved and entire panel sealed. Exceptions as noted.

1. Legends shown on drawings are typical. Refer to AV Systems block diagrams and/or submit proposed layout to Commissioner for review.
 2. Similar groups of connectors on AV Panels are typically labeled with an appropriate signal level and circuit location title (e.g., microphone lines terminate in "M" series connectors on the "MICROPHONE" section of the panel).
 3. Individual connectors are labeled with the corresponding patch panel reference (e.g., "M-A11" indicates a microphone line terminating at patch panel row A, jack number 11), or other appropriate circuit reference (e.g., production intercom "CH A"). Refer to "Part 3 - Execution: Installation - Equipment - Labeling".
 4. Signal level title legend size shall be 0.1875" or 0.250" high characters of medium weight (as required).
 5. Patch panel reference legend size shall be 0.125" high characters of medium weight.
 6. Legend color typically references the specific signal level and follows guidelines found in "Part 3 - Execution: Installation - Equipment - Labeling".
- c. Termination: Refer to general termination guidelines in "Part 3 - Execution: Installation - Wiring - Termination" for further explanation of the following methods. Exceptions as noted.
1. XLR-type connectors: Solder wire directly to connector in the field.
 2. BNC-type connector: Attach double crimp-type (crimp-crimp) straight plug to end of coaxial cable for connection directly to the feed-through jack. Ensure integrity of coaxial cable shield isolation from back box by insulating connectors (and/or any adapters) with a shroud or hood of shrink tubing, or similar material. Plastic "electrical" tape is not acceptable.
 3. NL4 series connectors: Attach properly sized crimp-type female disconnect terminals to large gauge loudspeaker wire and mate with male disconnect terminals on the connectors. Securely strain relief loudspeaker wires to connector body or wall plate to ensure integrity of the electrical/mechanical disconnect termination.
 4. Ethercon RJ-45 connectors: 110 punchdown at patchbays; Male RJ-45 crimp to panel passthrough connector in field.
- d. Wall Connector plates (sizes as shown on drawings and schedules)
1. All details as in (a) above, with the following additional requirements:
 - a) Refer to AV Symbol & Device Schedule for back box type, size, and depth, and mounting information.
 - b) All plates shall be flush type for mounting to recessed back boxes or surface mount Wiremold-type boxes.
 - c) Wall plate: Standard, x-gang (size "x" to match detail drawings), type 302 stainless steel (heavy gauge), bright brushed or satin finish, flush-type electrical wall plate. Mount to back box with 6-32 stainless steel, slot or phillips drive, oval head machine screws. Exceptions as noted below.
 - d) Plates in public areas to have finish by Commissioner.
- e. AV panels (sizes as shown on drawings and schedules).
1. All details as in (a) above, with the following additional requirements.
 2. Panel: Fabricated of type 5052-H32 aluminum, 0.125" minimum thickness, lightly brushed (vertical direction), with black anodized and clear sealed finish. Panel dimensions to match back box size. Edges of panel shall be ground square and flat. Corners of panel to

- 3. have small radius. Exceptions as noted below.
 - 4. Panels in public areas to have finish by Commissioner.
 - 5. Panels that are flush mounted shall be oversized by 1/2" on all sides to cover the transition from backbox to wall treatment.
 - 6. Back Box: Provided by div 26, Hoffman type with a minimum depth of 6". Color: Black. Exceptions as noted below. Coordinate with Electrical Contractor.
 - 7. Panels 8" wide and larger shall have aluminum black anodized oval instrumentation handles or approved equal as shown on AV systems panel detail drawings. Handles shall be 1.75" deep.
- f. Floor Boxes
- 1. All details as in (a) above, with the following additional requirements.
 - 2. Panel (inside box): Fabricated of type 5052-H32 aluminum, 0.125" minimum thickness, lightly brushed (vertical direction), with black anodized and clear sealed finish. Panel dimensions to match opening size of floorpanel or as required by floor pocket manufacturer. Edges of panel shall be ground square and flat. Corners of panel to have small radius. Exceptions as noted below.
 - 3. All floor box lids to have finish by Commissioner.
 - 4. Floor Back Box: Furnished by AV contractor, available from floor pocket manufacturer. Exceptions as noted below. Coordinate with Electrical Contractor. Refer to Drawings for back box types.
 - 5. Installation of floor pocket and back box requirement of floor box shall be by Electrical Contractor.
 - 6. Floor boxes shall be as per the Appendix A equipment list.

D. Connectors

- 1) Connectors, as specified below, to properly install and terminate all AV Systems components.
 - a. Provide a minimum of five percent (5%) spare parts, for each connector series listed below, including all shells, pins, sockets, modules, strain reliefs, latches, etc. Exceptions as noted.
- 2) Audio Connectors.
 - a. XLR Type
 - 1. XLR-3 (Microphone, Line, Communication, Loudspeaker): (male) and (female) panel mount connectors; (male) and (female) cable connectors. Silver contacts and nickel shells throughout.
 - 2. Note wiring:
 - a) Balanced mic/line: pin 1 = shield (screen), pin 2 = high (hot), pin 3 = low.
 - b) Unbalanced mic/line: pin 1 = shield/common, pin 2 = high, pin 3 = tie to pin 1.
 - c) Production intercom: pin 1 = shield/common, pin 2 = +30VDC, pin 3 = audio/signal.
 - d) In no case shall pin 1 be tied to case of connector.
 - 3. XLR-4 (Production Intercom Headset/Handset): (male) and (female) cable connectors. Silver contacts and nickel shells throughout.
 - b. 1/4" Phone Plugs and Jacks
 - 1. Plug: 2-pole and 3-pole cable plugs. Nickel contacts and nickel shells.
 - 2. Jack: latching 2- or 3-pole cable jack. Silver contacts and nickel

- shells.
 - 3. Note wiring:
 - a) 3-pole: Sleeve = ground/shield, ring = low, tip = high (hot).
 - b) 2-pole: Sleeve = common/ground/shield, tip = high.
 - c. 1/8" Mini Plug
 - 1. 1/8" T/R/S "Walkman-type" stereo mini plug. Metal shell required.
 - d. Phono (RCA) plugs and jacks
 - 1. Plug: RCA plug (available in pairs of black and red). Gold plated nickel contacts and brass shell.
 - 2. Jack: RCA jack. Nickel plated brass contacts and shell. Use isolation washer color as required (black/red/yellow/green/blue/white)
- 3) Video / RF connectors
- a. UHF Type (Wireless Microphone System Antenna)
 - 1. Phenolic insulated panel receptacle (female) for RG-8/U type coaxial cable. Beryllium copper center contact and TR-5 tarnish resistant alloy finish on body and fittings.
 - b. 75-ohm BNC Type (Video)
 - 1. Insulated double female (feedthru) recessed panel mount connector; double crimp-type straight plug (with long body sleeve for 75-ohm precision coaxial cable). Gold plated center contact and beryllium copper external contact.
- 4) Multipin Audio Connectors
- a. Whirlwind MASS-Series connectors as detailed below:
 - 1. Up to 16-channel:
 - a) Whirlwind W5CRP or approved equal crimp type pin/socket panel mount connector assembly.
 - b) Whirlwind W5IRP or approved equal crimp type pin/socket cable connector assembly.
 - 2. Up to 28 channel:
 - a) Whirlwind W6CRP or approved equal crimp type pin/socket panel mount connector assembly.
 - b) Whirlwind W6IRP or approved equal crimp type pin/socket cable connector assembly.
 - 3. Up to 40-channel:
 - a) Whirlwind W3CRP or approved equal crimp type pin/socket panel mount connector assembly.
 - b) Whirlwind W3IRP or approved equal crimp type pin/socket cable connector assembly.
 - 4. Up to 56-channel:
 - a) Whirlwind W4CRP or approved equal crimp type pin/socket panel mount connector assembly.
 - b) Whirlwind W4IRP or approved equal crimp type pin/socket cable connector assembly.
 - 5. Refer to manufacturer's pinout diagrams for wiring details.
 - 6. Wire and assemble connectors only according to the manufacturer's instructions.
 - 7. Use only those assembly tools supplied by the manufacturer for these contacts:
 - a) Crimp tool kit (or better: i.e., stripping/crimping machine) and all necessary crimping dies for specified contacts.

- b) Insertion/extraction tool for formed contacts.
 - 8. Provide 20% spare pins and sockets:
 - a) Crimp type male pin contact
 - b) Crimp type female socket contact
 - 5) Data/Networking Connectors
 - a. RJ-45 Type (Data Network)
 - 1. EtherCon type CAT6 D-shape panel mount jack.
 - 6) Fiber Optic
 - a. Duplex LC series panel connectors
 - 1. OpticalCon type LC-Duplex pass-through connector in D-shape panel mount jack.
 - b. Duplex LC series cable connectors
 - 1. Corning #95-051-98-SP-X Anaerobic Connectors or approved equal
 - 2. Corning # TRIGGER-BP-D Duplex Clip or approved equal
- E. Switches
- 1) Pushbutton
 - a. Manufacturers
 - 1. EAO
 - 2. Switchcraft
 - 3. C&K Components
 - 4. Or approved equal
 - b. Basis of Design
 - 1. Basis-of-design for is EAO Series 31. Comparable products by one of the manufacturers listed above shall also be acceptable
 - c. Square panel mount general purpose pushbutton switches with internal incandescent lamp. Refer to Drawings for further details.
 - 2) Keylock
 - a. Manufacturers
 - 1. EAO
 - 2. Switchcraft
 - 3. C&K Components
 - 4. Or approved equal
 - b. Basis of Design
 - 1. Basis-of-design for is EAO Series 15. Comparable products by one of the manufacturers listed above shall also be acceptable
 - c. Panel mount general purpose two position keylock switches with internal incandescent lamp. Refer to Drawings for further details.
- F. Wire and cable
- 1) Conduit Installation
 - a. Refer to Wire and Cable Schedule located in the Appendix for specific wire type information.
 - 2) Flexible Drop Multicable (where required)

- a. Provide Kellems-type metal mesh cord strain relief correctly sized to restrain permanently attached multi-conductor cables to junction boxes.

G. AC power equipment

1) AC Receptacle Strip

a. Wiremold 20GB Series Plugmold Strip or approved equal

- 1. A painted steel, 3-wire, 1-circuit, prewired outlet receptacle strip with insulated grounding conductor. Unit is available in three (3), five (5), or six (6) foot lengths containing 5 to 12 receptacles.
- 2. Receptacle strips shall be permanently mounted inside equipment racks.
- 3. Wiring to AC power switcher and intermediate junction boxes shall be in flexible conduit (greenfield).
- 4. Provide a sufficient quantity and configuration of AC receptacle strips to support the specified equipment in each equipment rack group, plus a minimum of 50% spare outlets.
- 5. Isolated ground conductors shall be wired directly to the copper busbar in each rack. Busbars are bonded together in a "star" configuration with 3/0 AWG welding cable and connected to the branch circuit panelboard via heavy-gauge cable (wiring and connection to panelboard by the Electrical Contractor). Refer to AC power grounding detail on drawings.

H. Computers and Associated Equipment

1) CPU

- a. Due to the ever-changing nature of the computer market, the CPU provided shall be the latest model and speed available at the time of installation. CPU make and model shall be fully compatible with all specified peripherals including audio cards, video cards, and proprietary control cards.
- b. The PC shall be fabricated and supplied by an Original Equipment Manufacturer to be approved by the Commissioner. Custom-built computers will not be accepted.
- c. Unless specifically noted otherwise, any CPU provided shall be rack mountable. This may be accomplished with a rack shelf or an actual rack enclosure.
- d. Standard peripherals, such as mouse and keyboard shall be supplied with the CPU.
- e. The operating system and platform shall be as specified in the equipment list, 11 61 83-A.
- f. On CPU specifically designated for performance playback use motherboards with integrated video or audio cards shall not be acceptable.
- g. All standard currently-available external interfaces shall be available.

2.6 ACCESSORIES

A. Spare Parts Package

- 1) Provide a package of spare parts for all user-serviceable portions of the AV Systems.
- 2) A minimum quantity of 10% of all connectors, bulbs, fuses, knobs, switches and other miscellaneous parts shall be supplied, in addition to any spare parts specifically listed

in individual product specifications.

- 3) Label all spare parts with manufacturer's part number, designation and description, and location(s) where used.
- 4) The spare parts shall be delivered to the City of New York after completion of the Commissioning procedure.

2.7 SOURCE QUALITY CONTROL

- A. Contractor shall demonstrate to the Commissioner the operation of all custom-designed equipment such as paging interfaces and communication control panels prior to shipping such equipment to the site. Other equipment such as mixing consoles, loudspeaker systems, equipment racks and other equipment shall also be inspected at this time. Testing shall be performed at a time to be determined by the Commissioner.

2.8 FABRICATION

- A. Fabrication, assembly and wiring shall be neat and workmanlike throughout.
- B. Control desks, racks and cabinets shall be welded assemblies of sheet steel or aluminum or of bar size angles, channels and tees or aluminum extrusions forming rigid enclosures to support internal components.
- C. All face panels shall be fully supported on all edges, either internally or by rolling interior edges of panels.
- D. Wood furniture/cabinet work for control desks acceptable with prior approval.
- E. Operating elements shall be mechanically safe and electrically "dead".
- F. All steel parts and panels shall be cleaned and primed with rust inhibiting primer. Exterior finishes shall be epoxy resin or baked enamel in matte black or in anodized black aluminum where approved.
- G. Control element working face panels shall be heavy aluminum or bakelite. Legends and control and protective device designations shall be engraved in panels, or in permanently attached plates, and located for ready identification.
- H. All panel engraving shall be in Helvetica Regular, height as indicated herein. In no case shall the engraving be less than 1/4" high without Commissioner approval.
- I. All internal wiring shall be factory completed and clearly marked.
- J. Control relays wherever possible shall be the glass or polycarbonate enclosed plug-in type. Relays shall be acoustically damped.
- K. All wire sizes and insulation to comply with UL standards and local codes and meet or exceed electronics industry standards.
- L. All wiring to be harnessed and bound. No loose or randomly routed wires permitted.
- M. Key all components in this section with locks or keyswitches alike. Provide six keys minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

- 1) The AV Contractor shall examine areas and conditions under which the work of this section is to be installed and shall notify the General Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.
- 2) Confirm by site visit all field conditions that may affect manufacture and installation of AV Systems equipment prior to fabrication.
- 3) The AV Contractor shall ensure by drawing review and field survey that the conduit/raceway and power/grounding infrastructure is sufficient for the proper installation of the specified and required wire and cable, and/or any approved-substitute types of wire and cable. Submit any necessary changes to equipment and mounting details to Commissioner for review prior to fabrication.

3.2 INSTALLATION

A. General

- 1) Install all work in this section in accordance with the Contract Documents, Commissioner's direction, specifications, approved shop drawings with review action "No Exceptions" or "Make Corrections Noted", pertinent Contract Drawings, established trade practices and applicable code requirements.
- 2) Provide in accordance with final submittals and the manufacturer's written recommendations and as set forth herein. Verify measurements and dimensions at the project site and coordinate with the Work of other trades. Install at locations shown, in correct alignment and elevation, plum, level, straight and true. Use procedures that prevent damaging and soiling the Work during installation.
- 3) Coordinate work with all other trades to avoid causing delays in construction schedule.
- 4) Mount equipment and enclosures plumb and square. Permanently installed equipment to be firmly and safely held in place. This shall include loudspeakers, conduit, cables control equipment, rack equipment, etc. Fastenings and supports shall be adequate so support their loads with a safety factor of at least three. All switches, jacks, outlets, cables. All equipment shall be installed in such a fashion as to present no safety hazard to operating personnel.
- 5) All attached equipment shall comply with zone 3 seismic codes.
- 6) If any panel, distribution box, or other device requires relocation or change of mounting detail, and this fact is not known until after shipment due to sequence of work, modify equipment or provide new equipment to fit revised location or mounting detail. Notify Commissioner of any such changes, and submit all changes to Commissioner for review prior to fabrication.

B. Fabrication

- 1) Fabrication, assembly and wiring shall be neat and workmanlike throughout.
- 2) Control desks, racks and cabinets shall be welded assemblies of sheet steel or aluminum or of bar size angles, channels and tees or aluminum extrusions forming rigid enclosures to support internal components.
- 3) All face panels shall be fully supported on all edges, either internally or by rolling interior edges of panels.
- 4) Wood furniture/cabinet work for control desks acceptable with prior approval.
- 5) Operating elements shall be mechanically safe and electrically "dead".
- 6) All steel parts and panels shall be cleaned and primed with rust inhibiting primer. Exterior finishes shall be epoxy resin or baked enamel in matte black or in anodized black aluminum where approved.
- 7) Control element working face panels shall be heavy aluminum or bakelite. Legends and control and protective device designations shall be engraved in panels, or in permanently attached plates, and located for ready identification.
- 8) All panel engraving shall be in Helvetica Regular, height as indicated within Part 2 herein. In no case shall the engraving be less than indicated without Commissioner approval.
- 9) All internal wiring shall be factory completed and clearly marked.
- 10) Control relays wherever possible shall be the glass or polycarbonate enclosed plug-in type. Relays shall be acoustically damped.
- 11) All wire sizes and insulation to comply with UL standards and local codes and meet or exceed electronics industry standards.
- 12) All wiring to be harnessed and bound. No loose or randomly routed wires permitted.
- 13) Key all components in this section with locks or keyswitches alike. Provide six keys minimum.

C. Equipment Racks:

- 1) Mount equipment in racks and consoles and fully wire and test before delivery to job site.
- 2) Provide ventilation adequate to keep temperature within the rack below 100 degrees F (38 degrees C). Provide approved low-noise ventilation fan in each rack only if temperature in rack rises above 100 degrees F (38 degrees C) with power on for five continuous hours.
- 3) All metal cabinets connected to the sound system audio ground shall be effectively isolated from any conduit or other metallic component that is connected to the building electrical safety ground.

D. Wiring

- 1) The Contractor shall take such precautions as are necessary to prevent and guard against electromechanical/electrostatic/radio frequency interference. For line-level audio signals, flat cable shields at the output of source device. Refer to Drawings.
- 2) Exercise care in wiring; damage to cables or equipment will not be accepted. Isolate cables of different signals or different levels and separate, organize and rout to restrict channel crosstalk or feedback oscillation in any amplifier section. Between racks, cabinets, consoles or modules all cables shall be well-supported and shall be neatly laced and dressed.
- 3) Cover edges of cable pass-through holes in chassis, racks, boxes, etc, with rubber grommets or Brady GRNY nylon grommetting.
- 4) All joints and connections shall be made with rosin-core solder or with mechanical connectors approved by the Commissioner. Where spade lugs or other crimp-type terminals are used, crimp properly with ratchet type tool. Between racks, cabinets, consoles or modules, all cable shall terminate in approved terminal connectors, strips, blocks or boards.
- 5) Route unbroken microphone audio line and control wiring from receptacle plate/chassis to patch panel/rack. Remove spliced cables and replace without additional charge to the City of New York. No splices shall exist in any length of wire run except where noted on drawings.
- 6) Connect all loudspeakers electrically in phase, using the same wire color code for loudspeaker wiring throughout the project.
- 7) All wiring and connections shall be completely visible and labeled in rack. Termination resistors shall be 1/2 watt metal film 1% tolerance; fully visible and not concealed within equipment or connectors.
- 8) All terminations of shielded cables shall consist of a PVC or neoprene heat shrink sleeve covering the shield drain wire and an overall PVC or neoprene heat shrink sleeve covering the point at which the cable jacket and shield end.
- 9) Run vertical wiring inside rack in properly sized raceway with snap-on covers (Panduit type E series). Horizontal wiring in rack to be neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack but still allow for service and testing. Provide horizontal support bars for cable bundle sag. Neatly bundle excess AC power cable from rack-mounted equipment with plastic cable ties. Rack wiring to be bundled with plastic cable ties or lacing twine. Electrical tape and adhesive-backed cable tie anchors are not acceptable.
- 10) Category 5/5e/6 lengths shall not exceed the maximum rated length of 90M/295ft. Contractor is responsible to ensure that no Ethernet data/network cable exceeds this length.
- 11) Refer also to additional guidelines noted under "References," and "Examination."

E. Labeling and Marking:

- 1) All portable cables and patch cords shall be color coded by length using a heat-shrink polyolefin sleeve near the male end of the cable. This sleeve shall be hot-stamped with the name of the facility. Color coding is to be as follows:

a.	Black	=	5'
b.	Red	=	10'
c.	Yellow	=	25'
d.	Blue	=	50'
e.	White	=	100'

- 2) All AV Systems wire and cable shall be logically and permanently marked. All wire shall be identified at each termination point, and shall be marked to indicate the discrete destination (i.e., a wire shall show the reference number of the jack or connector to which it's other end is terminated). All cable markers shall bear the alphanumeric characters of the circuit shown on the approved shop drawings.
- 3) Wire and cable shall be marked with an approved system of durable identification markers, such as slip on type PVC or neoprene sleeves, or with directly heat stamped characters. Cloth or vinyl tape type markers are not acceptable.
- 4) The individual pairs of multipair cable and individual conductors of multiconductor cable shall be readily identified by permanent color coding of the wire insulation. Multipair or multiconductor cable that is identified only by means of the form or order of lay of individual wire is not acceptable.
- 5) All spare wire shall be marked "spare" at both ends and numbered consecutively. A "spare schedule" shall be provided indicating spare wire and cable numbers, locations and types.
- 6) Provide engraved lamacoid labels at the front and rear of all rack-mounted mixers, signal processing equipment, power amplifiers and other active equipment. Mount labels in a neat, plumb and permanent manner. Labels to include device name and schematic designation, and the devices the equipment controls. Embossed labels are not acceptable.
- 7) All wall receptacle plates shall be laser etched/engraved to indicate the reference number of the circuit to which each is attached. Such numbers will, when applicable, be referenced to the patch panel jack to which the circuit connects. Refer to the Drawings for reference numbers and designations.
- 8) Panels and receptacles must be readable in dim lighting. Quality of laser etching/engraving, letter sizes, etc. shall comply with the specification and as approved by the Commissioner through shop drawing and sample submittal.
- 9) All legends shall be laser etched/engraved in a color as indicated on the drawings, unless otherwise noted below.
- 10) Colored rings shall be used to color code connectors on panels with specific functions as described in the drawings. These color coding shall be consistent with color coding on the patchbays.
- 11) Portable rack connection cables shall be strain relieved at the rack end. The portable rack shall provide space for storing the cable when not in use. Cables will need to be color coded when they are intended to be used in color coded connectors as described above.

F. Audio Shielding / Grounding:

- 1) All shielded cables shall have their shields isolated from both the conduit system and any other shielded cables. Shields shall be continuous from source to input points. Shields shall be connected per AES 48, except as noted below.
- 2) Microphone wiring shall have continuous shields from the microphone receptacle to microphone patch jack, and if normalled to a console microphone input, continuous to that point.
- 3) Tie-line patch points shall have continuous shield connection from one patch jack to another with no permanent connection to the audio ground network.
- 4) Unbalanced wiring, such as used in certain communication systems, shall have audio shields connected at device inputs and floated at device outputs. Strap shield to "low" side of unbalanced input.
- 5) No "doubling up" of ground points on multi-pin connectors or terminal blocks shall be allowed.
- 6) Shielded audio cables that normal through patch panels shall utilize a normalling type jack which has an isolated switching "break" circuit. This shall be used for sleeve normalling.

G. Noise from Equipment:

- 1) The residual noise and hum output of the systems shall be such that PNC-15 or below can be measured at the center of main floor, and the character of the remaining noise must be random, with no audible discrete frequency components.
- 2) Where a control panel or rack is to be used or located in an operational area, such as on the fly chamber, gallery, or control room, there shall be no acoustic noise associated with the panel. No internal cooling fans or similar moving or magnetic equipment shall be permitted unless approved by the Commissioner in writing.
- 3) Operation of switches, pushbuttons, relays, solenoids, and similar shall not be audible to members of the audience.

H. Electrical Safety:

- 1) No voltage in excess of 25V RMS AC or 24V ripple free DC shall be exposed to touch in normal use or in any equipment by the withdrawal of modules or of any plug or connector or without the removal of suitably indelibly labeled covers.
- 2) Unless specifically excepted, all live electrical parts above 50V RMS AC or 60V ripple free DC, including terminals, shall remain completely shrouded by insulation or grounded metal when the main access panels are removed. The separate shrouds or covers shall require a tool to remove them to prevent inadvertent contact with live parts.
- 3) In addition, where enclosures or items of equipment containing predominantly control, computer, or similar low voltage signals also contain voltages in excess of 50V RMS AC or 60V ripple free DC, clear standard warning notices indicating the maximum voltage present shall be provided on all removable access panels. Similar warning notices shall be provided where voltages exceeding 120V are present in any enclosure or item of equipment and such a voltage would not reasonably be

expected to be present.

- 4) Within enclosures, racks and panels identify with prominent, standard, and indelible signage which circuit breakers or disconnects are to be switched off in order to isolate the equipment totally. Warning notices shall also be provided on all equipment which contains live terminals after operation of its circuit breaker or disconnect. These terminals must be completely shrouded to prevent inadvertent contact.
- 5) All equipment, control stations, equipment racks, enclosures, and all metal cases, raceways, and conduit shall be efficiently grounded. Special hand held or portable equipment which is not double insulated shall have duplicated grounding connections. All grounding shall be in accordance with the current edition of the National Electrical Code and as identified within this specification.

I. Interface with Other Work:

- 1) AC Power and Grounding:
 - a. Coordinate final connection of power and ground wiring to racks. Hard wire power wiring directly to power contactors or internal AC receptacles to ensure uninterrupted operation.
 - b. Install approved isolated-ground receptacles in wireway in each rack. Provide a minimum of two spare outlets in each rack. Label each outlet as to which AC circuit is feeding it and provide the same information in the circuit breaker panel.
 - c. Install a copper ground buss bar top to bottom in each rack, insulated from the rack. Ground equipment chassis not having a three-wire power cord to these busses. Connect green ground wire from each AC outlet in rack to this busbar.
 - d. AC power for the AV Systems is distributed at 120VAC, 60Hz.
 - e. Isolated-ground (audio ground) distribution:
 1. The audio system "isolated ground", including ground source, ground conductors, and ground distribution points shall be installed by the Electrical Contractor. The isolation and ground continuity of this network, although the responsibility of the Electrical Contractor, shall be reconfirmed by the Contractor prior to installation of equipment.
 2. Except at the ground source, the audio ground shall be totally isolated from all other electrical grounds. Therefore, if the connection between the audio ground network and the ground source is disconnected, no continuity between the audio ground and the building electrical ground shall exist.
 3. All equipment racks containing active electronics shall be connected to the audio ground, except as otherwise noted in this specification. Caution must be exercised so that these racks are not permanently, or in any way during operation, capable of being accidentally connected to the building safety ground.
 4. All conduits and back boxes containing AV Systems wiring shall be permanently connected to the building electrical safety ground.

3.3 FIELD QUALITY CONTROL

A. Field Tests and Inspection:

- 1) Prior to energizing of the AV systems, perform complete system check-out to verify that all items are correctly installed and shall safely operate as specified herein.
- 2) Perform required tests and adjustments upon completion of installation of AV System, including but not limited to those specified herein.
- 3) Contractor shall provide sufficient field service personnel (minimum of 2) to perform all tests specified below. Contractor shall furnish sufficient workmen to operate all equipment and to assist in all tests specified below. Contractor shall provide ladders and other devices, to allow access to all devices to be tested and communication between parties.
- 4) Contractor shall carry out the following inspections of the AV systems and submit to the Commissioner the written results at each inspection for inclusion on the permanent records of the sound system. Follow EIA standards RS-160 and RS-219 in performing test. Make corrections necessary to bring system(s) into compliance with the specifications.
- 5) AV Systems Low-Voltage Cable Testing:
 - a. General:
 1. Submit hardcopies and electronic copies of all documentation and raw data.
 - a) Test and report on each point-to-point cabling segment separately.
 - b) Test each end to end cable link.
 - c) Submit copy of final results organized by cable wire, consistent with circuit numbering scheme used in preparing submittal drawings and in labeling connectors and terminations.
 - d) Identify installed length of copper and fiber optic cabling.
 - b. Audio Cabling (Microphone/Line Level/70V Loudspeaker)
 1. Test cabling using at least one (1) of the following test measurement devices or equal:
 - a) Acoustic polarity tester. BSS Audio Ltd. Phasecheck System AR 130, GoldLine, or equal.
 - b) Integrated audio test set (Example: Audio Precision or Neutrik A1 or A2 System).
 2. Testing Procedures:
 - a) Verify all terminations.
 - b) Record cable length in feet.
 - c) Test all conductors for continuity.
 - d) Confirm that there are no shorts between conductors, and no shorts to ground.
 - e) Confirm all connectors are wired in correct polarity.
 - f) Perform a sweep test to 0.5MHz.
 - c. Coax Cabling:
 1. Test cabling using at least one (1) of the following test measurement devices or equal:
 - a) Combination Signal Level Meter and Frequency Domain Reflectometer (WaveTek CLI-1750/LST-1700).
 - b) Test Pattern Generator (Extron VTG 200 or equal).
 - c) RF Generator, 5-1,000 MHz. (GenRad, Hewlett Packard, or equal).

- d) Field Strength Meter, 5-1,000 MHz. (Tektronix, Hewlett Packard, or equal).
 - e) Spectrum Analyzer, 5-1,000 MHz. (Tektronix, Hewlett Packard, or equal).
 - f) Time-Domain Reflectometer (Tektronix, or equal, no known equal).
 - g) Precision Demodulator (Rhode & Schwartz, or equal).
 - h) True RMS Audio Digital Volt-Ohm-Millimeter.
2. Performance Requirements:
- a) At receptacles (subscriber outlets) provide output levels:
 - i) Not to exceed +15 dBmV
 - ii) For 54 to 400 MHz, +6 to +12 dBmV nominal, not to exceed +15 dBmV
 - iii) Above 400 MHz, not less than +3 dBmV
 - iv) Tap selection to provide +9dBmv (± 3 dBmv) at each modulated video receptacle. Taps shall be located as close as possible to the video receptacle.
3. Test Procedures:
- a) RF video distribution system points shall be tested for proper signal level as specified utilizing a spectrum analyzer or signal level meter.
 - b) Following the Signal Level Test, a standard television color receiver shall be connected to the interface point test tap output with suitable pad(s). All TV channels shall be viewed to verify that there are not visible signal distortions such as intermodulation (windshield wiper effect), ghosting, beats, etc. on any channel.
 - c) The RF distribution system shall be checked at the first and last outlet in each leg to verify that the RF distribution system meets all performance requirements utilizing the spectrum analyzer or signal level meter and TV receiver.
 - d) Provide a frequency sweep test over the entire forward bandwidth 5MHz to 1000MHz.
 - e) Measure and document signal level at each tapoff.
- d. Category Cable:
1. Test cabling using at least one (1) of the following test measurement devices or equal:
- a) Category 6 Cable Pair Tester, Level III or later tester for full compliance with TIA/EIA 568-B.1 and B.2, (to include all current addendums) - Microtest Omniscanner, HP, Scope, Fluke, Siemon, or equal.
 - b) Outside Plant Voice Cabling Plant tester - capable of detecting shorts, opens, reversals, mis-wiring and crosstwists. (example: Siemon STM-8).
2. Performance Requirements
- a) To EIA/TIA standards referenced herein for Category 6 cabling. Performance requirement is for circuit end-to-end.
3. Test Procedures:
- a) Use the specified Category 6 cable test set, and test using the Permanent Link procedure.
 - b) Verify that all Category 6 cable runs meet TIA/EIA-568B compliance, using an appropriate Level III testing instrument. The instrument must verify the integrity of all conductors, as well as correctness of termination sequence. Tests shall be

performed between modular jacks at SVC panels and modular jacks at patch panel.

- c) Test station wire only after all pairs of station wire in an area have been terminated at both ends, and no work of this Section or other Sections may cause physical disturbance to the wiring.
- d) Test and submit a test report for each individual cable segment.
- e) Provide 250MHz sweep test, polarity checks, near-end cross talk, signal attenuation, noise, DC loop back resistance, pair-by-pair continuity and length.
- f) Submit a test report indicating that the link meets Category 6 minimum requirements for at least the following parameters.
 - i) Wire map, pin to pin match.
 - ii) Length
 - iii) Report by frequency:
 - a. Insertion loss.
 - b. NEXT, worst pair to pair
 - c. Power sum NEXT
 - d. ELFEXT, worst pair to pair
 - e. Power sum ELFEXT
 - f. Return loss
 - iv) Report pass or fail
- g) Correct any and all transpositions found.
- h) Retest.
- i) If any conductor in a station wire tests either open or short, then the entire station wire is to be removed, replaced, and re-tested.

e. Fiber Optic Cable:

- 1. Test cabling using at least one (1) of the following test measurement devices or equal:
 - a) Optical power meter (HP, Sיעor, 3M, Fotec).
 - b) Optical Time Domain Reflectometer (Tektronix TTP2 Fiber Master Optical Time Domain Reflectometer or equal).
- 2. Performance Requirements
 - a) Optical Budget, any end to end link - not to exceed the sum of the following:
 - i) The specified cable performance, pro-rated for total link distance.
 - ii) Multimode:
 - a. 0.03 dB for each fusion splice
 - b. 0.3 dB for each mechanical splice
 - c. 0.4 dB for each LC connector
- 3. Test Procedures:
 - a) Measure and record all fiber optic line End-to-End attenuations in accordance with TIA/EIA-526-14A using factory terminated test jumpers. Overall line attenuation, including all patch panel connections and mechanical or fusion splices shall be in accordance with TIA/EIA-568B. All fiber connectors shall be tested to assure insertion losses < 0.3 dB (typical) and 0.75 dB (maximum).
 - b) Test each fiber link for overall attenuation from end to end in both directions.
 - c) Perform the attenuation acceptance test for multi-mode cable at both the 850nm and 1300nm wavelengths.

- 6) Verify Basic System Operation:
 - a. Inspect all device labels to ensure that devices are correctly and clearly labeled.
 - b. Test all circuits for proper labeling, wiring, polarity, and connection to proper device.
 - c. Test all equipment for proper operation.
 - d. Test all control panels for all functions.
 - e. Test all functions of all remote devices and all control plug in points.
 - f. Test all extension cables, adapters, etc.
 - g. Verify signal flow through the entire system.

- 7) Audio System:
 - a. Test Equipment: Provide least one each of the following test measurement devices or approved functional equivalents:
 1. Calibrated measuring microphones.
 2. First-aRrival measuring system, provide one any of:
 - a) SIA Smaart V7.0
 - b) Meyer Sim 3
 - c) SDA Systune V1.1.6
 3. Polarity tester
 4. Pink noise generator
 5. Sine wave generator
 6. True RMS audio voltmeter
 7. Recorded program material
 - b. Test Procedures:
 1. Test all mixing console operations.
 2. Measure and record the impedance of each loudspeaker and loudspeaker line circuit terminating at the equipment rack. Use 100 Hz for low frequency loudspeakers, 1kHz for mid-range horns, 4kHz for high frequency horns. For full-range devices, use 1kHz.
 3. Check polarity of loudspeakers with an electronic polarity checker and by applying music program or constant "pink noise" signal to system while walking through the transition areas of coverage from one loudspeaker to the next. Transition should be smooth with no apparent shift in source from one loudspeaker to the next.
 4. Apply sine wave sweep signal to each loudspeaker system, sweeping from 50 Hz to 5 kHz and at a level of 10dB below full amplifier output, and listen for rattles or noise. Correct if apparent.
 - c. Establish the normal settings for systems level controls.
 1. Adjust level controls on rack-mounted equipment for optimum signal-to-noise ratio and signal balance; cap controls which are not intended for end-user operation.
 2. Measure, adjust, align signal delay and equalize the response of all loudspeaker systems using calibrated measuring microphones and multi-channel testing equipment.
 - d. Optimizing S/N Ratio and Setting Gain Structure:
 1. After verifying the system is physically operating correctly, perform the following:
 - a) Turn down all power amplifier/level sensitivity controls.
 - b) Turn off power amplifiers.
 - c) Set all gain/level controls, system-wide, to their off or minimum settings.

- d) Defeat all dynamic controllers.
 - e) Defeat all equalization
 - f) Set all crossovers to maximum output level.
 - g) Connect a 400Hz sine-wave tone generator to an input of the mixing console, and set that channel's input fader and the main output (stereo) fader at unity (0). Increase gain until the channel is just below clipping, as determined by an oscilloscope. It is also helpful to have a piezo tweeter available to aurally determine when the signal is clipping.
 - h) This establishes the maximum level available throughout the system. All devices between the mixing console and the amplifiers now need to be calibrated to match. In effect, all devices (including mixing console) will clip at the same time if calibrated correctly.
With the 400Hz generator still connected to the mixing console, move to the next device in the signal path. If a device has input and output controls, do the input first, then the output. (You will need to open the output slightly in order to determine when the input is clipping). Continue doing this at each device in the signal path until you reach the power amplifier.
 - i) With the amplifier sensitivity controls at "off," slowly open the sensitivity control until clipping just begins. This is the maximum output power possible.
 - j) Repeat the process for each amplifier.
 - k) References:
 - l) Dennis Bohn, "Setting Sound System Level Controls," Rane Note #135, 1997.
 - m) Pat Brown, "Piezo Magic," The Syn-Aud-Con Newsletter, Vol 24, No. 2, Spring 1996
- e. Setting Equalizers:
1. Using a calibrated measuring microphone located in the seating area at twice the critical distance (at which direct sound from the source and reverberant sound are in a ratio of 1:1), establish the unequalized acoustic amplitude response to a pink-noise source. Bring the observed acoustic amplitude to within ± 2 dB uniformity (flat) from 40 to 1,000 Hz (with subwoofers in use). Initially set the roll off at the low frequency end at 24dB / Octave below 20 Hz. Initially set the roll off at the high frequency end 3dB/Octave above 1kHz. Adjustments to these settings may be required following initial listening tests.
 2. With an open microphone on stage adjust the sound system gain until it reaches feedback. Determine the most prominent frequencies of feedback and adjust the appropriate filters until the observed feedback ceases.
 3. Equalization shall be further adjusted as necessary during acceptance testing to the satisfaction of the Commissioner and District.
- f. Electro-Acoustic First Arrival Testing
1. Use Meyer SIM Testing, SMAART, or Systune.
 2. Measure, adjust, align signal delay and equalize the response of all loudspeaker systems using calibrated measuring microphones and approved Meyer Sound SIM System 3 multi-channel testing equipment (v2.3m or greater) using a SIM-3022 analyzer with SIM-

- 3088 and 3081 mic and line switcher interfaces.
 - 3. For Meyer SIM process, testing and calibration shall be performed by a Certified SIM testing engineer. Testing and adjustment shall be in full accordance with SIM methodology and standards.
 - 4. For SMAART or Systune process, testing and calibration shall be performed by a person with factory training.
- 8) Projection and Production Video Systems:
- a. Test Equipment: Provide least one each of the following test measurement devices or approved functional equivalents:
 - 1. Combination Signal Level Meter and Frequency Domain Reflectometer (WaveTek CLI-1750/LST-1700).
 - 2. Wide Band Oscilloscope (Tektronix, Hewlett Packard, or equal).
 - 3. Test Pattern Generator (Extron VTG 200 or equal).
 - 4. RF Generator, 5-1,000 MHz. (GenRad, Hewlett Packard, or equal).
 - 5. Field Strength Meter, 5-1,000 MHz. (Tektronix, Hewlett Packard, or equal).
 - 6. Spectrum Analyzer, 5-1,000 MHz. (Tektronix, Hewlett Packard, or equal).
 - 7. Time-Domain Reflectometer (Tektronix, or equal, no known equal).
 - 8. Precision Demodulator (Rhode & Schwartz, or equal).
 - 9. True RMS Audio Digital Volt-Ohm-Millimeter.
 - 10. Any other items of equipment or materials required to demonstrate conformance with the Contract Documents.
 - b. Test Procedures:
 - 1. Test equipment according to equipment manufacturer procedures.
 - 2. Set up image display devices using Imaging Science Foundation procedures
- 9) Final Checkout:
- a. Repair or replace any equipment that fails to conform to specification, and schedule second set of tests and adjustments.
 - b. Repeat testing and repair or replacement as required to make entire AV Systems conform to specification.
 - c. Upon completion of testing, furnish the City of New York and the Commissioner a complete report on all field-testing and adjustment, certifying that system is complete, conforms to specification and is ready for Demonstration.

3.4 ADJUSTING

- A. Contractor shall correct all cosmetic damage to equipment. Ensure that all equipment is clean and in perfect condition at time of Demonstration.
- B. Repair or replace any equipment that has suffered non-cosmetic damage prior to time of Demonstration. Claims arising from repair or replacement of such damage shall be considered only after final acceptance of system by the City of New York.

3.5 CLEANING

- A. Contractor shall clean all racks, panels and boxes of dirt, dust, and debris, re assemble all equipment, and replace all panels, covers and screws prior to time of Demonstration.

- B. Contractor shall ensure that all control back boxes are free of dirt, dust and debris prior to installing control panels.
- C. Contractor shall correct all cosmetic damage to equipment. Ensure that all equipment is clean and in perfect condition at time of Demonstration.

3.6 CLOSEOUT ACTIVITIES

A. Demonstration:

- 1) Repair or replace any equipment that has suffered non-cosmetic damage prior to time of Demonstration. Claims arising from repair or replacement of such damage shall be considered only after final acceptance of system by the City of New York.
- 2) Schedule Demonstration no earlier than upon the City of New York's receipt of above specified report.
- 3) At request of Commissioner, repeat any and all tests specified in "Field Tests and Inspection" above in presence of the City of New York and the Commissioner.
- 4) Adjustments and modifications shall be made as directed by the City of New York and the Commissioner, and demonstration repeated until successful.
- 5) Following successful completion of demonstration, Contractor shall provide the City of New York's instruction as specified herein.
- 6) All costs for re-inspection and additional testing by the Commissioner, if required, due to incomplete work and/or errors and omissions shall be the responsibility of the Contractor.
 - a. All re-inspection or testing shall be scheduled and approved in writing by the Commissioner and the City of New York, in advance of the work.
 - b. All expenses, including travel, shall be the responsibility of the Contractor.

B. User Instruction:

- 1) Provide in-depth user instruction of the end-user staff in the operation and maintenance of all systems included herein.
- 2) Provide four days of user instruction of a maximum of six end user staff members on the use and operation of the AV Systems.
- 3) User instruction shall include information on the repair and maintenance of the AV systems and equipment including diagnostic testing, trouble shooting, component replacement and routine service.
- 4) All instruction shall be by approved instructors.

3.7 PROTECTION

- A. Do not use any control equipment intended for installation for the purpose of checking out wiring or circuitry prior to proper conditions existing on site, as specified above. Equipment may be used for such testing only in specific areas where such proper conditions exist.
- B. Provide appropriate protection from damage for all equipment in this section during the period

after installation and prior to demonstration.

- C. Remove all protection and clean all equipment immediately prior to demonstration.

3.8 GUARANTEE SERVICE

- A. One year following date of final acceptance, provide the services of a field engineer to examine, adjust and repair the equipment of the Work of this Section as required. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the Contractor.
- B. All labor and materials which are required to perform this service shall meet or exceed these specifications and shall not compromise the performance of the equipment in any way.
- C. Additional Materials:
 - 1) Submit an inventory of recommended spare parts for all equipment provided. This shall include expendable mechanical parts, electronic elements such as processors, power supplies, miscellaneous boards, fuses and the like.
 - 2) This inventory shall be reviewed by the Commissioner and recommendations made to the City of New York concerning parts and equipment which should be purchased.
 - 3) Furnish the additional materials to match those installed and taken from the same production run, packaged with protective covering for storage and identified with appropriate labels.
 - 4) Deliver additional materials to the City of New York.

3.9 APPENDIX

- A. The following appendices detail equipment types and requirements. Refer to the Electrical drawings for conduit routing/sizing information. Refer to Theatrical Audio Video Systems Contract Drawings (TA-series) for wiring information and construction details.
- B. APPENDIX A 11 61 83:
 - 1) AV Systems Equipment List

MCC Theater Fit Out
Audio Video (AV) Systems
APPENDIX "A" - AV SYSTEMS EQUIPMENT LIST

NOTE: This equipment list specifies major systems components and equipment, and should not be interpreted as a "bill of materials". This list may not detail all equipment required for complete, working systems. It is the AV Systems Contractor's responsibility to provide complete, working systems regardless of the completeness of this list.

REF. NO.	ITEM DESCRIPTION	BASIS OF DESIGN MANUFACTURER	MODEL	AIR 1 QTY.	AIR 2 QTY.	NOTES
THEATER 1						
Sound Reinforcement / Playback System:						
T1-SR-1	Digital Mixing Console, basic speech reinforcement / sound playback use	Soundcraft	SI Performer 2	1	1	Refer to drawings
T1-SR-2	Console & Playback system connection cables	Whitwired		1	1	Refer to drawings
T1-SR-3	Custom console I/O patch panel w/ jumper cable	Contractor Fabricated		1	1	Refer to drawings
T1-SR-4	Digital signal processing, with digital audio bus	BSS Soundweb	BLU-160	1	1	System provides analog I/O: 12 in X 12 out
T1-SR-5	Digital signal processing, analog input card	BSS Soundweb	BLUCARD-IN	3	3	
T1-SR-6	Digital signal processing, analog output card	BSS Soundweb	BLUCARD-OUT	1	1	
T1-SR-7	Digital signal processing, output expander	BSS Soundweb	BLU-80B2	1	1	
T1-SR-8	Portable Source/Control Rack	Tascam	SS-CDR200	1	1	
T1-SR-9	Solid State / CD recorder, player	Gator	G-PRO-12U-19	1	1	
T1-SR-10	Racklight module	Litliffe	RL-10-D	1	1	
T1-SR-11	UPS/Power distribution for rack, small form factor, ultra-quiet	CyberPower	CP550SLG	1	1	
T1-SR-12	3U Rack Drawer	Middle Atlantic	UD3	1	1	
Control Room / AV Patch Racks & Audio Patching						
T1-SR-13	Mic / Line Level Patch Panel (1/4" TRS)	Bitree	B48DC-FNPITE3M20U7L	A/R	A/R	Refer to spec for additional patchbay requirements. Full normalizing model number shown for reference; refer to block diagrams for final normalizing requirements. Contractor to confirm final model numbers with Commissioner prior to ordering.
T1-SR-14	3U Rack Drawer	Middle Atlantic	UD-3	1	1	
T1-SR-15	T1 Patching rack - swing frame (40U)	Middle Atlantic	SR-40-22	1	1	
T1-SR-16	T1 Control Room rack - standard rack (44U)	Middle Atlantic	MRK-4431	1	1	
T1-SR-17	Rack vent panels	Middle Atlantic	VT series	A/R	A/R	
T1-SR-18	Rack blank panels	Middle Atlantic	HBL series	A/R	A/R	
T1-SR-19	Rack accessories - refer to specifications	Ref Specs.	Ref Specs.	A/R	A/R	Rack light, power strip, etc. per specification.
T1-SR-20	UPS/Power distribution for rack, tower, ultra-quiet	CyberPower	CP1500PFLC1CD	2	2	Locate (1) in Control Rm rack, (1) in AV patching rack.
T1-SR-21	Audio / data circuit drop box	Whitwired	MD-6-2-C6-100	3	3	Mount to shelf in rear of rack
T1-SR-22	1/4" patch cords, 3'	Bitree	LPC3600-110	40	40	Provide with 100-ft cable for use in T1 stage house
T1-SR-23	1/4" patch cords, 4'	Bitree	LPC4800-110	10	10	
T1-SR-24	E3 Tool Kit	Bitree	SBCTLK01	1	1	
T1-SR-25	E3 Mult	Bitree	E3-Mult	4	4	
T1-SR-26	E3 to blunt - 15'-0"	Bitree	CCAD196	20	20	
T1-SR-27	Audio PatchBay Programmable Shunts	Bitree	plot	2	2	Provide (1) bag Red, (1) bag White
T1-SR-28	Video patch cables (3)	Canare	VPC-003F	10	10	
T1-SR-29	Video patch cables (4)	Canare	VPC-004F	6	6	
T1-SR-30	CAT6 patch cable, 3'	Per Contractor	Per Contractor	20	20	

REF. NO.	ITEM DESCRIPTION	BASIS OF DESIGN MANUFACTURER	MODEL	Alt 1 QTY.	Alt 2 QTY.	NOTES
T1-SR-31	CAT6 patch cable, 4'	Per Contractor	Per Contractor	10	10	
T1-SR-32	Fiber - 50/125 duplex keyed LC-LC MM patch cable, 3'	Per Contractor	Per Contractor	12	12	
T1-SR-33	XLR patch cables, 3' Installed Loudspeakers	Whirlwind	MK403	24	24	
T1-SR-34	Center Array Loudspeakers	Meyer Sound	UPJ-1P	4	4	Loudspeaker horn to be rotated for 50-deg H x 80-deg V coverage
T1-SR-35	Center Array rigging plates	Meyer Sound	MAAM-UPJ	3	3	
T1-SR-36	Additional loudspeaker array rigging, as per drawings	Per AV Contractor	Custom	A/R	A/R	
T1-SR-37	Front fill Loudspeakers (Type SFF)	Meyer Sound	UP-4XP	5	5	
T1-SR-38	Front fill Loudspeaker mounting U-bracket	Meyer Sound	MUB-UP4	5	5	Provide with EN3 connector. Provide EN3 M-F cable for connection to wall plates
T1-SR-39	Front fill Loudspeaker DC power supply	Meyer Sound	MPS-488HPp	1	1	Mounted in equipment rack
T1-SR-40	Surround Sound Loudspeakers					
T1-SR-41	Portable surround loudspeakers	Meyer Sound	UPM-1P	16	16	
T1-SR-42	Portable surround loudspeaker mounting U-bracket and hardware (C-Clamp or Unistrut bolt as required)	Meyer Sound	MUB-UPM	16	16	
Assistive Listening System:						
T1-AL-1	Monitor Microphone	Shure	SM-137	1	1	Provides signal for program audio and assistive listening
T1-AL-2	Monitor Microphone preamplifier	ART	TPS-II	1	1	
T1-AL-3	Monitor Mic Clamp	Cardellini Products	2M Microphone Mount	1	1	
T1-AL-4	FM Transmitter	Listen Tech	LT-800-xxx	1	1	Contractor to coordinate 72 vs 216 Mhz frequency selection
T1-AL-5	Transmitter Rack Mount	Listen Tech	LA-326	1	1	
T1-AL-6	Universal Remote Antenna Kit	Listen Tech	LA-123	1	1	Contractor to confirm final antenna type after RF frequency coordination.
T1-AL-7	Multi-channel FM receiver (wide-band)	Listen Tech	LR-500-xxx	8	8	Contractor to coordinate 72 vs 216 Mhz frequency selection
T1-AL-8	Receiver NiMH Rechargeable Batteries (2 AA)	Listen Tech	LA-362	8	8	
T1-AL-9	Headset	Listen Tech	LA-165	8	8	
T1-AL-10	Headset Sanitary Cover (pack of 10)	Listen Tech	LA-168	1	1	
T1-AL-11	Induction Loop	Listen Tech	LA-166	3	3	
T1-AL-12	Receiver Charging Case w/ removable lid (16 unit)	Listen Tech	LA-325-01	1	1	
T1	Wire, cable	As required	A/R			
T1	Misc hardware, etc.	As required	A/R			
T1	Labor	As required	A/R			

REF. NO.	ITEM DESCRIPTION	BASIS OF DESIGN MANUFACTURER	MODEL	Alt 1 QTY.	Alt 2 QTY.	NOTES
THEATER 2						
	Sound Reinforcement / Playback System:					
T2-SR-1	Digital Mixing Console, basic speech reinforcement / sound playback use	Soundcraft	SI Performer-1	1	1	Mounted in portable rack. Provide with optional rack mount kit
T2-SR-2	Console & Playback system connection cables	Whitwired		1	1	Refer to drawings
T2-SR-3	Digital signal processing	BSS Soundweb	BLU-160	1	1	
T2-SR-4	Digital signal processing, input card	BSS Soundweb	BLUCARD-IN	2	2	
T2-SR-5	Digital signal processing, output card	BSS Soundweb	BLUCARD-OUT	2	2	
	Portable Sources/Control Rack					
T2-SR-6	Solid State / CD recorder, player	Tascam	SS-CDR200	1	1	
T2-SR-7	Portable rack (for console, playback equipment, UPS)	Gator	GRC-10X12-PU	1	1	
T2-SR-8	Racklight module	Little	RL-10-D	1	1	playback rack
T2-SR-9	UPS/Power distribution for rack, small form factor, ultra-quiet	CyberPower	CP550SLG	1	1	
T2-SR-10	3U Rack Drawer	Middle Atlantic	UD3	1	1	
	Theater 2 Rack Room AV Racks & Audio Patching					
T2-SR-11	Mic / Line Level Patch Panel (1/4" TRS)	Bitree	B48DC-FNPITE3M20U7L	A/R	A/R	Refer to spec for additional patchbay requirements. Full-normalizing modal number shown for reference; refer to block diagrams for final normalizing requirements. Contractor to confirm final model numbers with Commissioner prior to ordering.
T2-SR-12	Equipment racks & accessories	Middle Atlantic	MRK-4031	3	3	Rack count to be determined by AV Contractor. This line item covers all equipment housed in the AV Rack Room. Refer to Specification for Equipment Rack General Requirements.
T2-SR-13	Rack vent panels	Middle Atlantic	VF series	A/R	A/R	
T2-SR-14	Rack blank panels	Middle Atlantic	HBL series	A/R	A/R	
T2-SR-15	Rack accessories - refer to specifications	Ref Specs.	Ref Specs.	A/R	A/R	Rack light, patch cord holder, power strips, etc. per specification.
T2-SR-16	3U Rack Drawer	Middle Atlantic	UD-3	1	1	
T2-SR-17	UPS/Power distribution for rack	CyberPower	PR2200LCDRTXL2U	2	2	
T2-SR-18	Network switch	D.Link	DGS-2208	1	1	
	Portable Loudspeakers					
T2-SR-19	Portable loudspeakers	Meyer Sound	UPJ-1P	4	4	
T2-SR-20	Portable loudspeaker yoke bracket	Meyer Sound	MUB-UPJ	4	4	
	Assistive Listening System:					
T2-AL-1	Monitor Microphone	Shure	SM-137	1	1	Provides signal for program audio and assistive listening
T2-AL-2	Monitor Microphone preamplifier	ART	TPS-II	1	1	
T2-AL-3	Monitor Mic Clamp	Cardellini Products	2M Microphone Mount	1	1	
T2-AL-4	FM Transmitter	Listen Tech	LT-800-xxx	1	1	Contractor to coordinate 72 vs 216 Mhz frequency selection.
T2-AL-5	Transmitter Rack Mount	Listen Tech	LA-326	1	1	
T2-AL-6	Universal Remote Antenna Kit	Listen Tech	LA-123	1	1	Contractor to confirm final antenna type after RF frequency coordination.
T2-AL-7	Multi-channel FM receiver (wide-band)	Listen Tech	LR-600-xxx	8	8	Contractor to coordinate 72 vs 216 Mhz frequency selection
T2-AL-8	Receiver NiMH Rechargeable Batteries (2 AA)	Listen Tech	LA-362	8	8	

REF. NO.	ITEM DESCRIPTION	BASIS OF DESIGN MANUFACTURER	MODEL	AIR 1 QTY.	AIR 2 QTY.	NOTES
T2-AL-9	Headset	Listen Tech	LA-165	8	8	
T2-AL-10	Headset Secondary Cover (pack of 10)	Listen Tech	LA-168	1	1	
T2-AL-11	Induction Loop	Listen Tech	LA-166	3	3	
T2	Wire, cable	As required	A/R			
T2	Misc hardware, etc.	As required	A/R			
T2	Labor	As required	A/R			
FACILITY WIDE SYSTEMS, PATCHING & NETWORKING						
AVS-1	Partyline Intercom Patch Panel	AVP	Universal Bulkhead	A/R	A/R	Populated with Neutrik XLR connectors as required. Provide blank coverplates on open connector slots. Provide separate patch panels for Theatre 1 and Theatre 2 as shown.
AVS-2	Video Patch Panel	Blitree	B48T-1WNHD	A/R	A/R	Refer to spec for additional patchbay requirements. Normalizing as shown on AV Systems Block Diagrams.
AVS-3	RF Antenna and Word Clock Patch Panel	AVP	Universal Bulkhead	A/R	A/R	Populated with Neutrik BNC connectors as required. Provide blank coverplates on open connector slots. Provide separate patch panels for Theatre 1 and Theatre 2 as shown.
AVS-4	Cat-6+ Patch Panel (48 port - 2U)	Leviton	Extreme 6+ (69270-U48)	A/R	A/R	With Leviton 482RU-HFO 2RU front cable management. Contractor to confirm final model numbers with Commissioner prior to ordering.
AVS-5	Fiber Connector Housing Panel - 12 fiber LC duplex	Hubbell	FCR525SPR	A/R	A/R	Contractor to confirm final model numbers with Commissioner prior to ordering.
AVS-6	12 LC-LC Dual module	Hubbell	FSPLC6	A/R	A/R	
AVS-7	Ethernet Switch, fanless	Netgear	GS724T-300	2	2	
AVS-8	2-port Fiber module for ethernet switch	Netgear	AGM731F	2	2	For connection between T1 patch rack and T2 rack room
AVS-9	Network Firewall	Netgear	FVS336G	1	1	For connection of AV systems network to IT network
AVS	Wire, cable	As required	A/R			
AVS	Misc hardware, etc.	As required	A/R			
AVS	Labor	As required	A/R			

REF. NO.	ITEM DESCRIPTION	BASIS OF DESIGN MANUFACTURER	MODEL	Alt 1 QTY.	Alt 2 QTY.	NOTES
Production Intercom Equipment:						
Theater 1						
PIC-1	Partyline Intercom power supply, 4-channel	Clear-Com	PS-704	3		
PIC-2	Partyline Intercom remote station, 2-channel	Clear-Com	RM-702	1	1	Mounted in Theater 1 control room AV equipment rack
Portable Stage Manager Station (SMP): see below						
PIC-3	Remote Production Intercom Station, 4-channel	Clear-Com	RM-704	1	1	
PIC-4	Remote Intercom station gooseneck mic	Clear-Com	GM-9	1	1	
PIC-5	Back-of-house paging 4-button selector panel	Symetrix	ARC-SW4e	1	1	
PIC-6	Back-of-house paging 4-button selector panel expander	Symetrix	ARC-EX4e	1	1	
PIC-7	Back-of-house paging mic pre-amplifier	RDL	STM-2	1	1	
PIC-8	Back-of-house paging mic pre-amplifier power supply	RDL	PS-24AS	1	1	
PIC-9	Back-of-house paging station dynamic gooseneck mic	ClockAudio	D33E	1	1	
PIC-10	Custom mounting panel	Custom	See dwgs	1	1	
PIC-11	Racklight module	Furman	PL-8	1	1	
PIC-12	Portable Remote Station case (8U)	Anvil, or similar		1	1	
House Manager panel (HM): see below						
PIC-13	Intercom handset, w/ cradle	Clear-Com	HS-6	1	1	
PIC-14	Intercom plate	Clear-Com	HB-702	1	1	
PIC-15	Custom Telephone Cabinet Plate	Custom		1	1	
Theater 2						
PIC-16	Partyline Intercom power supply, 4-channel	Clear-Com	PS-704	2	2	
PIC-17	Partyline Intercom remote station, 2-channel	Clear-Com	RM-702	1	1	Mounted in Theater 2 AV equipment rack
PIC-18	UPS - Backup for Intercom System	TrippLite	Smart3000RM2U	1	1	
Portable Stage Manager Station (SMP): see below						
PIC-19	Remote Production Intercom Station, 4-channel	Clear-Com	RM-704	1	1	
PIC-20	Remote Intercom station gooseneck mic	Clear-Com	GM-9	1	1	
PIC-21	Back-of-house paging 4-button selector panel	Symetrix	ARC-SW4e	1	1	
PIC-22	Back-of-house paging 4-button selector panel expander	Symetrix	ARC-EX4e	1	1	
PIC-23	Back-of-house paging mic pre-amplifier	RDL	STM-2	1	1	
PIC-24	Back-of-house paging mic pre-amplifier power supply	RDL	PS-24AS	1	1	
PIC-25	Back-of-house paging station dynamic gooseneck mic	ClockAudio	D33E	1	1	
PIC-26	Custom mounting panel	Custom	See dwgs	1	1	
PIC-27	Racklight module	Furman	PL-8	1	1	
PIC-28	Portable Remote Station case (6U)	Anvil, or similar		1	1	
House Manager panel (HM): see below						
PIC-29	Intercom handset, w/ cradle	Clear-Com	HS-6	1	1	
PIC-30	Intercom plate	Clear-Com	HB-702	1	1	
PIC-31	Custom Telephone Cabinet Plate	Custom		1	1	
PIC	Wire, cable	As required	A/R			
PIC	Misc hardware, etc.	As required	A/R			
PIC	Labor	As required	A/R			

REF. NO.	ITEM DESCRIPTION	BASIS OF DESIGN MANUFACTURER	MODEL	Air-1 QTY.	Air-2 QTY.	NOTES
	Program Monitor / Paging System					
	Theater 2 Rack Room					
PM-1	Digital multi-zone processor, program / paging	Symetrix	Zone Mix 761	1	1	
PM-2	Digital multi-zone processor, remote station power supply	Symetrix	ARC-PSe	1	1	
PM-3	8-Channel 70V Amplifier, 250W / ch.	Lab.gruppen	C 20-8X	1	1	For BOH 70V Ceiling Loudspeakers - T1 Zone1, T1 Zone2, T1 Zone3, T2 Zone1, T2 Zone2, T2 Zone3
PM-4	Passive Monitor Panel	TOA	MP-032B	1	1	
PM-5	24VDC power supply	Power One	A/R	1	1	
PM-6	Priority Page Relay	Contractor Fabricated	custom	4	4	
PM-7	Life Safety Mute Distribution system	Contractor Fabricated	custom	1	1	
	Loudspeakers & Volume Controls					
PM-8	70V Loudspeaker, ceiling mount, surface (Type SS)	JBL	Control 26-DT	30	30	BOH spaces fed from main AV Rack Room. Include with Atlas Sound SM191-78 backcan and 164-8A grille. Contractor to confirm final quantity per drawings.
PM-9	70V Loudspeaker, wall mount, surface (Type SW)	JBL	Control 25T-WH	4	4	BOH spaces fed from main AV Rack Room. Provide with integral wall mounting bracket. Contractor to confirm final quantity per drawings.
PM-10	70V Loudspeaker, flat mount, surface ultra-slim profile (Type SWF)	Innovox	SL-2,1-US-blk-70	2	2	BOH spaces fed from main AV Rack Room. Provide 70V version with optional black perforated metal grille, SL2,1-US-PG-blk
PM-11	Volume Control, Wall Mount (Type VP)	See Notes	See Notes	2	2	Providing volume control to BOH locations. Parts as follows: Volume Control - Atlas AT-##-RM, or equal with rotary knob. Confirm final quantity per dwgs
PM-12	Volume Control, Wall Mount (Type VPS)	See Notes	See Notes	12	12	Providing volume control and program select to BOH locations. Parts as follows: Volume Control - Atlas AT-##-RM, or equal with rotary knob Program Select - Grayhill XXXX, or equal with rotary knob Confirm final qty per dwgs
PM-13	Volume Control, Wall Mount locking cover (Type VPL)	See Notes	See Notes	5	5	Providing volume control and program select to BOH locations. Parts as follows: Volume Control - Atlas AT-##-RM, or equal with rotary knob Program Select - Grayhill XXXX, or equal with rotary knob Locking Cover - FSR WB-PS3G Confirm final qty per dwgs

REF. NO.	ITEM DESCRIPTION	BASIS OF DESIGN MANUFACTURER	MODEL	Alt 1 QTY.	Alt. 2 QTY.	NOTES
PW	Wire, cable	As required	A/R			
PM	Misc hardware, etc.	As required	A/R			
PL	Labor	As required	A/R			
Production Video System						
Theater 1						
PV-1	Video Distribution Amp, 1 x 6	Extron	MDA-5V	4	4	Provide rack mount
PV-2	Equipment Rack preview monitor, pull out drawer with audio	Marshall Electronics	V-RD151P	1	1	Quantities give one system for each theatre
PV-3	Stage Video Show Relay	Hitachi	HV-D30			
PV-4	Program Camera, Color, (fixed stage view)	Fujinon / Canon	A/R			
PV-5	Variable focal length lens, 1/3" f/1.2, AI (stage view)	Custom	Custom			
PV-6	Camera C-Clamp Mount	Marshall Electronics	V-R82DP-2C			
PV-7	Portable video monitor station (SMP): see below	Anvli, or similar				
PV-8	Dual Rackmount LCD Monitor	Extron	MDA-5V			
PV-9	Portable Remote Station case (4U)	Anvli, or similar				
Theater 2						
PV-10	Video Distribution Amp, 1 x 6	Extron	MDA-5V	4	4	Provide rack mount
PV-11	Equipment Rack preview monitor, pull out drawer with audio	Marshall Electronics	V-RD151P	1	1	Quantities give one system for each theatre
PV-12	Stage Video Show Relay	Hitachi	HV-D30			
PV-13	Program Camera, Color, (fixed stage view)	Fujinon / Canon	A/R			
PV-14	Variable focal length lens, 1/3" f/1.2, AI (stage view)	Custom	Custom			
PV-15	Camera C-Clamp Mount	Marshall Electronics	V-R82DP-2C			
PV-16	Portable video monitor station (SMP): see below	Anvli, or similar				
PV-17	Dual Rackmount LCD Monitor	Extron	MDA-5V			
PV-18	Portable Remote Station case (4U)	Anvli, or similar				
PV-19	Wire, cable	As required	A/R			
PV-20	Misc hardware, etc.	As required	A/R			
PV-21	Labor	As required	A/R			

REF. NO.	ITEM DESCRIPTION	BASIS OF DESIGN MANUFACTURER	MODEL	A/R 1 QTY.	A/R 2 QTY.	NOTES
CUSTOM PLATES AND PANELS						
CP-1	AV Panels	Custom		A/R		Refer to drawings
CP-2	AV Plates	Custom		A/R		Refer to drawings
CP-3	Floor boxes	Acce Backstage	Ref drawing details	A/R	A/R	Furnish for installation by Division 26. Provide panel inserts & mounting frames as required
CP	Wire, cable	As required	A/R			
CP	Misc hardware, etc.	As required	A/R			
CP	Labor	As required	A/R			
ADDITIONAL REQUIREMENTS						
	<i>Note: Contractor shall make note of special provisions in the specifications, including, but not limited to:</i>					
AR-1	Product data and other submittals					
AR-2	Shop drawings					
AR-3	Software Programming					
AR-4	Mock-ups					
AR-5	Record documents					
AR-6	Samples					
AR-7	Testing					
AR-8	System measurement and equalization (SMAART)					
AR-9	RF Frequency Coordination					
AR-10	WiFi Coordination with IT					
AR-11	Warranty					
AR-12	Service agreement					
AR-13	Manuals and Documentation					
AR-14	Demonstration and user instruction					
AR-15	Accessories & requirements for equipment racks, patch panels, device plates and other equipment					
AR-16	Spare parts					
END OF SECTION						

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SECTION 12 05 00

UPHOLSTERY

PART 1 – GENERAL

1.01 DESCRIPTION

- A. General: Provide upholstered banquette covers in accordance with the Contract Documents.
- B. Scope of Work includes but is not limited to:
 - 1) Single piece upholstered seat and back
- C. Related Work specified in other Sections:
 - 1) Millwork

1.02 QUALITY ASSURANCE

- A. Codes: Comply with the 2008 New York City Building Code and standards listed.
- B. Standards: American Society of Testing and Materials (ASTM) ASTM E 84-01 - Test Method of Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

- A. Samples: Submit 18" x 18" foam sample with bonded polyfiber cover for architect review and approval
- B. Provide a complete, fabric wrapped seat and back cushion mock-up for architect review and approval.

1.04 PRODUCT HANDLING

- A. Delivery: Deliver components in manufacturer's clearly identified containers indicating the areas of their use.
- B. Storage & Protection: Store and protect window treatment work from subsequent construction activities as recommended by the manufacturer.

PART 2 - PRODUCTS

2.01 UPHOLSTERED SEATS AND SEATBACKS

- A. Fabric – Custom printed fabric will be provided to Contractor. Fabricator to provide exact requirements including quantity 16 weeks prior to contractor required delivery.
 - 1) Provide full coverage all sides.
 - 2) All cushion units shall be provided with continuous or matching fabric layouts at all sides.
- B. Seaming – non-welted only as identified in the drawing documents. Provide concealed single side zippered access.
- C. Foam – Open cell high density polyurethane foam with Dacron type polyfiber wrap laminated to foam using acceptable foam adhesives
 - 1) Labeled High Resilient (HR) value of 2.8
 - 2) Foam shall be fire resistant rated and labeled (FR) to meet all applicable furniture flammability laws
 - 3) Labeled Indentation Load (ILD) value of 41 (Medium Firm)
- D. Bonded Substrate
 - 1) Provide min. ½" bonded plywood backing to meet curvatures and shaping shown in drawing documents. Work shall be coordinated with the architectural millwork as identified in 064023. Bonding shall be adhered using long lasting, non-staining adhesives, and free from all protusions or projections.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify measurements and dimensions at the job site and cooperate in the coordination and scheduling of the work of this Section with the work of related trades and previously installed work so that job progress is not delayed.

3.02 INSTALLATION

- A. Workmanship: Install work in locations shown, plumb, level and in line with adjacent materials where required.

3.03 PROTECTION:

- A. Protect finished surfaces against damage during subsequent construction operations and remove such protection at time of substantial completion. Protect finished surfaces against damage during subsequent construction operations and remove such protection at time of substantial completion.

END OF SECTION

SECTION 12 61 00
FIXED THEATRE SEATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the New York City DDC General Conditions.

1.2 SUMMARY

- A. The work in this section includes but is not limited to furnishing and installing the following major elements and associated accessories:

- 1) Fabrication and installation of new, fixed, removable and demountable theater seating
- 2) All materials, components, and services necessary to provide the work indicated or implied in this section, as specified herein, in the Contract Documents and shown on related Drawings
- 3) Preparation and submission of complete shop drawings and samples for review by the Commissioner prior to fabrication
- 4) Preparation and submission of sample chairs as indicated herein for review by the Commissioner prior to fabrication
- 5) Installation in accordance with these specifications, pertinent drawings, established trade criteria and applicable code requirements
- 6) Inspection, demonstration and necessary adjustment of completed installations
- 7) Submission of required record drawings, service data and certificates
- 8) Coordination with other affected work and contractors

1.3 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION:

- A. Extra materials as listed in Paragraph 1.15A, Extra Materials.
- B. Provide fixed seats with chair mounted aisle lights with mechanically shielded wire whips. These shall be wired to junction boxes with wiring stub outs at floor slab locations by Division 26, Electrical. Provide transformers as required for quantity of aisle lights shown on the drawings, with a minimum of one transformer per level of seating. Transformers to be installed by Division 26, Electrical and located outside of the theater envelope.

1.4 RELATED SECTIONS:

- A. Coordinate with all related sections of the specifications including, but not limited to:
- 1) Railings (reference Architectural documents)

- 2) DDC General Conditions
- 3) Division 03 – Concrete
 - a. Fastener requirements
- 4) Division 04 - Masonry:
 - a. Fastener requirements
- 5) Division 05- Metals:
 - a. Structural steel supporting the work of this section
- 6) Division 09 – Finishes:
 - a. Flooring of audience chamber
- 7) Division 23 – Mechanical:
 - a. Floor and riser mounted air supply/return devices

1.5 REFERENCES

- A. References to code, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies will refer to the latest edition of such publications adopted and published prior to submittal of the bid. All such codes and standards will be considered a part of this specification as if they were fully included herein.
- B. If an applicable code or standard permits work of lesser quality or extent than this specification and the related drawings, this specification will govern.
- C. Comply with prevailing local codes and applicable Underwriters Laboratory standards.
- D. Comply with national, state and local labor regulations and requirements.
- E. Equipment to have pertinent labels.
- F. Refer to New York City DDC General Conditions.

1.6 DEFINITIONS

- A. "Contractor": Installer responsible for the construction and installation for the work contained in this section.
 - 1) Contractors involved with other work shall be indicated with a specific trade preceding the word "Contractor" (i.e. General, Electrical, etc.).
- B. "Furnish": Purchase and/or construct and deliver to project site.
- C. "Install": Physically install the items in their proper location (s) on the project site.
- D. "Provide": Furnish and install.
- E. In all cases where a device or a part of equipment is referred to in a singular manner within the contract documents, it is intended that such a reference shall include all devices required

to complete the installation in accordance with the project documents.

1.7 SYSTEM DESCRIPTION

- A. Refer to the 'TS' series contract drawings for seating layout plans, quantities of each type of seat, Refer to architectural and structural drawings for floor and riser plans.
- B. Theater 1 fixed de-mountable and removable seats:
 - 1) Seats are gravity assisted self-rising to a vertical safety position.
 - 2) Seat widths shall as indicated in the drawing except as required to meet requirements of actual site verified dimensions in which circumstance seats shall typically be 1'-10" (center to center). Alternate wider seats may be used where additional width may be required to bring row to proper width. Where absolutely necessary, 1'-8" seats may be used.
 - a. The 'TS' seating layout drawings in the bid package indicate proper widths and quantities of seats. Proposed contractor's alterations from this layout shall be explained in the shop drawing submittal.
- C. Layout Requirements:
 - 1) Seating layout shall conform to critical aisle dimensions as indicated on the Drawings. These dimensions are based on project code requirements.
 - 2) Actual makeup of rows and requisite seat widths shall be the responsibility of the Contractor and shall be based on the Contractor's own field measurements.
 - 3) The chairs must stagger from row to row on the centerline of the theatre to maximize vertical sightlines. End of rows shall align as indicated on the Drawings.
 - 4) In rows which contain varying width chairs, the following criteria shall be followed:
 - a. Narrower seats are to be mounted directly adjacent to aisles.
 - b. Wider seats are to be mounted adjacent to side-walls or railings.
 - c. The remaining varying width seats shall be distributed throughout the row so that the narrower seats are not mounted adjacent to one another.

1.8 CHAIR DESIGN CRITERIA

- A. Overall front to back envelope with seat in upright position shall not exceed 20.5" without notifying the architect in writing.
- B. The theatre seating shall be fabricated using molded foam cushions for maximum comfort, using materials, which are carefully selected to be free of defects, objectionable projections, or irregularities. Smoothly round corners, edges, and exposed fasteners, to present least possible snagging and pinching hazards.
- C. Seats:
 - 1) Seats shall be tested and professionally certified through an independent testing laboratory to support and withstand an evenly distributed minimum of 600 lbs. static load located 3" back from the front of the seat without deflection.

- 2) Seats shall be tested and professionally certified through an independent testing laboratory to withstand 300,000 operating cycles without added lubrication, spring fatigue or measurable bearing wear.
- 3) Seats shall be tested and professionally certified through an independent testing laboratory to withstand, without failure, not less than 100,000 impacts of a 40 lb. sandbag dropped equally from heights of 6", 8", 10" and 12".
- 4) All up-stops and down-stops shall be completely concealed.

D. Backs:

- 1) Backs shall withstand an evenly distributed front or rear load of 450 lbs.
- 2) Backs shall be tested and professionally certified through an independent testing laboratory to withstand, without failure, not less than 40,000 alternating swinging impact cycles by each of 2 opposing 40 lb. sandbags. Sandbags shall be moved horizontally and equally through various distances of 6", 8", 10" and 12" at 35 cpm.

E. Arm Rests:

- 1) Armrests shall be tested and professionally certified through an independent testing laboratory to accept a 250 lb. sandbag placed at the front of the armrest with no deflection.
- 2) The same test shall be performed on the rear of the armrest.

F. All components shall meet additional requirements as listed in Part Two below.

1.9 SUBMITTALS

A. Provide a statement with the following information:

- 1) Manufacturing company overview and history
- 2) Location of manufacturing plant
- 3) Name and work history of proposed installation team / company and name of foreman

B. Submittals shall be in accordance with New York City DDC General Conditions.

C. Submittals shall be submitted in a timely manner, allowing sufficient time for adequate review and possible resubmittals without jeopardizing the project schedule.

D. Submittals will be reviewed, accepted and field dimension verified prior to proceeding with the fabrication of the work in this section.

E. The Commissioner shall only mark one (1) set of drawings per submittal with comments. Any additional sets of drawings or product data shall be returned unmarked.

F. All submittals shall leave space available for review stamps and comments.

G. Shop Drawings:

- 1) Within 30 days of contract award, provide a provisional set of shop drawings with all required information included. A revised set of drawings shall be provided within 30 days after site verification measurements can be taken. The second set shall show any modifications due to unexpected site conditions.
- 2) All shop drawing submittals shall include but are not limited to:
 - a. Cover sheet with a drawing index including the sheet number and title for each sheet in the set
 - b. Each sheet shall have a 4" x 4" area near the title block for review stamps and comments. This area should be in relatively the same location on each sheet
 - c. Provide a minimum of one sheet for every seating level
 - d. 1/4" scale layout plan(s) clearly indicating seat widths, dimensions for coordination for seat mounting, aisle widths, aisle lighting and row to row clearances
 - e. Complete, fully dimensioned, large scale detailed fabrication drawings of all major components
 - f. Include plan or schedules with quantities of each seat size, removable seats, demountable seats, transfer arm seating, aisle lights, and all other accessories
 - g. Electrical junction box location plan and details
 - h. Plan drawing with row letter and seat number layout
 - i. Product data comprised of catalog or standard data sheets for component parts. The data shall include all information to indicate compliance with the specifications herein.
- 3) Responsibility to prevent or remedy conflicts with any floor element shall rest solely on the Contractor.
- 4) Responsibility for providing a seating layout that meets prevailing code requirements, as demonstrated in the contract drawings, rests with the contractor.
- 5) All exceptions to or variations from the bid set drawings and this specification shall be noted and indicated by arrow and boxed caption
- 6) Requisite schematics, plans and sections indicating assembly and installation of components. This requirement includes any electrical schematics required to show installation procedures for seat lights.
- 7) Inventory of all equipment to be supplied, including quantities, reference to applicable drawings, etc.
- 8) Provide aisle light power requirements within 30 days of contract award.

H. Samples

- 1) Provide the following for each type of seat under this section.
- 2) Submit samples of each of the following elements in each color, finish, pattern and texture specified within 30 calendar days of contract award. If qualities of an element have not been specifically indicated herein, submit manufacturer's color charts or samples of actual materials indicating the full range of standard colors, finishes, patterns and textures available. The samples shall include, but are not limited to:
 - a. Provide two 30" square "quality" samples of seating fabric.

- b. Actual samples of electrostatically applied powder finishes to be used on exposed parts.
 - c. Wood and plywood materials with finish samples for color selection.
 - d. Seat and back cushion.
 - e. Seat pan assembly with padding and upholstery.
- 3) Any additional samples as may be requested in writing during the shop drawing process to be submitted within 14 days of written request.
 - 4) Following approval of shop drawings and samples indicated above, a mock-up shall be fabricated for verification and testing.

I. Mock-Ups:

- 1) Provide the following for each type of seat under this section.
 - a. All mock-ups shall be identical in quality, workmanship and craftsmanship to the seats to be provided for installation. Rejected mock-ups shall require further submittals to meet the standards set forth herein.
- 2) Following approval of shop drawings and samples indicated above, a mock-up shall be fabricated for review by the Commissioner.
- 3) Provide mock-up of each type of seat specified.
- 4) The mock-up of the installed seats shall be of two (2) chairs including selected fabric, finishes, aisle lights, etc. One of the chairs of the mock-up will include an ADA aisle standard as specified herein; the other shall have a fixed decorative end standard equipped with an integral aisle light as specified herein. The mock-up should include the extreme widths of chairs to be provided.
 - a. The Commissioner shall approve the mock-up prior to the fabrication of the remainder of the seating. The Commissioner shall retain the mock-up until the installation is complete.
 - b. The seating installed in the project shall be compared with the mock-up. They shall be identical in all respects.
 - c. It shall be the Contractor's obligation to provide shipping of the mock-up to the Commissioner's office and, following installation, to the job site. Following approval of the finished installation, the mock-up shall be turned over to the City of New York.

J. Quality Assurance Submittals:

- 1) The Contractor shall provide quality assurance submittals including the following:
 - a. Certificates: Submit manufacturer's certificate stating materials meet fire performance requirements specified herein.

K. Closeout Submittals:

- 1) The Contractor shall comply with all closeout procedures as described in New York City DDC General Conditions.
- 2) Verification that all punch list items have been rectified will be required for project closeout and initiation of the warranty period.

- 3) Operation and Maintenance Data:
 - a. Provide specific recommendations for cleaning upholstery including precautions against materials and methods which could damage upholstery fabric.
 - b. Provide recommendations for maintaining and touch-up of all finished surfaces of chairs.
 - c. Reference New York City DDC General Conditions for additional requirements.

- 4) Warranty:
 - a. The Contractor shall provide copies of all warranty information as specified herein. All warranty information and documentation shall be integrated into all materials provided at time of "as-built" submission.

1.10 QUALITY ASSURANCE

- A. Installer: The contractor or subcontractor performing the work of this Section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.
- B. Manufacturer: 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. The systems described herein shall be provided by a Theatrical Seating Contractor who will be responsible for furnishing all services described herein including but not limited to coordination and supervision of the engineering, shop drawings, fabrication and provision for all systems specified herein and shown in the drawings.
- C. Seat construction and installation of fixed and removable theatre seating to be the responsibility of a single theatre seating manufacturer, who shall own and operate their own shop for the manufacture of theatre and theatre seating and shall be regularly engaged in the fabrication and installation of such equipment.
- D. Manufacturer shall have under his control all parts composing the complete chair including castings, steel, plywood, fabric, and accessories, as well as mounting and installation components. Contractor shall do all construction and coordinate installation, shall maintain thorough test and inspection procedures to assure uniform high quality of all raw materials used as well as the finished product.

1.11 DELIVERY, STORAGE & HANDLING

- A. All equipment shall be appropriately and substantially packed for shipment.
- B. All equipment containers shall clearly indicate the equipment contained, "front", "top", "fragile", the project name, and theater site allocation. Include packing and shipping lists for each container.
- C. All shipping costs to the job site are the responsibility of the Contractor. The shipping method/company is at the total discretion of the Contractor in order to meet the published project schedules.
- D. Coordinate responsibility for acceptance of material and equipment at job site with the General Contractor.

E. Upon delivery, the materials shall be stored under cover in a dry and clean location, off the ground. Delivered materials which are damaged or otherwise not suitable for installation shall be removed from the job site and replaced with acceptable materials.

- 1) Replace all equipment and materials which are damaged during storage or handling at no additional cost to the City of New York.

1.12 SITE CONDITIONS

A. Environmental Requirements: Coordinate all environmental requirements for all materials provided and installed under this contract.

B. Existing Conditions: Verify all conditions at jobsite. Any additions or corrections are to be requested through the General Contractor prior to fabrication.

C. Field Measurements: Field measurements must be taken prior to preparation of final shop drawings to ensure proper fitting of work. Allow for adjustments as necessary whenever taking field measurements.

1.13 SEQUENCING AND SCHEDULING

A. The installation of the equipment in this section shall begin following the completion of work which may be in conflict with the installation including:

- 1) Concrete floor (Structural Drawings)
- 2) Division 11, Equipment
- 3) Mechanical air supply devices. (Division 23, Mechanical)
- 4) Electrical back boxes for aisle lights (Division 26, Electrical)

1.14 WARRANTY

A. Manufacturer shall warrant materials and workmanship of all seats and chairs, including fabric, supplied as free of defects, and shall guarantee in writing the repair or replacement within 14 days of any item found defective during a period of three (3) years following the date of final acceptance. Ordinary wear and defects due to improper usage are excepted.

1.15 WARRANTY SERVICE

A. Extra Materials: Deliver stock of maintenance material to the City of New York. Furnish the following to match those installed and taken from the same production run, packaged with protective covering for storage and identified with appropriate labels.

- 1) Seat and back fabric or fabric covers in a quantity equal to five percent (5%) of each type of chairs provided, with covers prorated to sizes of chairs used.
- 2) Provide spare light bulbs for aisle lights in a quantity equal to ten percent (10%) of the chairs installed with aisle lights.
- 3) Provide mounting hardware for all mounting conditions equal to five percent (5%) of chairs installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. To establish comparative standards of quality, the equipment and installation indicated herein shall be by one of the following manufacturers:
- 1) Poltrona Frau
 - 2) Ducharme Seating
 - 3) Series Seating.
 - 4) Or approved equal
- B. Qualifications
- 1) Equipment of the work in this Section shall be the responsibility of the single Manufacturer, who shall own and operate their own shop for the fabrication of theatrical seating equipment, and be regularly engaged in the fabrication of such equipment
 - 2) Manufacturer shall have under his control all parts composing the complete chair including castings, steel, plywood, fabric, and accessories, as well as mounting and installation components.

2.2 PRODUCTS – BASIS OF DESIGN

- A. Fixed, removable and demountable seating
- 1) Basis-of-design for audience seating is Poltrona Frau Thea with modifications described herein, with arm rests and low voltage LED aisle lights, ADA flip-up ends at transfer arm locations and finishes specified herein. Comparable products by one of the manufacturers listed above shall also be acceptable.

2.3 SCOPE

- A. Provide all seating and seating components in Theater 1 complete with all necessary accessories and as described herein.

2.4 MATERIALS

- A. The following criteria apply to all fixed, removable and de-mountable seating under this work.
- B. All variations from the specified materials and product must be approved by the Commissioner.
- C. Fire Performance Characteristics:
- 1) Flammability performance: Upholstery components and the assembly thereof shall be in conformance with flammability standards as set forth in California Technical Bulletin #117.

- 2) Padding: Provide new (prime manufacture) polyurethane foam with an average burn length not exceeding 8" and average flame time after removal of flame source not exceeding 15 seconds, with drippings from test specimen not continuing to flame for more than 5 seconds after falling, when tested vertically in compliance with Federal Test Method Standard 191, Method 5903.2.
 - 3) Fabric to comply with 16 CFR Part 1610 Class I.
 - 4) Certificates: Provide certificates by manufacturer attesting that the materials provided for theatre seating meet the above fire performance requirements.
- D. Gray Iron Castings: American Society of Testing Materials A48, Class 25.
- E. Steel Plates, Shapes, and Bars: American Society of Testing Materials A36.
- F. Steel Sheets for Baked Enamel Finish: American Society of Testing Materials A591, commercial and drawing quality; Class C, galvanized-bonderized; 20 gauge minimum unless otherwise indicated.
- G. Expansion Bolts: FS FF-B-588; Type, Class, and Style as recommended by the chair manufacturer.
- H. Concealed Plywood: PS 1/ANSI A199.
- I. Finish for all exposed metal parts shall match color to be selected by the Commissioner.
- J. Exposed Wood: Douglas Fir, free of visible defects. Color shall be stain per the Commissioner. Species shall be as specified herein. Stain and seal with Lacquer.
- K. Upholstery fabric:
- 1) Flame Retardant: Meets Class "A" flamespread rating in accordance with American Society of Testing Materials-E84, NFPA #255, UBC #42-1, and Underwriters Laboratory #723.
 - 2) Light Fast: Exceeds 48 hour NAFM requirement. Test method A.A.T.C.C.-16A.
- L. Cushions: Seat and back cushions made of open cell polyurethane foam.
- M. Fasteners: All fasteners shall be concealed. No exposed fasteners permitted.

2.5 THEATER 1 FIXED, REMOVABLE AND DEMOUNTABLE SEATS

A. General:

- 1) The intent of the seat is to provide the comfort of individual seats with arms and to aesthetically create rows of monolithic, flat wood flat back seats.
- 2) When not occupied, the rows of seats will appear as solid single rows from the rear with minimal gaps between individual backs.
- 3) The backs will remain fixed and will not move up and down as the seat is deployed or returns upright.

- 4) The arms will be fixed and will be completely within the envelope of the seat of 20-1/2".
- 5) The top of the seat back shall be 34" above the floor of the row in which the seat is located.

B. Seat Bottom:

- 1) The seat bottom will have a 9/16" thick wood panel with a fully upholstered cushion applied to the top.
- 2) The wood bottom will be a single piece of birch/poplar plywood with a single bend at the 1/3 point to create two facets, veneered on both sides in Douglas Fir and stained in a standard color to be selected by the architect.
- 3) The top of the seat cushion, when deployed, shall be 17-3/4" above the floor.
- 4) The seat cushion shall be made of virgin HR polyurethane foam, flame retardant without additive, allergy proof, odorless, and moisture proof. The foam cushions shall be glued in place using inflammable glue and shall be perfectly fitted to the plywood structure.
- 5) The cushion will be 2-1/2" to 5" thick and will be molded for comfort.
- 6) When not occupied, seat bottoms will automatically return to a full upright position. Seat return mechanism shall use gravity to recline by means of a steel counterweight placed in the bottom back of the seat. Spring operated mechanisms will not be accepted.
- 7) All fasteners and attachments shall be concealed.

C. Seat Back:

- 1) The seat back will have a 3/4" thick flat wood rear panel with an upholstered cushion applied to the front side. The wood will not have a camber in any direction and the horizontal line at the top will be flat.
- 2) The wood back will be a single piece of birch/poplar plywood, veneered on both sides in Douglas Fir and stained in a standard color to be selected by the architect.
- 3) The cushion will be 2-1/2" to 5" thick and will be molded for comfort as the wood back will be flat.
- 4) The wood of the back will end approximately 13/16" from top of cushion, but the cushions will continue to the sides of the back.
- 5) All fasteners and attachments shall be concealed.

D. Intermediate Standard and Armrest:

- 1) The standards between seats shall be less than 2" wide and constructed of birch plywood upholstered in the same fabric as the seat.
- 2) The top and the rear of the standard shall be capped in a 1" thick single piece of

birch/poplar plywood, veneered on all sides in Douglas Fir and stained in a standard color to be selected by the architect to match seat bottom and back.

- 3) The front of the standard shall be perpendicular to the floor.
- 4) The rear of the standard shall be constructed be flush with the seat back wood panel, so as to form a monolithic seat back unit.
- 5) The standard shall be approximately 2'-9/16" high inclusive of wood cap.
- 6) The standard shall be supported on a 6" high steel hoop.
 - a. Hoop shall be 1"x1 15/16" bar steel
 - b. Hoop shall be finished in standard color powder coating selected by architect.
 - c. Hoop shall have a flat bottom to be used to secure seat standard to the floor.
- 7) Fabricate standards for attachment to sloped or flat floor, as required by the Drawings.
- 8) Provide bolt caps at each floor mounted standard foot, which cover mounting stud and nut. Color to match selected metal finish for aisle standard.
- 9) Aisle standards shall be floor mounted as per manufacture's specifications or as indicated on the Drawings. All mounting assemblies shall be approved by the Commissioner prior to installation.

E. Aisle End Panels:

- 1) The aisle end panels shall be of the same construction as Intermediate Standards.
- 2) Row letter identification tags will be incorporated into the end panels.

F. Fabric:

- 1) Manufacturers:
 - a. Kvadrat
 - b. Or approved equal
- 2) The basis of design for the seat fabric is "Hermod" as manufactured by Kvadrat. The color shall be "1544".

G. Handicapped Access Aisle Standards

- 1) The aisle end panels shall be visually identical to all other end panels.
- 2) The decorative aisle end panel shall be fully removable to allow side access to the seat.
- 3) Provide code complying graphics to indicate Handicapped aisle standards.

H. Number and Letter Plates

- 1) Provide brushed stainless steel finished plates with engraved and black filled or

black filled etched Helvetica Medium characters for seat location identification system corresponding to approved shop Drawings.

- 2) Black fill shall be deep in color and consistent. Characters shall be centered on the plate.
- 3) Row letter plates shall be round and located in a routed recess for flush mounting in the aisle end panel.
 - a. Mounting to use two (2) escutcheon pins or appropriate fastener without keying. Mounting pins to be of similar or identical metal to letter plate.
 - b. Engraving of aisle letter plate to be consistent with engraving of seat number plates.
- 4) Seat number plates to be recess mounted in the center of the seat bottom edge.
- 5) Mounting fasteners shall match finish of number/letter plates.

I. Donor Plates

- 1) All chairs shall accommodate donor plates. Location shall be determined with mock-up, either in a recess for flush mounting in all arm rests or at the top of the rear seat back panel.
- 2) Donor plate material shall visually match number and letter plates.
- 3) Donor plates shall be adhered with adhesive material; do not use pins, brads or screws.

J. Demountable seat bases

- 1) Provide seats, as designated in locations indicated on the drawings, with low-profile steel platforms fitted with specially designed locking devices to provide for easy demounting and re-attachment of the seat to accommodate conversion of the space occupied by the chair to wheelchair or equipment access
- 2) Provide release/transport tool to the owner with each chair/platform

K. Removable seats

- 1) Provide seats, as designated in locations indicated on the drawings, of the same construction as the fixed theater seat that is designed as a free-standing chair.
- 2) The chair shall be designed not to attach to the floor and be equipped with non-marking plastic glide feet

2.6 FABRICATION

A. Shop Assembly:

- 1) Fabricate all work in this section in accordance with the Commissioner's direction, specifications, approved shop drawings, pertinent project drawings, established trade practices, and applicable code requirements.
- 2) Do not commence shop assembly until written approval of all mock-ups has been

received from the Commissioner.

- 3) Carry out shop welding in full accordance with the appropriate sections of "Specifications for the Design, Fabrication and Erection of Structural Steel Buildings" of the American Institute of Steel Construction (AISC).
- B. Shop/Factory Finishing: All factory finishes shall comply with manufacturers' recommendations. Color selection shall be as indicated in the seating color scheme schedule at the end of this section.
- C. Tolerances: Machine finish all operating parts to standard trade tolerances, fits and finishes.

PART 3 -- EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Contractor must examine areas and conditions under which theatre seating is to be installed, including condition of substrate to which seating standards are to be attached, and must notify Commissioner in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Contractor.

3.2 PREPARATION

- A. Surface Preparation: Prepare all surfaces as to manufacturers recommendations. Comply with all industry standards regarding surface materials.

3.3 ERECTION / INSTALLATION / APPLICATION / CONSTRUCTION

- A. Comply with best standard industry practice for secure and proper installation. Install seats in locations indicated on approved shop drawings, with required clearances, elevations, and sightlines.
- B. Install standards in locations necessitated by seating layout with each standard attached to the substrate by no less than two (2) anchoring devices of recommended size.
- C. Install seats by mounting components to standards or brackets mounted on standards using industry approved hardware and fasteners.

3.4 FIELD QUALITY CONTROL

- A. The installation of the equipment indicated in this section shall be supervised by qualified personnel who are regularly employed by the Contractor for supervision of equipment installation similar to that indicated herein.
- B. Arrange for all tests and inspections required by the NYC DDC General Conditions.

3.5 ADJUSTING AND CLEANING

- A. Adjust seat uplift mechanisms as required to assure that seats in each row are aligned when in upright position.
- B. Replace any upholstery that has been damaged during installation.

- C. Touch-up minor abrasions and imperfections in painted finishes with coating to match factory-applied finish.
- D. Remove all debris caused by this work from the premises.

3.6 DEMONSTRATION

- A. Installed seating to be operated for approval, and inspected for quality by the City of New York and the Commissioner.
- B. Make necessary adjustments or modifications as required.
- C. Instruct City of New York's designated staff or representatives in the care and maintenance of all items.
- D. Schedule tests and instruction in conformance with project construction schedules and the availability of City of New York and Commissioner.
- E. Cost of re-inspection and additional testing by the Commissioner, if required, due to lack of completion and/or errors and omissions shall be paid by the Contractor respective to the area of work concerned.

3.7 OWNER'S INSTRUCTIONS & COMMISSIONING

- A. Supply instruction to City of New York and City of New York's operating personnel on operation and care of system for not less than six (6) hours total. Instruction shall include, but not be limited to, proper maintenance of all systems, replacement procedures for user replaceable parts to obtain maximum usage of systems.
- B. Deliver all copies of approved Operations Manual to the City of New York prior to first instruction session, and review it as part of that session.
- C. Timing of all sessions shall be scheduled by City of New York at their convenience.
- D. All instruction shall be by technical staff of the Seating Contractor.

3.8 PROTECTION

- A. Take suitable precautions to protect the equipment in this section from damage after installation and prior to acceptance by the City of New York.
- B. Remove all equipment protection and clean all components thoroughly prior to the demonstration session.

END OF SECTION

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SECTION 144200

WHEELCHAIR LIFTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to install the wheelchair lifts, as shown on the drawings, specified herein, and/or as needed for a complete and proper installation.

1.3 RELATED SECTIONS

- A. Volatile organic compound (VOC) limits for adhesives, sealants, paints and coatings – Section 018419.
- B. Environmental Practices (LEED Building) – Section 018116.
- C. Construction waste requirements – Section 017419.
- D. Construction IAQ requirements – Section 018119.
- E. Elevators – Division 14.
- F. Electrical service - Division 26.

1.4 QUALITY ASSURANCE

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.
- B. 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.
- C. Use products produced by manufacturers regularly engaged in the business of manufacturing, installing, and servicing equipment of the type required by this Section of these Specifications, and with a 3 year history of successful production acceptable to the Commissioner.

D. Special Experience Requirements

1. Installer: The contractor or subcontractor performing the work of this Section must, within the last 5 consecutive years prior to the bid opening, have successfully completed in a timely fashion at least 3 projects similar in scope and type to the required work.

E. Technical Services: Manufacturer shall maintain a team of design personnel to work with Architects, Engineers, and Contractors to adapt the wheelchair lift product to the design and structural requirements of the building.

F. Performance Requirements: The unit shall be completely assembled and pre-wired (less optional equipment and necessary gates) and manufactured with adequate lifting and load capacity for the application described in this specification.

1.5 APPLICABLE STANDARDS

A. Unit shall be designed and manufactured in accordance with the following standards:

1. American National Standards Institute (ANSI A17.1) Parts 2000 and 2100 for vertical wheelchair lifts in private and public places.
2. Underwriter's Laboratories (UL)
3. International Building Code (IBC)
4. National Electric Code (NEC)
5. American Society for Testing Materials (ASTM)
6. American Welding Society (AWS)

1.6 SUBMITTALS

A. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the Commissioner.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the Commissioner for review.

B. Submit

1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades;
4. Manufacturer's recommended installation procedures which, when approved by the Commissioner, will become the basis for accepting or rejecting actual installation procedures used on the Work.

- C. Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Commissioner three copies of an operation and maintenance manuals.

1.7 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the City of New York.

1.8 WARRANTY

- A. Unit shall have a one (1) year limited warranty on the basic unit and electrical system with a two (2) year warranty on drive train components as furnished by the manufacturer.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Basis of Design: Vertical Platform Lift, Model HBC-108, shaftway standard model by National Wheel-O-Vator, or equivalent product of Garaventa, ThyssenKrupp Access, or approved equal.
- B. Composition and Materials
1. Machine Tower: 16 gauge steel sheet.
 2. Base Frame: 2" square x 1/4" structural steel tubing.
 3. Lift Weldment: 3/8" hot rolled steel plate and 2" square x 1/4" wall structural steel tubing.
 4. Tower Cap: 7 gauge hot rolled, pickled and oiled steel plate.

5. Side Guard Panels: 22 gauge, steel sheet panel in 1" square x 14 gauge galvanized steel tubing frame.
6. Front Panel: 18 gauge steel sheet.
7. Platform: 11 gauge galvanized steel plate with slip resistant surface.
8. Access Ramp: 11 gauge galvanized steel plate with slip resistant surface.
9. All Welded Parts: Shall be made by welders certified in accordance with the requirements of AWS D1.1.

C. Characteristics of System

1. Capacity: 750 lbs.
2. Speed: 20 fpm.
3. Drive System: Hydraulic, 24 VDC 1-1/2 HP drive = 1:2 leaf chain hydraulic with type "A" instantaneous slack chain safety device.

D. Safety Devices: The unit shall have the following safety devices to safeguard the user.

1. Upper and lower limit switches.
2. Upper final limit switch.
3. Slack chain device.
4. 24 V low voltage controls.
5. Grounded electrical system.
6. Non-slip platform and access ramp surface.
7. Platform safety pan.
8. Emergency stop button.
9. Key-lock on controls shall meet the requirements of ANSI A17.1, Part 2000.
10. Locking top and bottom landing gates provided with combination mechanical lock and electrical contact meeting ANSI A17.1, Section 2000.
11. Grab rail.

E. Finish: Unit shall utilize the following finish process.

1. Alkaline detergent wash.
2. Clear water rinse.
3. Iron phosphate coating.
4. Clear water rinse.

5. Non-Chromate rinse.
6. Application of Polyester (TGIC) Thermostatic Powder Coating Material; black finish.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions where wheelchair lifts are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Unit shall be installed and operated in accordance with ICC/ANSI A117.1, NEC and ASME A18.1 Guidelines.

3.3 COORDINATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of these trades for interface with the work of this Section.
- B. Adjust all components to operate within accepted design tolerances, and lubricate equipment in accordance with the manufacturer's recommendations.
- C. Upon completion of the installation, make arrangements for and secure required inspections, tests, and approvals of the completed systems. Make all changes and adjustments required without additional cost to the City of New York.

END OF SECTION

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CONTRACT # 2
PLUMBING WORK

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SECTION 22 00 00

GENERAL PROVISIONS FOR PLUMBING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment and services necessary to furnish, deliver and install all work of this Section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of the Contract General Conditions, Section 230000 General Provisions, and with the provisions of all applicable Local, State, and Federal Codes and laws.

1.3 SCOPE OF WORK

- A. The work under this Section shall include all incidentals, labor, material, equipment, appliances, services, hoisting, scaffolding, supports, tools, consumable items, fees, licenses, and administrative tasks required to complete and make operable the plumbing work shown on the drawings and specified herein.

- B. Contract #2 Contractor shall furnish and install all equipment as necessary to provide a complete installation including system check out and start up on each item and system. The following equipment shall be provided:

1. Sanitary, waste, and vent systems.
2. Domestic hot and cold water systems.
3. Domestic water from existing service
4. Fire protection water from existing service.
5. Pipe materials, hangers and supports.
6. Insulation.
7. Valves.
8. Hose bibbs.
9. Pipe sleeves and seals.
10. Drains.
11. Cleanouts.
12. Plumbing fixtures.
13. Water heating equipment and specialties.
14. Trap primers.
15. Miscellaneous plumbing specialties.
16. Access panels.
17. Water detection systems.
18. Kitchen equipment plumbing support systems and connections.

1.4 WORK BY OTHERS

- A. Division 26 shall provide power wiring to electrical devices. Section 220000 shall provide and install all control wiring required for equipment operation. Section 220000 shall provide motor starters for installation by Division 26.

- B. Section 220523 shall provide and install all make-up water distribution to HVAC equipment from outlet valve of backflow preventer. Section 220000 shall provide and install backflow preventer.
- C. Section 220523 shall provide and install indirect condensate waste piping and trap to drain receptor from all HVAC equipment.
- D. Excavating, backfilling, and compacting shall be provided under other divisions of this specification. Coordinate requirements.
- E. Concrete housekeeping pads for floor-mounted equipment and concrete pits shall be provided under other divisions. Coordinate exact locations, dimensions, piping locations, and anchor bolt requirements.
- F. Plumbing devices, faucets, valves and fittings required for food service equipment shall be provided by other divisions. Section 220000 shall provide and install piping connections. Food service equipment shall be assembled by other divisions. Coordinate requirements.
- G. Plumbing fittings, faucets, drains, fixtures, and devices, required for laboratory and darkroom equipment shall be provided by other divisions. Section 220000 shall provide and install piping connections. Coordinate requirements.

1.5 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to all State, Local, and Federal Codes and Laws.
- B. The criteria of design and performance to produce the required operation is based on equipment of the named manufacturers. Equipment of other manufacturers shall be considered, subject to its acceptability in the Engineer's judgment and opinion. The equipment must conform to the operational characteristics and dimensions established by specified item and the drawings for mechanical spaces and other clearances.
- C. The following manufacturers, vendors or materials, when provided in accordance with requirements of this Division, are approved for use. Materials supplied shall comply with specification requirements and be of a product of approved manufacturers. No deviations from this list shall be permitted unless specifically approved, in writing, after submission of satisfactory evidence relative to compliance with specification requirements.

1.6 SUBMITTALS

- A. Procedure: Prepare and make the submissions listed below and in Section 230000.
- B. Shop Drawings: Submit shop drawings of all items proposed to be furnished and installed under this Section which shall include but not be limited to.
 - 1. Coordination drawings, coordinated with all other trades as outlined in section 220000.
 - 2. Piping materials, joints and fittings.
 - 3. Valves, tags and name plates with schedule and location.
 - 4. Pipe hangers and supports
 - 5. Insulation
 - 6. Valves
 - 7. Pressure regulating valves
 - 8. Cross connection protection devices.
 - 9. Pipe sleeves and seals.

10. Drains
11. Cleanouts
12. Plumbing fixtures
13. Water heating equipment
14. Pumps
15. Drip details.
16. Access panels.
17. Trap primers.
18. Miscellaneous plumbing specialties.
19. Welding certifications: submit reports as required for piping work,
20. Brazing certifications: submit reports as required for piping work.
21. Manufacturers' recommended installation procedures which, when approved, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.

1.7 RELATED SECTIONS

- A. Section 017419 – Construction Waste Management

1.8 WORK INCLUDED

- A. Requirements of Construction Waste Management, Section 017419.
 1. The Commissioner has established that as many of the surplus and waste material as economically feasible shall be reused, salvaged, or recycled. To that end, the Contract #2 Contractor shall participate in the development of the Waste Management Plan, and collect, sort and deposit in designated containers, their waste, non-returned surplus materials and rubbish in accordance with the approved Plan.
 2. Project Diversion Goals are stated in Section 017419 – Construction Waste Management. Contract #2 Contractor shall meet or exceed the minimum percentage of waste stated there for diversion from landfill, unless Contract #1 Contractor designates a different amount. Specific items/categories shall be in accordance with the Documents and as established in the Plan.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

- A. Sanitary, waste, vent, and storm piping above ground (up to and including 10" size) within building: Hubless cast iron pipe with no hub fittings CISPI 301 and "Clamp-All 125" or 4 and 6 band "Huskey" clamps. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI).
- B. Domestic hot water, cold water, hot water recirculating, condensate, and indirect waste piping above ground: hard drawn seamless Type L copper tubing ASTM B88 with wrought copper solder fittings A.N.S.I. B16.22 and "Bridgit" or other no lead content solder joints ASTM B32-83, alloy Grades SN96 or SB5. Solder flux lead content-zero percent.
- C. Domestic water service piping (up to 2" size): Type K soft copper tubing ASTM B88 with Flared fittings for copper ASA A40.2. No joints are permitted below concrete slabs.

2.2 PIPE HANGERS, SUPPORTS, SEISMIC RESTRAINT, AND VIBRATION ISOLATION

- A. Pipe hangers and supports: refer to section 220523.
 - 1. Roof piping support: Miro "pillow block" series, pre-fabricated, Polycarbonate resin pipestands with roller guides, spacer units and .040 aluminum pipe straps with #8 stainless steel screws to secure piping to stands. Model selection shall be based on carrier pipe size.
- B. Seismic restraint: refer to section 230000 and 220548.
- C. Vibration isolation: refer to section 220548.

2.3 INSULATION

- A. Insulation and sound attenuation: refer to section 220700.

2.4 VALVES

- A. General: refer to section 220523 for general information in addition to plumbing valves noted below.
- B. Ball Valves for domestic water systems up to 2" size: 600 WOG, bronze, two-piece, full port, brass ball with soldered or thread ends.

Manufacturer: Stockham S-206-BR-R-S or S-206-BR-R-T
Nibco S-585-70 or T-585-70
Watts B-6081 or B-6080

- C. Check valves for domestic water systems up to 2" size: Class 125, bronze, "Y"-pattern, swing check, threaded cover, bronze disc with soldered or threaded ends.

Manufacturer: Stockham B-309Y or B319Y
Nibco S-413 or T-413
Watts CVYS or CVY

- D. Water pressure regulating valve: the valve type shall be a fluid actuated pilot controlled pressure regulating valve equipped with a pressure sustaining feature that will cut out flow at a pre-set minimum pressure. The cut-off minimum pressure shall be set in the field, after a documented flow test and water supply curve is performed and plotted. The valve shall incorporate:

1. Bronze body.
2. Sealed FDA approved elastomer diaphragm.
3. Stainless steel spring and stem
4. Quad-ring flow throttling retainer.
5. Brass hydraulic control pilots.
6. Copper control tubing.
7. Full size FDA approved strainer and blow down valve.
8. Inlet and outlet pressure gauges with bleed shut off valves on the gauge stem.

Manufacturer: Watts 115-2 series.
Watts Regulator Co. ACV Div., Houston TX.
Cla-Val 92-01 series.

- E. Hose end drain valves: 600psi CWP, all bronze ball valve with 3/4" hose thread outlet, threaded hose cap, rubber gasket and safety chain with soldered or threaded ends.

Manufacturer: Nibco S-585-70-HC or T-585-70-HC
Watts B-6001-CC or B-6000-CC

2.5 PIPE SLEEVES AND SEALS

- A. Masonry walls and slabs: Schedule 40 galvanized steel pipe with integral water stop flange.
- B. Piping seal (interior walls in contact with earth): interlocking expandable synthetic rubber links, assembled with corrosion resistant bolts, nuts and pressure plates; equal to PSI "Link seal".
- C. Piping seal (interior walls and floors in contact with earth): interlocking expandable synthetic rubber links, assembled with corrosion resistant bolts, nuts and pressure plates; equal to PSI "Link seal".
- D. Piping seal (interior floor slabs in contact with earth): seal between pipe and sleeve with a flexible elastomeric caulk listed specifically as a pipe sealant.
- E. Sleeve adapters: coated cast iron, equipped with flashing clamp.
- F. Pack annular space between sleeve and pipe (insulation) and/or conduit in fire rated construction with fire retardant putty, sealant and/or caulk. Material shall be non asbestos based and installed in accordance with manufacturers instructions for fire rating required.
- G. Penetrations of multiple items and penetrations with annular space greater than 1/2" shall be provided with approved backing material in accordance with manufacturers instructions.
- H. Fire retardant sealer and system shall meet ASTM E-84, ASTM E-814, and UL-1479.

<u>MANUFACTURER</u>	<u>MODEL</u>
Dow Corning	Firestop 2001
Nelson	CLK,FSP
Standard Oil	Fyre Putty
3M	CP-25

2.6 DRAINS

- A. General:
1. Provide all poured in place drains with minimum 24" x 24" vinyl flashing.
 2. Subject to compliance with requirements, provide drain products by one of the following manufacturers... JR Smith, Zum or Wade unless otherwise noted below.
- B. Floor drain, mechanical rooms, indirect waste receptor (D1): cast iron body, bottom outlet, 9" diameter open top, dome bottom strainer, combination seepage pan/membrane flashing clamp and trap primer adapter.

Manufacturer: JR Smith 3960 with 2695Y-2 tp adapter
Wade 3200-RS with 2400NH tp adapter
Zum Z127 with Z1023 tp adapter

- C. Floor drain toilet rooms (D2): cast iron body, bottom outlet, 7" diameter nickel bronze top, trap primer connection, seepage pan and combination membrane flashing clamp.

Manufacturer: Smith 2010-A
Wade 1100STD
Zum ZN-415- type B strainer

- D. Floor drain, (trash room) (D3): acid resistant coated (ARC) interior, 6" deep cast iron body, bottom outlet, 8" square nickel bronze top, aluminum sediment bucket and combination seepage pan/membrane flashing clamp. Provide drains receiving indirect waste with 1/2 grate.

Manufacturer: JR Smith 3101-C
Wade 9110-26-27
Zum ZN1910-KC-23

- E. Floor sink, kitchens (D4): acid resistant coated (ARC) interior, 8" deep cast iron body, bottom outlet, 12" square nickel bronze top, aluminum sediment bucket and combination seepage pan/membrane flashing clamp. Provide floor sinks receiving indirect waste with 1/2 grate.

Manufacturer: JR Smith 3151-C
Wade 9140-26-27
Zum ZN1901-KC-23

- F. Floor Drain, indirect waste funnel (D5): Duro-Coated cast iron, with necessary fasteners to secure funnel to strainer. 6" - 7" diameter funnel converting assembly.

Manufacturer: JR Smith 3812
Zum ZN328-
Wade EF Funnel

- G. Floor Drain, cast floor drain for floating floors (D6): Cast iron design. The upper funnel section cast into the floating floor. Lower bucket, built into the structure, shall retain water surrounding the upper section as a between floors sound seal. Weep holes are required to drain the structural floor. Floor drains shall have water proofing membrane clamps.

Manufacturer: Mason Industries, Inc. Type CFD
Zum Z625-
Watts FD-600

2.7 CLEANOUTS

- A. General: Provide all poured in place cleanouts with 24" x 24" vinyl flashing.
- B. Floor cleanout (DPCO): areas incorporating floor finishes, adjustable round scoriated heavy duty nickel bronze secured top, cast iron body, flashing flange and clamp, tapered bronze plug.

Manufacturer: Smith 4020 series
Wade 6000Z series
Zum ZN-1400 series

- C. Floor cleanout (DPCO): carpeted areas, adjustable round scoriated heavy duty nickel bronze secured top, carpet marker, cast iron body, flashing flange and clamp, tapered bronze plug.

Manufacturer: Smith 4020 series
Wade 6000 series
Zum ZN-1400 series

- D. Floor cleanout (DPCO): exterior areas, adjustable round scoriated heavy duty cast iron top, cast ductile iron body, flashing flange and clamp, tapered bronze plug. Install cleanouts with 18" square x 6" deep concrete apron in non-paved areas.

Manufacturer: Smith 4250 series
Wade 8300MF series

- E. Wall plate cleanout cover (WPCO): provided at cast iron cleanouts with tapered bronze plug a 6" x 6" chrome plated nickel bronze square frame and plate secured with vandal proof screws.

Manufacturer: Smith 4730 series
Wade 8480ST series
Zum ZANB-1460 series

2.8 PLUMBING FIXTURES

- A. General: Fixtures shall be new, complete with trimmings and fittings, including faucets, carriers, supplies, stops, traps, tailpieces, waste plugs, casings, hangers, plates, brackets, anchors, supports, hardware and fastening devices.

1. Stainless steel: type 302, 304, 316, or 317, as noted, sound deadened.
2. Trimmings and fittings: construct of forged, cast, rolled or extruded brass or bronze with Monel and other suitable non-corrosive parts: designed with easily renewable parts which are subject to wear or deterioration. No die castings and stampings other than brass or stainless steel. Plumbing trim shall consist of:

Exposed surfaces: chrome plated.
Pipe: copper type L.
Pipe fittings: threaded bronze.
Supplies: chrome plated brass tube.
Waste tailpiece: 17 gauge chrome plated cast brass.
P-traps: 17 gauge chrome plated cast brass with cleanout plug.
Escutcheons: one-piece chrome plated cast brass or stainless steel.
Air Chambers: Nibco #620-L. 12" long

3. Furnish and install ADA compliant utility insulation kit under handicap accessible lavatories and/or sinks.

Manufacturer: Truebro 102 E-Z "Lav Guard 2"
Plumberex X4333 "Pro-extreme"
McGuire "Pro-wrap" PW2000

- B. Water closets (W1, W2): Wall-mounted, flushometer, standard and handicapped vitreous china, wall hung, 1.28 gpf low flow, elongated, siphon jet, with 1-1/2" top spud. Seat: heavy duty solid plastic elongated open front. Flush valve (include trap primer on 1 flush valve in each toilet room equipped with floor drain), combined concealed carrier and support. Color: white.

Fixture: Toto CT708E(G)
Kohler Kingston K-4326
American Standard "AFWALL Millenium FloWise"

- Flushometer: Toto TET1LN32
Kohler K-7521
American Standard "Selectronic"
- C. Urinal (U1): wall hung, flush valve, standard and/or handicapped, vitreous china, 1.0 gpf, low flow, washout with 3/4" top spud, complete with flush valve and combination concealed carrier and support. Color: white.
- Fixture: Toto UT104EV
Kohler Bardon K-4904-ET-0
American Standard "Washbrook"
- Flush valve: Toto TET2LN33
Kohler K-7527
American Standard "Selectronic"
- D. Wall hung lavatories (L1): standard or handicapped, vitreous china, concealed arm carrier, drilled for 4" O.C. faucet, 1-1/2" chrome plated cast brass P-trap with cleanout plug, chrome plated brass angle stops with loose key operator, grid drain and tailpiece. Faucet: Chrome plated self closing metering faucet (0.5 gpm and 0.25 gallons per cycle). Insulate trap and hot water piping below lavatory with insulation kit. Color: white.
- Fixture: Duravit #041765
American Standard "Lucerne"
Kohler "Greenwich"
- Faucet: McGuire Pro Wrap
Delta 2517-HDF
Symmons S-60-G
- E. Undercounter mounted lavatory (L2): Vitreous china, oval, undercounter mount, 1-1/2" chrome plated cast brass P-trap with cleanout plug, chrome plated brass angle stops with loose key operator, and grid drain. Faucet: Chrome plated self closing metering faucet (0.5 gpm and 0.25 gallons per cycle). Insulate trap and hot water piping below lavatory with insulation kit. Color: white.
- Fixture: Kohler K-2214
American Standard "Aqualyn"
Eljer "Laura"
- F. Shower (SH1): pressure balancing shower valve with lever handle, integral check stops and volume control, chrome plated, vandal proof, 2.5 gpm shower head assembly. Type D shower drain.
- Shower valve: Florestone 39-62H
Symmons 4-500
Leonard PAM II-ST-TB
- G. Undermount Sink (S1): standard, single bowl, 18 gauge, type 304 stainless steel. Dual spray pull-out faucet.
- Fixture: Elkay ELUB12FB.
Just Mfg DFB18
Moen 1800 series.
- Drain: Elkay LK-35.
Just Mfg. J-35.
Moen sink drain.

Faucet: Eurodisc 33-330.
Just Mfg. JPO series.
Moen "Extensa" 7560 series.

- H. Undermount Sink (S2): Gourmet single bowl sink with ribbed area. 18 gauge type 304 stainless steel. Self-rimming. Dual spray pull-out faucet.

Fixture: Elkay ILGR4322L.
Just Mfg. SI-2243-A-GR-R

Drain: Elkay LK-35.
Just Mfg. J-35
Moen sink drain.

Faucet: Eurodisc 33-330.
Just Mfg. JPO series.
Moen "Extensa" 7560 series.

- I. Undermount Sink (S3): Drop-in sink-ette with drainboard. 18 gauge type 304 stainless steel. Self-rimming. Dual spray pull-out faucet.

Fixture: Elkay ILR5422DD.
Just Mfg. SI-2243-A-GR

Drain: Elkay LK-35.
Just Mfg. J-35.
Moen sink drain.

Faucet: Eurodisc 33-330.
Just Mfg. JPO series.
Moen "Extensa" 7560 series.

- J. Utility Sink (S4): 18 gallon capacity utility tub set.

Fixture: Mustee 19F
Swanstone "Veritek" MF-4W

Faucet: Eagle #313304
T&S B-0892
Advance Tabco K-132

- K. Utility Sink (S5): 19 gallon capacity utility tub set.

Fixture: Mustee 27F
Florestone20FM
Zum MS2620

Faucet: Eagle #313304
T&S B-0892
Advance Tabco K-132

- L. Drinking Fountain (DF):

Wall-mounted drinking fountain constructed of #18 gauge, type 304, stainless steel. Contoured basin, safety bubbler, push-button operated. In-line flow regulator to provide stream from 20 to 105 psi.

Manufacturer: Elkay EDFP214C
Halsey Taylor HAC8FSQ
Haws HCBF7 series.

2.9 WATER HEATING EQUIPMENT

- A. General: Water heaters shall conform to all applicable A.S.M.E. Standards, approved by the National Sanitation Foundation, and in compliance with ASHRAE 90 (latest edition).
- B. Electric storage water heater. (WH1): Heater(s) shall have the UL seal of certification and be factory equipped with an CSA/ASME rated temperature and pressure relief valve. Tank(s) interior shall be coated with a high temperature porcelain enamel and furnished with an R-Tech restored magnesium anode rod rigidly supported. Water heater(s) shall meet or exceed the energy factor requirements of ASHRAE. Tanks shall have a working pressure rating of 150 psi, and shall be completely assembled. Water heater(s) shall be equipped with copper, restored, "screw-in" type elements. Tank shall be insulated with 2 1/2" of rigid polyurethane foam insulation. Water heater(s) shall be equipped with surface mounted thermostats each with an integral, manual reset, high limit control. Water heater(s) shall be covered by a three year limited warranty against tank leaks.

Manufacturer: Rheem ELD120
AO Smith PCT-120
Bradford White LD-120R3-3

- C. Electric storage water heater. (WH2, WH3): Steel tanks with anode rods and polyurethane foam insulation; high porcelain enamel finish maximizes corrosion resistance. Include thermostat and temperature limiting control. Factory-installed T&P valves are AGA/ASME rated. Max. thermostat setting: 160°F Moderate Hot Water Recovery, units feature 2 elements, 2-1/2" of rigid polyurethane foam insulation, and brass drain valve.

Manufacturer: Rheem EGSP30
AO Smith PCJ-30
Bradford White LD-30L3-3

- D. Water heating equipment specialties.
1. Thermostatic mixing valve, water heater (TMV1): Threaded inlets and outlet, thermostatic controller with swivel action check stops, removable cartridge with strainer (provide 1 extra cartridge), stainless steel piston and liquid fill thermal motor, volume control/shut-off valve, bi-metal dial thermometer, (3" face, 20 degrees F. to 240 degrees F.) brass pipe, fittings and unions. Rough chrome body finish.
 2. Thermometer (TH): adjustable angle type, mercury or liquid actuated, constructed with non-corrosive internal mechanism and recalibrator adjustment; assembled in minimum 3-1/2 inch diameter gasket sealed, glass faced stainless steel case; equipped with stainless steel bracket assembly, separable socket, 30 to 240 degrees F. water temperature range.

Manufacturer: Terice L80030.
Palmer Wahl 35A
Weiss Instruments 3RBMS

3. Pressure and temperature relief valve (P&T): ASME rated, bronze body, non-corrosive trim, automatic reseating, extension thermostat, test lever, threaded inlet and outlet; 75 to 150 psi adjustable pressure range, set at 125 psi, 210 degrees F. water. Provide P&T if not included with water heating equipment.
4. Thermal expansion tanks (ET1): ASME rated, suspended-type, 6.4 gallon total volume, 0.50 maximum acceptance volume, 150 psig working pressure, welded steel shell, heavy duty butyl diaphragm, polypropylene lined water reservoir. 200°F operating temperature, provide 62 psi pre-charge

Manufacturer: Amtrol "Therm-X-Trol" ST-12-C
 Watts PLT-12
 Elbi DTS series

2.10 PUMPS

- A. General: refer to drawings for specific pump characteristics, (i.e. H.P., gpm, TDH, and Elec.).
- B. Domestic hot water circulating pumps (RP1): Bell & Gosset Series 100 or approved equal, UL listed, all bronze, in-line centrifugal pump, close coupled, 1/6 HP, 120V, 1PH, 1750 RPM.
 1. Circulator controllers: UL listed, automatic immersion aquastat, adjustable temperature range, and differential immersion well. Electrical rating 115 VAC.
 2. Motor starters: UL listed, manual starting switch in NEMA 1 enclosure with "Hands-Off-Auto" selector switch. Refer to section 220513.

2.11 MISCELLANEOUS PLUMBING SPECIALTIES

- A. Mechanical mixing valves: bronze body, chrome plated, 3/8" inlet and outlet connections.

Manufacturer: Symmons #4-10 series.
 Watts LFUSG-B
 Sloan Mix series.

- B. Water hammer arrestors: all 316 stainless steel, mechanical-pneumatic type, hermetically sealed bellows, threaded inlet; 150 psi WWP. Size and placement determination: PDI-WH 201.

Manufacturer: Precision Plumbing Products SS Series.
 Watts SS-series
 JR Smith Hydrotrols

- C. Water hammer air chambers: Copper ASTM B88, 12" long with spun closed end and sweat inlet connections. Install behind each fixture on each service.
- D. Air vent: bronze body, stainless steel trim and float, threaded inlet and outlet; 150 psi WWP.

Manufacturer: Sarco 13W series.
 Spirotherm Spirotop VTP
 Armstrong AV series

- E. Electronic trap primer (TP1) serving 1 to 4 floor drains in mechanical rooms: Precision plumbing products:

Manufacturer: PPP Mini-Prime model MP-500-115V

MIFAB MI-300
Zum Z1020

- F. Trap primer valve: self adjusting automatic trap primer and distribution unit complete with integral backflow preventer, distribution box, corrosion resistant brass fittings with a copper reservoir, clear plastic inspection cover on reservoir. Provide mounting brackets and install with access panel.

Manufacturer: Precision Plumbing Products Oregon #1 series.
MIFAB M-500
Watts LFTP300

- G. Pressure gauge (PG): direct mounting, liquid filled, constructed with non-corrosive internal mechanism, recalibrator adjustment, assembled on 4-1/2" black phenolic turret type case with blow out plug, gasket sealed glass faced with dial, 0 to 200 psig range. Gauge accurate to 1% of scale range.

Manufacturer: Terice 450LFB series.
Palmer Wahl 45TS series
Weiss Instruments Series PG-1

- H. Gauge valve: all bronze needle valve, 150 psi WWP.

- I. Water filter: two-piece high impact strength plastic housing, 125 psi WWP, replaceable 5 micron filter cartridge. Equip on cold water supply to all electric water coolers.

Manufacturer: AMF CUNO 1M housing with G78B2 filter series.
Watts AIRPO
Omnipure CL series

- J. Water filter Scale Inhibitor: scale inhibitor water conditioner, constructed of high impact strength plastic for 125 psi WWP, equipped with integral by-pass and replaceable cartridge filter element, 1 to 6 gpm flow range. Equip on cold water make-up supply to all HVAC equip.

Manufacturer: Filterite SI-4 series.
Watts OneFlow series.
Omnipure Q series

- K. Hose bibb (HB): unfinished areas, bronze body, removable valve seat and stem assembly, threaded end and Watts NF8 vacuum breaker.

Manufacturer: Nibco #64 with Watts NF8 series.
Watts SC8 series with vacuum breaker.
Zum Z1341

- L. Hose bibb (HB): finished areas, chrome plated bronze sill cock with "lock shield key", removable hand wheel, and vacuum breaker.

Manufacturer: Nibco 763-LS series.
JR Smith 1/4 Wall Hydrant
Woodford Wall Hydrant

- M. Manual washing machine drain and shut-off valves – recessed, single lever ball type, brass body, copper ELL adaptors, in a plastic wall box complete with standpipe drain piping connection and plastic cover. Install per manufacturer's instructions at each washer.

Manufacturer: Watts 2M2-DWB
Sioux Chief OxBox
Zurn WM2961

2.12 ACCESS DOORS IN WALLS AND CEILINGS

- A. At each valve, cleanout or plumbing device requiring access, furnish an access door for installation by other sections. Rigid construction with two hinges and a latch. In plenum ceilings, provide felt between the door and frame to make an air tight seal. Access doors shall be flush mounted, prime coated with rust inhibitive paint, concealed frame, flushscrew driver operated locks with metal cams and anchors as required. Refer to division 8 for additional requirements.

Access door sizes shall be:
12" x 12" at easily accessible items.
16" x 16" where partial body access is required.
24" x 24" where full body access is required.

Manufacturer: Milcor type M series.
Cesco series.

PART 3 - EXECUTION

3.1 GENERAL

- A. Drawings are diagrammatic and indicate a general arrangement of work. General design concepts indicated must be followed or bettered. Do not scale drawings. Consult Architectural and Structural drawings for space conditions. Develop and submit coordination drawings as outlined in section 230000.
- B. Manufacturer's qualifications: firms regularly engaged in the manufacture of fixtures, appliances, pipes and pipe fittings of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- C. Material qualifications: shall conform to all local, state, and national/federal codes and regulations which may apply and nothing in these specifications shall be interpreted as an infringement of such codes or regulations.
- D. Welding: qualify welding procedures, welders, and operators in accordance with ASME B31.1, or ASME B31.9, as applicable. Certify welding of piping work using Standard Procedure Specifications by, and welders tested under supervision of, National Certified Pipe Welding Bureau (NCPWB).
- E. Brazing: certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.

3.2 DELIVERY, STORAGE, AND HANDLING

- A. Except for concrete, corrugated metal, hub-and-spigot, clay, and similar units of pipe, provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage and handling, as required to prevent pipe-end damage, and eliminate dirt and moisture from inside of pipe and tube.
- B. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.
- C. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

3.3 ELECTRICAL CONNECTIONS AND WIRING

- A. Power wiring to electrical devices shall be installed by Division 26. Contract #2 Contractor shall be responsible to furnish all motor starters for installation by Division 26 and provide and install miscellaneous control and power wiring required by the equipment for proper and safe operation not specifically outlined in Division 26.

3.4 EQUIPMENT IN OTHER DIVISIONS AND/OR BY THE OTHERS

- A. Section 220000 shall provide and/or install traps, stops, faucets, fittings, tailpieces, etc. including any miscellaneous trim and/or components not furnished by others but required for safe and proper operation, and connect the service
- B. Obtain certified and approved prints of roughing drawings of equipment before starting work.
- C. Coordinate and verify all equipment locations, connections, and equipment requirements with the appropriate contractors (i.e. Kitchen). Provide and install all piping and equipment necessary to operate all equipment properly and safely whether specifically shown or not.
- D. All exposed piping, stops, cocks, and wastes which are visible to occupants shall be chrome plated.

3.5 COORDINATION OF WORK

- A. Carefully coordinate space requirements with other trades to insure that all materials can be installed in spaces allotted thereto, including finished suspended ceilings.
- B. Prepare and submit coordination drawings as outlined in section 230000.
- C. Provide and install concrete housekeeping pads for all floor mounted plumbing equipment.

3.6 ALTERATION WORK

- A. All equipment, fixtures, piping, etc. to be removed, shall be disposed of, turned over to the City of New York, or salvaged as directed by the City of New York. Equipment, fixtures, piping, devices, etc. shall not be removed from the premises without the City of New York's approval.
- B. All piping to remain shall be properly plugged, valved, capped and/or by passed such that upon completion of work all abandon systems are properly concealed, and that existing systems to remain, remain operational.

- C. No dead ends shall be left on any piping systems upon completion of work.
- D. Existing exposed piping systems not to be reused, and not specifically noted for removal shall be completely removed.
- E. All systems shall be left in working order to the satisfaction of the City of New York upon completion of all new work.
- F. All existing exposed, unnecessary piping related to new work shall be completely removed.
- G. Re-route or remove all existing piping and systems where necessary to avoid new equipment, structural, or masonry work as required by the proposed alterations.

3.7 PIPING GENERAL

- A. The word "piping" in this Specification shall mean pipe, fitting, flanges, nipples, and valves. Install underground piping as soon as possible so that trenches may be closed as quickly as possible.
- B. No piping shall be covered until tested approved by the Commissioner.
- C. Install all piping in correct relation thereto and the finished grades indicated on the drawings, and as required for coordination.
- D. All piping shall be run perpendicular and/or parallel to floors, interior walls, etc. Piping and valves shall be grouped neatly and shall be run as to maximize headroom or passage clearance. All valves, controls and accessories concealed in furred spaces and requiring access for operation and maintenance shall be arranged to assure the use of a minimum number of access doors.
- E. All pipe lines made with screwed fittings must be provided with a sufficient number of flanges and/or unions to allow for easy and convenient dismantling of the system without breaking fittings.
- F. Check the drawings for space limitations permitted for the installation of piping such as shafts, chases, and furred ceilings.
- G. All piping shall run concealed in furred spaces of occupied areas or chases wherever construction permits. Contract #2 Contractor shall obtain permission from the Commissioner to run any exposed pipes.
- H. All pipes shall be reamed to full area before installation and blown clear of chips and dirt. With threaded pipes apply compound to the male thread only.
- I. Cap all pipe and equipment outlets during construction and keep lines and inside of equipment free of foreign materials. Provide for expansion without warping or dislocating lines or straining connected equipment. Install piping to clear building construction and to avoid interference with other work.
- J. Provide and erect in a workmanlike manner, according to the best practices of the trade, all piping shown on the drawings or required to complete the installation intended by these specifications.
- K. The drawings indicate schematically the size and location of piping. Piping shall be set up and down and offset as required to meet field conditions.

- L. Contract #2 Contractor shall inform himself from the general construction specifications and plans, of the exact dimension of finished work and of the height of finished ceilings in all rooms where equipment or pipes are to be placed and arrange his work in accordance with the schedule of interior finishes, as indicated on the architectural drawings.
- M. All piping below grade or building slab shall be coated with coal tar enamel.
- N. Provide and install identification of piping and valves. Refer to other Division 23 Sections for installation requirements.
- O. Provide and install additional pipe protection (i.e. concrete encasement, and /or laying condition, bedding type and methods.) for underground piping subject to excessive loading by depth of bury, traffic or other sources.
- P. Underground piping shall be coordinated with concrete piers, footings and grade beams. Piping shall not be located adjacent to the concrete structure's bed closer than a 45 degree angle from the bottom of the concrete structure. Piping running below a wall footing or grade beam shall have a minimum non-bearing clearance of 6" above the pipe to the bottom of the concrete structure.

3.8 PRESSURIZED PIPING

- A. Exterior water piping shall be installed at least 5'-0" below grade to top of pipe.
- B. Water piping shall be run free of traps and unnecessary bends. Any traps formed shall be provided with hose end drain valves with threaded cap and chain to completely drain the system.
- C. Install water hammer arrestors on water systems in accordance with manufacturer's recommendations.
- D. Provide section cut-off valves on all main branches or as shown. Pitch and valve all water piping for convenient drainage.
- E. Wherever dissimilar metals are joined together an approved dielectric fitting shall be used.
- F. Each sectional shut-off shall have a brass tag and copper wire with a number. A chart shall be made up for each system setting forth the number of valves and what fixture it controls. Chart to be placed in glass frame and hung in Mechanical Equipment Room. Refer to section 230000 for piping and valve identification requirements.
- G. Balance domestic hot water recirculation systems to maintain temperature throughout entire system.

3.9 DRAINAGE PIPE INSTALLATION

- A. Run all soil, waste and vent piping shown or required by local codes. Piping shown is minimum and in accordance with State and Federal codes. If local codes require additional venting or larger sizes, same shall take precedence.
- B. Make all connections through traps. Each trap to be vented, either by circuit, loop, or individual vent, as required, but not less than shown, or as required by local code.
- C. Vent pipes shall be graded to free themselves of any water or condensation. Pitch vents not less than 1/8" per foot up toward stack.
- D. Install exterior cleanouts with an 18" square x 6" thick concrete apron.

- E. Pitch horizontal storm water and drains within or buried under the building not less than 1/8" per foot unless otherwise indicated on drawings.
- F. Pitch horizontal sanitary and waste piping at 1/2" per ft. slope for piping 1-1/2" or less; 1/4" per ft. slope for piping 2" and 3" diameter; and 1/8" per ft. slope for piping 4" to 6" diameter.
- G. Piping shall be laid true to line and grade as shown on the drawings, and in such a manner that a true and even surface at the invert is made over joints and throughout the entire length of the line. Piping shall be graded by the tripod level and measuring rod method assuring a uniform slope of the pipe.
- H. All underground piping shall be laid on 6" sand and backfilled with clean fine earth compacted to 12" above pipe. Complete backfill with available earth free of large boulders and sharp rocks. Tamp backfill in 6" elevations and overfill to allow for settlement.

3.10 PIPING SUPPORT

- A. General
 - 1. Refer to Sections 230000, 220523, and 222000 for general requirements.
 - 2. Protection shields shall be provided under all horizontally insulated piping at each hanger.
 - 3. Provide necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations.
- B. Horizontal piping support
 - 1. Cast iron soil pipe shall be supported at not more than 5-foot intervals. Supports shall be of ferrous material.
 - 2. Copper tubing shall be supported at approximately 6-foot intervals for piping 1-1/2" and smaller and 10-foot intervals for piping 2" and larger. Supports shall be of copper material.
- C. Vertical piping support
 - 1. Cast-iron soil pipe. Cast iron soil pipe shall be supported at not less than every story height and at its base. Supports shall be of ferrous material.
 - 2. Bases of cast iron soil stacks shall be supported on concrete, or metal brackets attached to the building structure, or any other methods designed to eliminate stress at the base of stacks and leaders approved by the local administrative authority.
 - 3. Copper tubing shall be supported at each story for piping 1-1/2" and over and not more than 4-foot intervals for piping 1-1/4" and smaller. Supports shall be of copper material.

3.11 INSULATION

- A. Refer to section 220700 for installation requirements.

3.12 VALVES INSTALLATION

- A. Refer to section 220523 for general requirements.
- B. Do not install air gap backflow preventers in concealed spaces or in areas where splashing water will damage finishes. Provide and install an oversized copper funnel with air gap directly below RPZ pressure relief port. Pipe funnel to spill as an indirect waste to an approved drain location.
- C. Install all trap primer valves in an accessible location. Provide and install access panels and doors where required to gain access in concealed construction.

3.13 SLEEVE INSTALLATION

- A. Refer to Section 230000 and 220523 for general requirements.
- B. All piping through walls, floors or ceilings shall have sleeves and escutcheons.
- C. All piping penetrating a slab on grade or foundation wall below grade and in contact with earth shall be provided with a poured in place schedule 80 galvanized steel water tight sleeve with integral water stop and seal equal to "link seal".
- D. Furnish and set steel pipe sleeves of schedule 40 black steel for all locations of interior partitions, walls and floors providing at least 1/2" clearance between pipe insulation and sleeve or pipe and sleeve. Wall sleeves shall be smooth cut and set flush with finished walls. Floor sleeves shall extended 2" above the finished floor. Provide a two-piece chrome escutcheon where piping passes through walls or floors of finished spaces.
- E. Fill void spaces between piping and pipe sleeves penetrating fire/smoke walls and floors with an approved UL listed and fire tested sealing material.

3.14 DRAIN AND CLEANOUT INSTALLATION

- A. General: Provide and install all drains and cleanouts with 6# 24" x 24" vinyl flashing.
- B. Make all connections through traps. Each trap to be vented, either by circuit, loop, or individual vent, as required, but not less than shown, or as required by local code.
- C. Cleanouts shall be installed at the base of all stacks, at all changes of directions greater than 45 degrees and in runs to provide means of cleaning lines at maximum 50' intervals. Cleanouts shall be provided as noted and as required by code on all horizontal runs, except where floor drains connect to mains with less than 3'-0" of horizontal run from trap and the Commissioner approves of this exception.
- D. Coordinate floor drain locations with respect to equipment housekeeping pads. Place drains such that edge of the floor grate extends no further than 2 inches from the side of the pad.

3.15 PLUMBING FIXTURES

- A. The fixtures shall be furnished complete with chrome plating on exposed piping or trim. Provide anchor bolts, hangers, strainers, faucets and other incidental items furnished as standard. Provide loose key stops at every fixture. All supply fittings and exposed fixture trim shall be all brass, chrome plated.
- B. All fixtures are to be new, free of cracks, blemishes or other imperfections and to be "acid-resisting" quality.

- C. Set and properly connect all fixtures with hot and cold water, vent and drainage piping, as required and protect fixtures until acceptance and test. Clean all flush valves after two weeks of operation.
- D. All piping through walls, floors or ceilings shall have sleeves and escutcheons.
- E. Provide all fixture mounting supports and carriers as required to suit field conditions. Carriers and supports shall be floor mounted type except as noted.
- F. Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Correct any incorrect location of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the engineer. All rough-in to plumbing fixtures shall conform to fixture manufacturer published rough-in dimensions, and requirements.
- G. Adjust all plumbing fixtures, faucets and flush valves to meet the maximum water consumption requirements listed herein.

Water closets:	1.28 gallons per flush
Urinals:	0.5 gallons per flush
Lavatory:	0.5 gpm flow restrictor
Showers:	2.0 gpm
- H. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. Correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- I. Inspect each installed unit for damage to finish. If damaged, restore and match finish to original at site to the satisfaction of the Commissioner; otherwise, remove fixture and replace with new unit. Remove cracked or dented units and replace with new units.
- J. Clean plumbing fixtures, trim, and strainers of dirt and debris upon completion of installation.
- K. Adjust water pressure at drinking fountains, faucets, shower valves, and flush valves to provide proper flow stream and specified gpm.
- L. Exercise care in handling of fixtures, trim, pipe, and fittings. Use tools designed to prevent damage to surface finishes.
- M. Set fixtures level and uniformly, with connections at right angles to wall and properly centered. Lay out roughing accurately and in coordination with space and finish requirements. If field cut-outs and holes are required use proper cutting and drilling tools to maintain integrity of finished surface. Provide cut-out templates for countertop insert or undermount items.
- N. Locate waste outlets and water supplies at constant horizontal levels, with waste outlet centered on fixture drain connection and water supplies spaced equally to right and left.
- O. Support wall hung fixtures rigidly from building construction, not from piping, by means of concealed metal supporting members designed to carry weight of fixture under conditions of unusual loading, with no stress placed on waste connection or any other part of system.

- P. Secure floor mount supports to slab. Secure wall mount supports to 1/4 inch thick metal backup plate secured to wall construction. Do not use wire, nails, or other makeshift devices to secure supporting members. Secure recessed and inserted items to supporting surface.
- Q. Use vandal-proof devices to secure fixtures, trimmings and fittings to deter unauthorized removal. Provide chrome plated brass washers and cap nuts for exposed bolt ends.
- R. Provide escutcheons, threaded or held in place with threaded part or set screw, on piping and fixture supports protruding from wall or floor, and on visible connections to fixtures.
- S. Make connection between integral trapped fixtures and drainage piping with an approved prepared gasket that shall be a germicide, absolutely gas and fume-proof, watertight, stainproof, containing neither oil or asphaltum, and which will not rot, harden, or dry under any extreme of climatic change, and must adhere on wet surfaces.
- T. Use non-ferrous spacing devices to support and stabilize water piping.
- U. Paint non-coated ferrous metal surfaces of fixtures, including brackets, hangers, and plates with prime coat of paint.
- V. Upon completion of work, remove protective covers and thoroughly clean surfaces, traps and strainers. Check all items for proper operation. Tighten packings and retaining devices.
- W. Adjust flush valves to provide minimum flow consistent with cleaning requirements of fixtures. Adjust supplies to provide adequate flow without splashing, and with flow rate of hot and cold water equal in velocity, except as otherwise required.

3.16 INDIVIDUAL SIZES OF BRANCHES TO FIXTURES

	COLD	HOT	WASTE	VENT
Water closets(tank)	1/2"	---	4"	2"
Water closets(flush val)	1-1/4"	---	4"	2"
Urinals (flush valve)	3/4"	---	2"	2"
Lavatories	1/2"	1/2"	1-1/2"	1-1/2"
Electric water coolers and drinking fountains	1/2"	---	1-1/2"	1-1/2"
Hose bibbs	3/4"	--	---	---
Clothes washer	1/2"	1/2"	2"	2"
Service sink or mop receptor	1/2"	1/2"	2"	2"
Sinks	1/2"	1/2"	2"	2"
Showers	3/4"	3/4"	2"	2"

3.17 ROUGHING HEIGHTS

A. Above Finished Floor

Lavatories	31" to top of rim
Urinals	24" to top of rim
Water closets	15" to top of rim
Electric water coolers and drinking fountains	33" to top of rim
Hose bibbs	24" to bottom of spout

B. Handicap fixtures shall be set in accordance with ADA and local requirements.

3.18 EQUIPMENT IN OTHER DIVISIONS AND/OR BY CITY OF NEW YORK

- A. Kitchen equipment - Equipment will be provided and set by Kitchen Equipment Contractor (K.E.C.), except as noted below or on drawing.
- B. Faucets and tailpieces will be provided but not set by K.E.C.
- C. Plumber shall provide and install traps and stops and install faucets and tailpieces and connect the service as required.
- D. Plumber shall obtain certified prints of roughing drawings of equipment before starting work.

3.19 THRUST BLOCKS AND BRACING

- A. General: Conform to the requirements of NFPA 24.
- B. Thrust blocks for water piping shall be provided at all changes in direction both horizontally and vertically. Thrust blocks shall bear against undisturbed earth or earth installed in accordance with NFPA 24.
- C. Use rough forms along ends of concrete. Place concrete directly against fittings to be braced, and directly against undisturbed surface of trench wall. Do not encase fittings in concrete.

3.20 PENETRATIONS THROUGH FIRE SEPARATIONS

- A. Fire and smoke seal: UL listed, approved and tested fire and/or smoke sealing material installed in all fire and/or smoke rated floor and partitions in accordance with manufacturer's recommendations.

3.21 DISINFECTION OF POTABLE WATER SYSTEM

- A. Potable water systems shall be disinfected in accordance with State and Local codes but by not less than one of the following methods before it is placed in operation.
- B. The system, or part thereof, shall be filled with a solution containing 50 parts per million of available chlorine and allowed to stand 24 hours before flushing and returning to service.
- C. The system, or part thereof, shall be filled with a solution containing 200 parts per million of available chlorine and allowed to stand 3 hours before flushing and returning to service.

3.22 TESTS

- A. General: Test plumbing systems to satisfaction of Building Official. Do not close in, conceal, or cover up any plumbing work until it has been tested, inspected, and approved.
- B. Flush piping, prior to testing, to remove foreign materials which may have entered during course of installation. Clean filters and strainers after flushing.
- C. Test all piping except drainage and vent piping, including valves, fittings and joints hydrostatically at a pressure equal to at least 1-1/2 times the normal working pressure of the system under which it is to be used, but no less than 100 psig for a minimum of four hours. Blank off or remove all elements or equipment which may be damaged by the pressure. Open but do not back-seat valves. Inspect all joints and connections.

- D. Test rough plumbing drainage and vent system with water or air at least as follows:
 - 1. Water test: apply water test to drainage system either in its entirety or in sections. If applied to entire system, tightly close all openings in piping, except highest, and fill system with water to point of overflow. If system is tested in sections, tightly plug each opening except highest opening of section under test, and fill section with water. In testing successive sections at least upper 10 feet of next preceding section shall be tested, so that no joint or pipe in building (except uppermost 10 feet of system) shall have been submitted to a test of less than a 10 foot head of water. Keep water in system or in portion under test, for at least 15 minutes before inspection starts; system shall then be tight at all points.
- E. Final test for gas and water tightness to be as follows:
 - 1. Smoke test: fill all traps with water, and then introduce into the system a pungent thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof, they shall be closed, and a pressure equivalent to one inch water column shall be held for the test and inspection period.
- F. Repair all leaks, defects or damage revealed by the results of the testing and re-test the system.
- G. Do not insulate or conceal piping until the system has been tested and the results approved.
- H. Perform tests in the presence of the DOB Inspector. Notify Commissioner.

3.23 INSTRUCTION

- A. Provide field instruction course for City of New York's designated personnel.
- B. Instruction shall be provided for a total period of at least (8) hours of normal working time and shall start after the system is functionally complete but prior to final acceptance tests.
- C. Field instruction shall cover all of the items contained in the operation and maintenance manuals.

3.24 WASTE MANAGEMENT

- A. Contract #2 Contractor shall coordinate and comply with the Waste Management Plan requirements developed in conjunction with Contract #1 Contractor 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

SECTION 220013 – PLUMBING CONTRACTOR WORK
ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

1.01 SCOPE FOR ASBESTOS ABATEMENT WORK

- A. The "General Conditions" apply to the work of this Section.
- B. The Asbestos abatement contractor shall remove asbestos containing materials as needed to perform the other work of this Contract when discovered during the course of work. When required, the Asbestos abatement contractor shall replace the ACM with non-asbestos containing materials. An allowance of **\$5,000.00** for the **Plumbing Contractor** is herein established for this incidental work when so ordered and authorized by the Commissioner.
- C. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE RULES AND REGULATIONS OF THE ASBESTOS CONTROL PROGRAM AS PROMULGATED BY TITLE 15 CHAPTER I OF RCNY AND NEW YORK STATE DEPARTMENT OF LABOR INDUSTRIAL CODE RULE 56 CITED AS 12 NYCRR, PART 56 WHICHEVER IS MORE STRINGENT AS PER LATEST AMENDMENTS TO THESE LAWS AND AS MODIFIED HEREIN BY THESE SPECIFICATIONS.
- D. ALL DISPOSAL OF ASBESTOS CONTAMINATED MATERIAL SHALL BE PER LOCAL LAW 70/85.
- E. THE ASBESTOS ABATEMENT CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT CERTAIN METHODS OF ASBESTOS ABATEMENT ARE PROTECTED BY PATENTS. TO DATE, PATENTS HAVE BEEN ISSUED WITH RESPECT TO "NEGATIVE PRESSURE ENCLOSURE" OR "NEGATIVE-AIR" OR "REDUCED PRESSURE" AND "GLOVE BAG".
- F. THE ASBESTOS ABATEMENT CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR AND SHALL HOLD THE DEPARTMENT OF DESIGN AND CONSTRUCTION AND THE CITY HARMLESS FROM ANY AND ALL DAMAGES, LOSSES AND EXPENSES RESULTING FROM ANY INFRINGEMENT BY THE ASBESTOS ABATEMENT CONTRACTOR OF ANY PATENT, INCLUDING BUT NOT LIMITED TO THE PATENTS DESCRIBED ABOVE, USED BY THE ASBESTOS ABATEMENT CONTRACTOR DURING PERFORMANCE OF THIS AGREEMENT.
- G. "Asbestos" shall mean any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumingtonite-grunerite), crocidolite (riebeckite), tremolite, anthrophyllite and actinolite.

- H. Prior to starting, the Asbestos abatement contractor must notify the Commissioner of the Department of Design and Construction if he/she anticipates any difficulty in performing the Work as required by these Specifications. The Asbestos abatement contractor is responsible to prepare and submit all filings, notifications, etc. required by all City, State and Federal regulatory agencies having jurisdiction.

The Asbestos abatement contractor is responsible for submitting the Asbestos Project Notification Form (ACP-7 Form) to the Department of Environmental Protection, Asbestos Control Program, as per Title 15, Chapter I of RCNY and to the NYSDOL as per Industrial Code Rule 56.

The Asbestos abatement contractor is responsible for preparing, and submitting Asbestos Variance Application (ACP-9). If a Variance is required, the Asbestos abatement contractor is responsible to retain a NYSDOL Asbestos Project Designer, as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required variance.

The Plumbing contractor is responsible for preparing and submitting an Asbestos Abatement Permit and/or Work Place Safety Plans (WPSP) that may be required for the completion of the Contract or incidental work. If such plans are required, the Asbestos abatement contractor is responsible to retain a NYSDOL Licensed Design Professional as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required plans.

The Asbestos abatement contractor is responsible for the submission of all required documents to the NYCDEP to acquire the appropriate Asbestos Project Conditional Closeout (ACP-20) and/or Asbestos Project Completion Forms (ACP-21) on a timely basis for the completion of the incidental work encountered under this contract.

The Asbestos abatement contractor will be required to attend an on-site job meeting with the Construction Project Manager prior to the start of work to examine conditions and plan the sequence of operations, etc.

The Asbestos abatement contractor shall have a NYSDOL/NYCDEP Asbestos Supervisor onsite to oversee the work and conduct a final visual inspection as required by both Title 15, Chapter 1 of the RCNY and NYSDOL Industrial Code Rule 56.

- I. All work shall be done during regular working hours unless the Asbestos abatement contractor requests authorization to work in other than regular working hours and such authorization is granted by the Commissioner. (Regular work hours are those hours during which any given facility, in which work is to be done, is customarily open and functioning, normally between the hours of 8:00 A.M. and 4:00 P.M. Monday - Friday.) If such work schedule is authorized by the Commissioner, the work shall be done at no additional cost to the City.

- J. The Commissioner may order that work be done in other than regular working hours as herein by defined and this order may require the Asbestos abatement contractor to pay premium or overtime wages to complete the work. If the Commissioner orders work in other than regular working hours, the Asbestos abatement contractor shall multiply the unit price for that portion of the work requiring premium wages by 1.50 when computing payment in accordance with Paragraph 1.09. All requests for premium payment must be supported by certified payroll sheets and field sheets approved by the Construction Project Manager.

1.02 QUALIFICATIONS OF ASBESTOS ABATEMENT CONTRACTOR

- A. Requirements: The asbestos abatement contractor must demonstrate compliance with the special experience requirements set forth in subparagraphs (1) through (5) below. The asbestos abatement contractor must, submit documentation demonstrating compliance with all listed requirements. Such documentation shall include without limitation, all required licenses, certificates, and documentation.
1. The asbestos abatement contractor must, whether an individual, corporation, partnership, joint venture or other legal entity, must demonstrate for the three year period prior to the work, that it has been licensed by the New York State Department of Labor, as an "Asbestos abatement contractor".
 2. The asbestos abatement contractor must, for the three year period prior to the work, have been in the business of providing asbestos abatement services as a routine part of its daily operations.
 3. The asbestos abatement contractor proposing to do asbestos abatement work must be thoroughly experienced in such work and must provide evidence of having successfully performed and completed in a timely fashion at least five (5) asbestos abatement projects of similar size and complexity. The aggregate cost of these projects must be at least \$250,000.00 in each of the three years.
 4. For each project submitted to meet the experience requirements set forth above, the asbestos abatement contractor must submit the following information for the project; name and location of the project; name title and telephone number of the owner or the owner's representative who is familiar with the asbestos abatement contractor's work, brief description of the work completed as a prime or sub-asbestos abatement contractor; amount of contract or subcontract and the date of completion.
 5. The asbestos abatement contractor must demonstrate that it has the financial resources, supervisory personnel and equipment necessary to carry out the work and to comply with the required performance schedule, taking into consideration other business commitments. The asbestos

abatement contractor must submit such documentation as may be required by the Department of Design and Construction to demonstrate that it has the requisite capacity to perform the required services of this contract.

- B. Insurance Requirements: The asbestos abatement contractor must provide asbestos liability insurance in the following amount: 1 million dollars per occurrence, 2 million dollars aggregate (combined single limit). The City of New York shall be named as an additional insured on such insurance policy.
- C. Throughout the specifications, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics thereof.

1.03 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITIES

The Asbestos abatement contractor will visit the subject location within one (1) working day of notification to ascertain actual work required. If the project is identified as being "urgent", then work shall commence no later than 48 hours from the time of notification. In this event, the asbestos abatement contractor shall immediately notify when applicable EPA NESHAPS Coordinator, NYSDOL Asbestos Control Bureau and NYCDEP Asbestos Control Program of start of the work and file the necessary Asbestos Notifications and any applicable Variance Applications with the regulatory agencies cited above..

In the event that the project is not classified as "urgent" the Asbestos abatement contractor shall notify the EPA NESHAPS Coordinator, NYSDOL and NYCDEP by submitting the requisite asbestos project notification forms, postmarked 10 days before activity begins if 260 linear feet or more and/or 160 square feet or more of asbestos containing material will be disturbed.

The following information must be included in the notification:

- A. Name and address of building City or operator;
- B. Project description:
 - 1. Size - square feet, number of linear feet, etc;
 - 2. Age - date of construction and renovations (if known);
 - 3. Use - i.e., office, school, industrial, etc.
 - 4. Scope - repair, demolition, cleaning, etc.
- C. Amount of asbestos involved in work and an explanation of techniques used to determine the amount;

PLUMBING CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- D. Building location/address, including Block and Lot numbers;
- E. Work schedule including the starting and completion dates;
- F. Abatement methods to be employed;
- G. Procedures for removal of asbestos-containing material;
- H. Name, title and authority of governmental representative sponsoring project.

1.04 WORK INCLUDED IN UNIT PRICE

The Asbestos abatement contractor will be paid a basic unit price of **\$25.00** per square feet for the removal and disposal of asbestos containing material and replacement of the same with non-asbestos containing materials.

Unit price shall include all costs necessary to do the work of this Contract, including but not limited to: labor, materials, equipment, utilities, disposal, insurance, overhead and profit.

1.05 AIR MONITORING – ASBESTOS ABATEMENT CONTRACTOR

- A. "Air Sampling" shall mean the process of measuring the fiber content of a known volume of air collected during a specific period of time. The procedure utilized for asbestos follows the NIOSH Standard Analytical Method 7400 or the provisional transmission electron microscopy methods developed by the USEPA and/or National Institute of Standard and Technology which are utilized for lower detectability and specific fiber identification.
- B. Air monitoring of Asbestos abatement contractor's personnel will be performed in conformance with OSHA requirements, (All costs associated with this work are deemed included in the unit price.).
- C. Qualifications of Testing Laboratory:

The industrial hygiene laboratory shall be a current proficient participant in the American Industrial Hygiene Association (AIHA) PAT Program. The laboratory identification number shall be submitted and approved by the City. The laboratory shall be accredited by the AIHA and New York State Department of Health Environmental Laboratory Approval Program (ELAP).

Note: Work area air testing and analysis before, during and upon completion of work (clearance testing) will be performed by a Third Party Air Monitor under separate Contract with the City.

1.06 THIRD PARTY MONITORING AND LABORATORY

- A. The NYCDDC, at its own expense, will employ the services of an independent Third Party Air Monitoring Firm and Laboratory. The Third Party Air Monitor will perform air sampling activities and project monitoring at the Work Site.
- B. The Laboratory will perform analysis of air samples utilizing Phase Contrast Microscopy (PCM) and/or Transmission Electron Microscopy (TEM).
- C. The Third Party Air Monitoring Firm and the designated Project Monitor shall have access to all areas of the asbestos removal project at all times and shall continuously inspect and monitor the performance of the Asbestos abatement contractor to verify that said performance complies with this Specification. The Third-Party Air Monitor shall be on site throughout the entire abatement operation.
- D. The NYCDDC will be responsible for costs incurred with the Third Party Air Monitoring Firm and laboratory work. Any subsequent additional testing required due to limits exceeded during initial testing shall be paid for by the Asbestos abatement contractor.

1.07 PAYMENT REQUEST DOCUMENTATION

- B. The following information shall be included for each payment request:
 - 1. Description of work performed.
 - 2. Linear footage and pipe sizes involved.
 - 3. Square footage for boiler & breaching insulation removed.
 - 4. Square footage of non pipe and boiler areas removed, patched, enclosed, sealed, or painted.
 - 5. Square footage of encapsulation, sealing, patching, and painting involved.
 - 6. Total cost associated with compliance with the assigned task.
 - 7. Architectural, Electrical, HVAC, Plumbing, etc. work incidental to the Asbestos Abatement Work.
 - 8. A certified copy (in form 4312-39) to the Comptroller or Financial Officer of the New York City to the effect that the financial statement is true.

PLUMBING CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

9. A signed copy (in form 6506q-6) of certificate of compliance with non-discriminatory provisions of the Contract.
 10. Attach a copy of valid workmen compensation insurance.
 11. Valid asbestos insurance per occurrence.
 12. General liability insurance when required.
- C. Each payment request shall include a grand total for all work completed that billing period, the landfill waste manifests and a copy of waste transporter permit. The Department of Design and Construction will inspect the work performed, review the cost and approve or disapprove requests for payment.
- D. EXPOSURE LOG: With this final payment, the Asbestos abatement contractor shall submit a listing of the names and social security numbers of all employees actively engaged in the abatement work of this Contract. This list shall include a summary showing each part of the abatement work in which the employee was engaged and the dates thereof.

1.08 QUANTITY CALCULATIONS

In order to determine the square footage involved for the various pipe sizes of pipe insulation that might be encountered, the following table is to be used.

<u>PIPE INSULATION SIZE O.D.</u>	<u>PIPE SIZE O.D.</u>	<u>SQUARE FOOTAGE PER LINEAR FOOT</u>
2-1/2"	1/2"	0.65
2-3/4"	3/4"	0.72
3"	1"	0.79
3-1/4"	1-1/4"	0.85
3-1/2"	1-1/2"	0.92
4"	2"	1.05
4-1/2"	2-1/2"	1.18
5"	3"	1.31
6"	3-1/4"	1.57
7"	3-1/2"	1.83
8"	4"	2.09
9"	5"	2.36
10"	6"	2.62
12"	8"	3.14
14"	10"	3.67
16"	12"	4.19
18"	14"	4.71

1.09 METHOD OF PAYMENT

Payment shall be made in accordance with Items A through R below. Payment shall be calculated based on the actual quantity of the item performed by the asbestos abatement contractor, times the unit price specified below. Credits may apply to certain times, as specified below.

- A. REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING PIPE INSULATION:** Actual linear footage, multiplied by the square footage factor listed for the respective pipe size in Section 1.09, multiplied by the unit price in Section 1.05.

EXAMPLE: 100 lin.ft. of 1/2" pipe and 100 lin.ft. of 6" pipe, including elbows, tees. Flanges, etc.

$$100 \times 0.65 = 65 \text{ sq.ft.} \quad 65 \times \text{unit price} = \text{Payment}$$

$$100 \times 2.62 = 262 \text{ sq.ft.} \quad 262 \times \text{unit price} = \text{Payment}$$

- B. REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER INSULATION:** (all types including Silicate Block and including the removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

EXAMPLE: Item B. removal and replacement of 1000 S.F. of boiler insulation (incl. Silicate block)

$$1000 \text{ S.F.} \times (1.5) \times \text{the Unit Price} = \text{Payment}$$

- C. REMOVAL, DISPOSAL AND REPLACEMENT OF TANK INSULATION:** (all types including removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

- D. REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER UPTAKE, & BREACHING INSULATION:** (all types including stiffening angles and wire lath) Payment shall be made at 2.0 times the unit price per square foot.

- E. REMOVAL, DISPOSAL AND REPLACEMENT OF DUCT INSULATION:** Payment shall be made at 1.0 times the unit price per square foot.

- F. REMOVAL, DISPOSAL AND REPLACEMENT OF SOFT ASBESTOS CONTAINING MATERIAL:** (Including sprayed-on fire proofing and sound proofing) Payment shall be made at 1.0 times the unit price per square foot of surface area. Area of irregular surfaces must be calculated and confirmed with DDC representative.

- G. ACOUSTIC PLASTER REPAIR AND/OR ENCAPSULATION:** Payment shall be made at 0.5 times the unit price per square foot.

PLUMBING CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- H. **PATCHING OR REPAIR** of items listed in A through F will be paid at 0.33 times the unit price per square foot.
- I. **REMOVAL, DISPOSAL AND REPLACEMENT OF WATERPROOFING ASBESTOS CONTAINING MATERIAL:** (including friable and non-friable waterproofing material from interior and exterior walls, floors, foundations, penetrations, louvers, vents and openings other than windows, doors and skylights) Payment shall be made at 0.5 times the unit price per square foot.
- J. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING ELECTRICAL WIRING INSULATION:** (including friable and non-friable wiring insulation) Payment shall be made at 0.33 times the unit price per square foot.
- K. **PAINTING:** Payment shall be made at 0.05 times the unit price per square foot.
- L. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING PLASTER:** from ceilings and walls, including any wire lath and disposal as asbestos containing waste. Payment shall be made at 0.80 times the unit price per square foot.
- M. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING FLOOR TILES, CEILING TILES, TRANSITE PANELS:** (including any adhesive, glue, mastic and/or underlayment) and disposal as asbestos containing waste. Payment shall be made at 0.40 times the unit price per square foot. If multiple layers are discovered, each additional layer shall be paid at 0.20 times the unit price per square foot.
- N. **ADDITIONAL CLEAN UP/HOUSEKEEPING OF WORK AREA:** (excluding pre-cleaning of work area required by regulations) HEPA vacuuming and wet cleaning of asbestos contaminated surface. Payment shall be made at 0.20 times the unit price per square foot. When GLOVE BAG is employed to remove ACM, cost of HEPA vacuuming and wet cleaning of floor area up to 3 feet on each side of glove-bag shall be included in unit price and no extra payment will be made.
- O. **REMOVAL, DISPOSAL OF ASBESTOS-CONTAINING ROOFING MATERIAL:** including mastic, flashing and sealant compound and provide temporary asbestos-free roof covering consisting of one layer of rolled roofing paper sealed with asphaltic roofing compound. Payment shall be made at 0.8 times the unit price per square foot. Credit at a rate of 0.33 times the unit price will be taken for each square foot of temporary roof covering which the Asbestos abatement contractor is directed not to install.
- P. **PICK-UP AND DISPOSAL OF GROSS DEBRIS:** (excluding any waste generated from abatement under Item A-R) at a rate of \$150 per cubic yard for asbestos contaminated waste and \$75 per cubic yard for non-asbestos

contaminated waste. This cost includes all labor and material cost associated with work.

- Q. **REMOVAL OF ASBESTOS-CONTAINING BRICK, BLOCK, MORTAR, CEMENT OR CONCRETE:** along with all surfacing materials including wire lath and/or other supporting structures and disposal as ACM waste. Payment shall be made at a rate of \$25.00 per cubic foot of material removed.
- R. **REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING WINDOW/DOOR CAULKING:** including friable and non-friable caulking, weather-stripping, glazing, sealants or other waterproofing materials applied to windows, doors, skylights, etc. Payment shall be made at the rate of \$400.00 per opening regardless of size or configuration. This cost includes labor, consumable materials, set-up/breakdown, removal and disposal, as required.

Note 1: CREDIT: For items listed in A through F, a credit at a rate of 0.33 times the unit price, times the respective multiplier (for each item) will be taken for each square foot of insulation which the asbestos abatement contractor is not directed to reapply.

Note 2: MINIMUM PAYMENT: The minimum payment per call at any individual job sites or various job sites during the same day will be eight hundred dollars (\$800.00).

Note 3: All payments shall be made as described in paragraph 1.09 herein.

Note 4: WORKING HIGHER THAN 12 FEET ABOVE FLOOR LEVEL OR WORK REQUIRING COMPLEX SCAFFOLDING OR CONSTRUCTION WORK PLATFORMS: Provisions are made in this Contract to compensate the Asbestos abatement contractor for work performed in locations that are difficult to access due to work at elevations that are significantly higher than the normal work level. The unit price for these items will be paid at 1.20 times the unit price described in Paragraphs 1.09, A through R for those portions of the work that are more than twelve (12) feet above the grade for that would be judged as the normal working level.

1.10 GUARANTEE

- A. Work performed in compliance with each task shall be guaranteed for a period of one year from the date the completed work is accepted by the Department of Design and Construction.
- B. The Commissioner of The Department of Design and Construction will notify the Asbestos abatement contractor in writing regarding defects in work under the guarantee.

1.11 OCCUPANCY OF SITE NOT EXCLUSIVE

Attention is specifically drawn to the fact that contractors, performing the work of other Contracts, may be brought upon any of the work sites of this Contract. Therefore, the

Asbestos abatement contractor shall not have exclusive rights to any site of his work and shall fully cooperate and coordinate his work with the work of other contractors who may be brought upon any site of the work of this Contract. This paragraph applies to those areas outside the regulated Work Area as defined by Title 15, Chapter I of RCNY.

1.12 SUBMITTALS

A. Pre-Construction Submittals:

1. Attend a pre-construction meeting scheduled by the City of New York Department of Design and Construction. This meeting shall also be attended by a designated representative of the City of New York third party air monitoring firm, facility manager and the Construction Project Manager. At this meeting, the Asbestos abatement contractor shall present three copies of the following items:
 - a. Asbestos abatement contractor's scope of work, work plan and schedule.
 - b. Asbestos project notifications, approved variances and plans to Government Agencies.
 - c. Copies of Permits, clearance and licenses if required.
 - d. Schedules: the Asbestos abatement contractor shall provide to the Construction Project Manager a copy of the following schedules for approval. Once approved, schedules shall be maintained and updated as received. Asbestos abatement contractor shall post a copy of all schedules at the site:
 - (1) A construction schedule stating critical dates of the project including, but not limited to, mobilization, Work Area preparation, demolition, gross removal, fine cleaning, encapsulation, inspections, clearance monitoring, and phase of refinishing and final inspections. The schedule shall be updated biweekly, at a minimum.
 - (2) A schedule of staffing stating number of workers per shift per activity, name and number of supervisor(s) per shift, shifts per day, and total days to be worked.
 - (3) Submit all changes in schedule or staffing to the Construction Project Manager prior to implementation.

- e. Written description of emergency procedures to be followed in case of injury or fire. This section must include evacuation procedures, source of medical assistance (name and telephone number to nearest hospital) and procedures to be used for access by medical personnel (examples: first aid squad and physician). NOTE: Necessary Emergency Procedures Shall Take Priority Over All Other Requirements of These Specifications.
- f. Material Safety Data Sheets (MSDS) for encapsulants, sealants, firestopping foam, cleaners/disinfectants, spray adhesive and any and all potentially hazardous materials that may be employed on the project. No work involving the aforementioned will be allowed to proceed until MSDS are reviewed.
- g. Worker Training and Medical Surveillance: The Asbestos abatement contractor shall submit a list of the persons who will be employed by him /her to perform the removal work. Present evidence that workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101.
- h. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.
 - (1) The Asbestos abatement contractor shall provide a permanently bound log book of minimum 8-1/2" x 11" size at the entrance to the Worker and Waste Decontamination enclosure system as hereinafter specified. Log book shall contain on title page the project name, name, address and phone number of the Asbestos abatement contractor; name, address and phone number of Asbestos abatement contractor and City's third party air monitoring firm; emergency numbers including, but not limited to local Fire/Rescue Department. Log book shall contain a list of personnel approved for entry into the Work Area.
 - (2) All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted. Any significant events occurring during the abatement project shall be entered into the log. Upon completion of the job, the Asbestos abatement contractor shall submit the logbook containing a day-to-day record of personnel log entries countersigned by the Construction Project Manager every day.

- i. Worker's Acknowledgments: Submit statements signed by each employee that the employee has received training in the proper handling of ACM, understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.

B. During Construction Submittals:

1. Security and safety logs showing names of person entering workspace, date and time of entry and exit, record of any accident, emergency evacuation, and any other safety and/or health incident.
2. Progress logs showing the number of workers, supervisors, hours of work and tasks completed shall be submitted daily to the Construction Project Manager.
3. Floor plans indicating Asbestos abatement contractor's current work progress shall be submitted for review by the Construction Project Manager.
4. All Asbestos abatement contractors' air monitoring and inspection results.

C. Project Closeout Submittals:

Upon completion of the project and as a condition of acceptance, the Asbestos abatement contractor shall present two copies of the following items, bound and indexed:

1. Lien Waivers from Asbestos abatement contractor, Sub-Asbestos abatement contractors and Suppliers,
2. Daily OSHA air monitoring results,
3. All Waste Manifests (Asbestos and Construction Debris), seals and disposal logs,
4. Field Sign-In/Sign-Out Logs for every shift,
5. Copies of all Building Department Forms and Permits,
6. A Letter of Compliance stating that all the work on this project was performed in accordance with the Specifications and all applicable Federal, State and Local regulations,
7. All Warranties as stated in the Specifications,
 - a. Fully executed disposal certificates and transportation manifest.

8. Project Record: The Asbestos abatement contractor shall maintain a project record for all small and large asbestos projects. During the project, the project record shall be kept on site at all times. Upon completion of the project, the project record shall be maintained by the building owner. The project record shall be submitted to DDC as part of the close out documents. The project record shall consist of:
 - a. Copies of licenses of all asbestos abatement contractors involved in the project;
 - b. Copies of NYCDEP and NYSDOL supervisor and handler certificates for all workers engaged in the project;
 - c. Copies of all project notifications and reports filed with NYCDEP, NYSDOL and USEPA for the project, with any amendments or variances;
 - d. Copies of all asbestos abatement permits, including associated approved plans and work place safety plan;
 - e. A copy of the air sampling log and all air sampling results;
 - f. A copy of the abatement asbestos abatement contractor's daily log book;
 - g. Copies of all asbestos waste manifests;
 - h. A copy of all Project Monitor's Reports (ACP-15).
 - i. A copy of each ATR-1 Form completed for the asbestos project (if required).
 - j. A copy of each Asbestos Project Conditional Closeout Report (ACP-20) if required.
 - k. A copy of the Asbestos Project Completion Form (ACP-21).

1.13 PROTECTION OF FURNITURE AND EQUIPMENT

Cover all furniture and equipment that cannot be removed from Work Areas. Movable furniture and equipment will be removed from Work Areas by the Asbestos abatement contractor prior to start of work. At the conclusion of the work (after final air testing), the Asbestos abatement contractor will remove all plastic covering on walls, floors, furniture, equipment and reinstall furniture and equipment. He shall remove and store all sheaths, curtains and drapes, and reinstall same following final clean up.

1.14 UTILITIES

A. General:

All temporary facilities shall be subject to the approval of the Commissioner. Prior to starting work at any site, locations and/or sketches (if required) of temporary facilities must be submitted to the Construction Project Manager for the required approval.

B. Water:

The Department of Design and Construction will furnish all water needed for construction, at no cost to the Asbestos abatement contractor in buildings under their jurisdiction. However, it is the responsibility of the Asbestos abatement contractor to ensure that hot water is provided for showering in the decontamination unit. The Asbestos abatement contractor shall furnish, install and maintain any needed equipment to meet these requirements at his own expense.

C. Electricity:

The Department of Design and Construction will furnish all electricity needed for construction, at no cost to the Asbestos abatement contractor in a building, under their jurisdiction. The Asbestos abatement contractor is responsible for routing the electric power to the abatement Work Area.

All temporary lighting and temporary electrical service for Work Area shall be in weatherproof enclosures and be ground fault protected.

- D.** In leased spaces, arrangements for water supplies and electricity must be made with the landlord. However, all such arrangements must be made through and are subject to approval of the Department of Design and Construction. Utilities will be provided at no cost to the Asbestos abatement contractor. However, it is the Asbestos abatement contractor's (or the Plumbing contractor's) responsibility to furnish and install a suitable distribution system to the Work Area. This system will be provided at no cost to the City.

1.15 FEES

The Asbestos abatement contractor shall be responsible for any and all fees or charges imposed by Local, State or Federal Law, Rule and Regulation applicable to the work specified herein, including fees or charges which may be imposed subsequent to the date of the Bid opening.

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SECTION 22 05 13

MOTORS AND STARTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 220000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #2 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 220000, General Provisions, and with the provisions of all applicable codes and laws.
- B. The installation and equipment is to conform to applicable building code articles and applicable reference standards cited therein.

1.3 SUBMITTALS

- A. Procedure
- B. Prepare and make the submissions listed below and in Section 220000 in accordance with the procedure specified in Section 220000.
- C. Shop Drawings
 - 1. Submit motors with individual items of driven equipment.
 - 2. Starters - Technical specs and application data.
 - 3. Schedule of starters including starter model, equipment served, starter enclosure, and accessories.
 - 4. Submit starter and drive unit wiring diagrams with the automatic control shop drawing submission required under Section 220000.
 - 5. Variable speed drive units - Technical specs and application data.

1.4 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 220000

1.5 GENERAL REQUIREMENTS

- A. Provide all necessary contacts, relays and switches for motor operation in accordance with the control system sequences and safety device operation.
- B. All motors, starters, push buttons, signal devices and motor controller equipment shall be NEMA standard and UL listed.
- C. All motors shall be covered by the warranty provided by the original equipment manufacturer which shall extend the full extent of the project warrantee. No motor shall be installed which has been manufactured more than two years prior to delivery.

PART 2 - PRODUCTS

2.1 MOTORS

- A. All motors shall be general purpose squirrel-cage induction type, NEMA Design B, Class B insulation, continuous duty, 40°C ambient, single or multiple speed as scheduled.
- B. All three phase motors shall be NEMA Premium Efficiency design. Motor efficiency shall be indicated on the motor nameplate by the manufacturer per IEEE Standard 112 Method B in accordance with following tables:

Open Drip Proof (ODP)

Horsepower	1200 RPM	1800 RPM	3600 RPM
1	82.5%	85.5%	77.0%
1.5	86.5%	86.5%	84.0%
2	87.5%	86.5%	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%
30	93.6%	94.1%	91.7%

Totally Enclosed Fan-Cooled (TEFC)

Horsepower	1200 RPM	1800 RPM	3600 RPM
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%	85.5%
5	89.5%	89.5%	86.5%
7.5	91.0%	91.7%	98.5%
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%
30	93.0%	93.6%	91.7%

- C. Unless otherwise indicated, motors 1/2 horsepower and larger shall be three-phase; motors less than 1/2 horsepower shall be single phase. Motor voltage shall be as indicated; verify with Contract #4 Contractor.
- D. All motors shall have a 1.15 minimum service factor.
- E. Two speed motors shall be two winding type, RPM as noted on plans.
- F. Single speed motors shall operate at 1750 RPM unless otherwise indicated.
- G. Motors controlled by Variable Frequency Drive (VFD) units shall be rated for inverter duty (NEMA MG1, Part 31).
- H. All motors shall have a terminal box, appropriate mounting base, and a ground post for connection of a ground conductor.

- I. Motor enclosures shall be open drip-proof unless otherwise indicated or required.
- J. Motor manufacturers:
 - 1. General Electric Co.
 - 2. Baldor
 - 3. Westinghouse
 - 4. Marathon

2.2 MANUAL STARTERS

- A. Provide manual starters for single-phase motors that are not interlocked with other equipment.
- B. Starter shall include quick make-quick break toggle mechanism in a suitable enclosure. The overload relay shall be field adjustable to +/-10% of nominal rating.
- C.

<u>Manufacturer</u>	<u>Series</u>
Cutler Hammer	9101
General Electric	CR101
Siemens	SMF
Square D	Class 2510 Type F
Westinghouse	MS

2.3 MAGNETIC STARTERS

- A. Provide electrically-held magnetic starter for three-phase motors 1/2 horsepower and larger. Magnetic starters shall be combination type, with adjustable motor circuit protector, across-the-line contactor, and thermal overload relay in a common enclosure.
- B. The motor circuit protector shall trip instantaneously when the motor current level is in excess of the trip setting. Trip settings of all poles shall be adjusted simultaneously by a single trip point adjustment.
- C. The starter shall be suitable for connection to a power system having available fault current of 100,000RMS symmetrical amperes.
- D. Furnish contactors with one N.O. auxiliary interlock contact for the holding circuit, and a minimum of two additional auxiliary contacts. Coordinate auxiliary contacts with Section 230923.
- E.

<u>Manufacturer</u>	<u>Series</u>
General Electric	CR387
Square D	Class 8539
Westinghouse	Class A206

2.4 REDUCED VOLTAGE STARTER

- A. Provide autotransformer type starters of the closed transition type, in an enclosure, with integral motor circuit protector, for all starters of NEMA Size 4 and larger (i.e. > 25 hp at 208 volts or > 50 hp at 480 volts).
- B. Transformers shall have three starting taps, 50%, 65% and 80%. Unit shall be set at 65% at factory.

- C. Furnish contactors with one N.O. auxiliary interlock contact for the holding circuit, and a minimum of two additional auxiliary contacts. Coordinate auxiliary contacts with Section 230923.

<u>Manufacturer</u>	<u>Series</u>
General Electric	CR331
Square D	Class 8606
Westinghouse	A606

2.5 STARTER ACCESSORIES

- A. Enclosure shall be NEMA 1 for dry location, NEMA 4 for wet or outdoor locations.
- B. The disconnect handle shall be capable of being padlocked in the open position.
- C. Provide all starters unless otherwise specified with manual reset thermal type overload relays having inverse time delay characteristics and interchangeable heater elements.
- D. Provide each starter with a red running light, neon type, mounted through cover.
- E. Provide each starter with a three position, maintained contact, H-O-A selector switch, mounted through the cover.
- F. Provide two speed starters for all motors listed with multiple speeds in the equipment schedules. Multiple speed starters shall be provided with a time delay relay when switching to a lower speed.
- G. Furnish contactors with one N.O. auxiliary interlock contact for the holding circuit, and a minimum of two additional auxiliary contacts for each motor speed. Coordinate auxiliary contacts with Section 230923.
- H. Current-Sensing, Phase-Failure Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection; arranged to operate on phase failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage. Provide adjustable response delay.

2.6 VARIABLE FREQUENCY DRIVES

- A. General
- Where variable speed control is indicated in drawings, schedules, or specifications, provide complete factory-assembled and -tested adjustable frequency AC drives as herein specified.
 - Variable frequency drives (VFD's) shall provide stepless speed control of standard NEMA Design B squirrel cage induction motors, without motor derating.
 - VFD's shall be variable torque design, suitable for HVAC pump, fan, and blower applications.
 - VFD's shall be tested and listed to the following standards:
 - UL Standard 508C
 - IEEE Standard 519-1992
 - NEMA – ICS 7.0, AC Adjustable Speed Drives
 - IEC 281000 Parts 1 and 2.

5. Each VFD shall be appropriately sized and rated to suit the driven load and input power characteristics.
6. VFD logic and control circuitry shall be microprocessor-based.

B. Design and Construction Features

1. Where located indoors in non-damp and non-wet environment, VFD enclosures shall be steel, ventilated NEMA 1, with hinged lockable door, suitable for wall mounting in sizes through 75 HP (at 460 VAC). Larger units shall have floor mounted, freestanding enclosures. Where located outdoors, or where VFD is mounted in damp or wet environment, provide NEMA 3R enclosures with strip heater.
2. The input section shall include a full-wave diode bridge rectifier, padlockable door-interlocked disconnect switch, input power fuses, input line reactor, and output reactor / filter for circuits longer than 75 feet.
3. The inverter section shall be sine-coded pulse-width-modulated (PWM), utilizing Insulated Gate Bipolar Transistors (IGBT's).

C. Performance Features

1. Produce rated output under the following service conditions:
 - a. Rated input voltage +/- 10%.
 - b. Ambient temperature 0°C. to 40°C.
 - c. Relative humidity 0-95% non-condensing.
 - d. Elevation up to 3300 feet above sea level.
 - e. Input frequency 60 hertz, +/- 2 hertz.
2. Input displacement power factor - minimum 0.95 at any speed.
3. Output - 6 to 60 hertz, 0 to input volts, with adjustable volts/hertz.
4. Adjustable output current limit - to 115%.
5. Adjustable acceleration and deceleration rates.
6. Adjustable minimum and maximum speed limits.
7. Automatic restart after an input power loss, with adjustable time delay, if RUN command is still activated.
8. Input current THD - 5% maximum.
9. Efficiency - minimum 96% at full load, full speed.
10. Capable of a smooth start into a rotating motor (either direction).
11. Minimum 2 second power loss ride-through for logic and control power.
12. Motor noise attributable to the VFD shall be less than 3 dB above that with across-the-line operation, measured at 3 feet from the motor centerline.

13. 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).
14. 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.
15. 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 NEC Table 430.250 for 3-phase alternating-current motors.
16. 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.
17. The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices and source transformers to be oversized per NEC 430.
18. 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.
19. 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 under-load condition.
20. 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.
21. 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.

D. Protective Features

1. Integral I^2t electronic motor overload protection, adjustable.
2. Integral trip circuits for input power undervoltage, overvoltage, phase loss, and overcurrent.
3. Integral trip circuits for internal overtemperature, DC bus overvoltage, and internal or output circuit ground fault.
4. The VFD's shall be suitable for connection to a power system having available fault current of 100,000RMS symmetrical amperes.
5. The VFD's shall be self-protecting against an open output circuit.

6. Provide input power line surge protection.
7. Provide user-selectable manual or automatic restart after a fault.

E. Controls and Indications

1. LED or LCD digital information display, including:
 - a. Output frequency, voltage, and current.
 - b. Input voltage, current, and KW.
 - c. % speed.
 - d. % load.
2. LED lamp or alphanumeric display indication of individual fault conditions.
3. Status indicators for POWER ON, READY, and RUN.
4. 3-position, maintained contact, Hand-Off-Auto selector switch.
5. Remote-Local speed reference selector.
6. Integral keypad for manual (local) speed control, adjustment, and programming functions.
7. Interfaces for remote safety contacts, start-stop contacts, and speed control (4-20 mA, 0-5 VDC, or 0-10 VDC, user selectable).
8. Form C (SPDT) dry contacts, wired to terminal blocks, for remote indication of RUN or FAULT.
9. Minimum of 3 programmable resonant frequency lockout bands.

F. 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 or approved equal. 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. All protocols shall be "certified" by the governing authority. Use of non-certified protocols is not allowed.
2. The BACnet connection shall be an RS485, MSTP interface operating at 9.6, 19.2, 38.4, or 76.8 Kbps. The connection shall be tested by the BACnet Testing Labs (BTL) and be BTL Listed. The BACnet interface shall conform to the BACnet standard device type of an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:
 - a. Data Sharing – Read Property – B.
 - b. Data Sharing – Write Property – B.
 - c. Device Management – Dynamic Device Binding (Who-Is; I-AM).
 - d. Device Management – Dynamic Object Binding (Who-Has; I-Have).
 - e. Device Management – Communication Control – B.

If additional hardware is required to obtain the BACnet interface, the VFD manufacturer shall supply one BACnet gateway per drive. Multiple VFDs sharing one gateway shall not be acceptable.

3. 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.
4. 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.
5. The VFD shall include an independent PID loop for customer use. The independent PID loop may be used for cooling tower bypass valve control, chilled water valve 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.

G. EMI / RFI Filtering

1. 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.

H. Special Features

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. Door interlocked, pad-lockable, circuit breaker that will disconnect all input power from the drive and all internally mounted options.
3. Fused VFD only disconnect (service switch). Fast acting fuses exclusive to the VFD – fast acting fuses allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection, maintaining bypass capability. Bypass designs, which have no such fuses, or that incorporate fuses common to both the VFD and the bypass will not be accepted.
4. The drive / bypass shall provide single-phase motor protection in both the VFD and bypass modes.

5. The following operators shall be provided:
 - a. Bypass Hand-Off-Auto
 - b. Drive mode selector
 - c. Bypass mode selector
 - d. Bypass fault reset

6. 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

7. The following relay (form C) outputs from the bypass shall be provided:
 - a. System started
 - b. System running
 - c. Bypass override enabled
 - d. Drive fault
 - e. Bypass fault (motor overload or underload (broken belt))
 - f. Bypass H-O-A position

8. 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.

9. 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.

10. 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).

11. 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.
 12. Class 20 or 30 (selectable) electronic motor overload protection shall be included.
 13. There shall be an internal switch to select manual or automatic bypass.
 14. There shall be an adjustable current sensing circuit for the bypass to provide loss of load indication (broken belt) when in the bypass mode.
 15. Output Reactor - A reactor (dv/dt filter) is to be installed between the drive and the motor if the total electric feeder distance between the two exceeds 75 feet.
- I. Factory Testing and Warranty
1. Each unit shall be fully tested prior to shipment, including operation at full load for 8 hours in a 40°C ambient.
 2. Each unit shall be fully warranted by the manufacturer for a period of 36 months from date of shipment, including the cost of all parts, labor, and travel expenses.
- J. Acceptable Manufacturers
1. Subject to compliance with requirements, provide variable frequency drives manufactured by one of the following:
 - a. Allen-Bradley
 - b. Yaskawa E7 Series
 - c. Asea Brown Boveri (ABB)
 - d. Graham / Danfoss
 - e. Square D

PART 3 - EXECUTION

3.1 GENERAL

- A. Motors shall be supplied as part of factory assembled equipment specified in other sections.
- B. All starters and variable speed drives shall be turned over to the Contract #4 Contractor for mounting, installation, and wiring in conformance with all applicable codes and ordinances. Starters and drives shall be located within line-of-site of the associated equipment being controlled.
- C. Install overload heaters, adjust overload relays, and set motor circuit protectors in accordance with motor nameplate ratings and NEC Article 430.
- D. Unless noted otherwise, starters for outdoor equipment shall be mounted attached to or adjacent to the equipment served and shall be provided with NEMA 3R enclosures with strip heaters.

3.2 MOTOR NOISE LEVEL

- A. Motor drives for pumps and refrigeration machines, or other mechanical equipment having a motor installed within a mechanical room, shall operate with noise levels not exceeding 85 dBA.
- B. Noise levels shall be determined in accordance with IEEE Standard #85 "Test Procedure for Air-Borne Noise Measurements on Rotating Electric Equipment".
- C. Motor drives for fans, regardless of where located, or other mechanical equipment located outside mechanical equipment spaces, shall not contribute to increase the manufacturer's sound power ratings by 2 dB in any octave band.

3.3 VARIABLE FREQUENCY DRIVE START-UP

- A. A factory authorized field service technician shall perform inspection of the drive installation and wiring, initial energizing and start-up, and the adjustments and programming necessary to achieve specified operation and performance.
- B. The factory-authorized field service technician shall program the 3 available resonant frequency lockout bands during motor/drive start-up based on actual motor/equipment performance for each drive. Provide the necessary frequency and vibration testing instruments.
- C. After successful start-up, a factory authorized representative shall provide a minimum of four (4) hours instruction and demonstration to City of New York's personnel.

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SECTION 22 05 23

PIPING, VALVES AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 220000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #2 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of section 220000, General Provisions, and with the provisions of all applicable codes and laws.

1.3 SUBMITTALS

- A. Procedure
 - 1. Prepare and make the submissions listed below and in Section 220000 in accordance with the procedure specified in Section 220000.
- B. Shop drawings
 - 1. Piping Materials, Joints and Fittings.
 - 2. Piping Specialties.
 - 3. Valve Tags and Name Plates with Schedule and Location.
 - 4. Valves.
 - 5. Strainers.
 - 6. Hot water accessories
 - 7. Anchors and guides
 - 8. Thermometers, gauges, complete listing with scale range and normal operating point.
 - 9. Water balance, contractors qualification, procedures, and report format
 - 10. Water Balance Report.

1.4 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 220000. Produce and maintain required effect under operating criteria determined in advance by agreement with the Commissioner.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. All pipe shall be new, free from scale or rust, and of the material and weight specified under the various services. Each length of pipe shall be properly marked at the mill for proper identification with name of symbol or manufacturer.

- B. All steel piping shall be standard or extra strong weight, in conformance with the ASTM designation A-53 as manufactured by National Tube Division, Republic Steel Corp., or approved equal. Piping shall be seamless except as specified herein.
- C. All brass piping shall be standard or extra heavy weight 85% red brass semi-annealed seamless-drawn, in conformance with the ASTM designation B-43, as manufactured by Anaconda, American Brass Co., Chase Brass and Copper Co., or Revere Copper and Brass, Inc.
- D. All copper tubing shall be of weight as required for service specified in conformance with ASTM designation B-88-47 for types "L" and "K" tubing, as manufactured by Chase, Anaconda, Revere, or approved equal. Copper tubing shall be used as specified in the schedule. Tubing and fittings shall be thoroughly cleaned with sand cloth and treated with an approved flux before solder is applied.
- E. All galvanized steel piping shall be standard or extra strong weight, as specified, in conformance with the ASTM designation A-53. Pipe shall be hot-dipped zinc-coated with prime western spelter and not wipes.
- F. Generally, unless otherwise specified, joints in steel and wrought-iron piping of sizes 2 inches and under shall be screwed, and all sizes 2-1/2" inches and over shall be welded or flanged. All drain piping shall be screwed. Brass pipe shall be screwed 2 inches and smaller and flanged 2-1/2 inches and over. Copper tubing shall be silver-soldered or 95-5 solder as herein specified.

2.2 FITTINGS

- A. Fittings shall be as specified under "Fittings" for each pipe service listed in the "Pipe Schedule".
- B. 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 clearances necessitate the use of standard radius pattern. Welding fittings shall be Tubeturn or Ladish.

Steel Welding Fittings	ASTM A-106
Wrought Iron Welding Fittings	ASTM A- 72
Malleable Iron Fittings	ASTM A-197
Cast-Iron Fittings	ASTM A-126
Brass Fittings	ASTM B- 62
Solder Fittings	ASTM B- 88

- C. All fittings used at expansion loops or bends shall be extra heavy.
- D. Cast-iron, malleable-iron and bronze fittings shall be of Crane Manufacture or approved equal.
- E. Flanges shall be of the same weight as the fittings in each service category. All flanges shall be drilled and spot faced in conformance with fittings. Screwed and loose flanges shall be of cast iron. Welding flanges shall be of steel welding neck type, flanges on brass to be Crane No. 2104 or approved equal.
- F. Flanges shall be faced and true and made up perfectly square and tight with gaskets. Bolts, nuts and gaskets shall be dipped in a mixture of graphite and oil just before installation.
- G. Unions - Unions 2 inches and smaller shall be screwed. Unions 2-1/2" and larger shall be flanged. Screwed unions on steel pipe, unless otherwise specified, shall be of malleable

iron with bronze ground seats suitable for 300 pounds, W.S.P. Screwed unions on brass pipe shall be brass, ground joint suitable for 300 pounds W.SP. Flanged unions shall be malleable iron, gasket type suitable for 150 pounds W.S.P. Unions shall be as manufactured by Crane, Dart or approved equal.

- H. Brass pipe threads shall be cut with special brass threading dies, and the joints shall be made with lubricant. Strap wrenches, or equivalent, shall be used in making up brass pipe. Wrenches that gouge or scar the pipe will not be used.
- I. Solder for each solder-type fitting shall be of 95% tin and 5% antimony or silver solder, as specified herein.
- J. Fittings shall be of the eccentric reducing type unless otherwise noted, where changes of size occur in horizontal piping to provide for proper drainage or venting. Steel pipe bends shall be made of the very best grade open hearth, low carbon steel, leaving a smooth uniform exterior and interior finish. Pipe bends shall be made with seamless steel pipe, leaving a minimum radius of not less than five (5) pipe diameters.

2.3 JOINTS

- A. Brass pipe threads shall be cut with special brass threading dies, and the joints shall be made up with lubricant. Strap wrenches or equivalent, shall be used in making up brass pipe. Wrenches which gouge or scar the pipe shall not be used.
- B. Flange joints shall be faced true, packed and made up perfectly square and tight. Each flange joint shall be provided with best grades steel bolts and with hexagon nuts. Flanges shall be raised face, suitable for pressure of system in which they are installed.

2.4 PIPE HANGERS AND SUPPORTS

- 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, do not 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 that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted both in the vertical and horizontal direction, as required. Hangers in contact with copper or brass pipe shall be copper plated steel or provided with felt sleeve.
- B. Pipe hangers shall be of the band type for piping 2" and smaller, clevis for pipe 2 1/2" and larger except where otherwise noted. Hangers for generator exhaust and steam pipe 2" and smaller shall be of the clevis roller type and two rod roller type for pipe 2 1/2" and larger except where otherwise noted.
- C. All vertical piping shall be supported by means of heavy wrought iron or steel clamps securely bolted or welded to the piping, and with end extension bearing on the building. Riser clamps shall be constructed of two flat wrought steel bar yokes formed to fit the pipe and bolted together.
- D. Beam clamps - hangers supported from steel shall be center loading beam clamps for hangers supporting piping 2 inches. For piping 2-1/2 inches and larger, 1 beam clamps shall be forged steel. "C" clamps are not to be used.
- E. Where piping is run near the floor and not hung from the ceiling construction, but is supported from the floor or in a trench, such supports shall be of pipe stanchion with base flange and adjustable top yoke with u-bolt retainer.

- F. Where piping is run above the floor, and is not hung from the ceiling construction or not supported from the floor, such piping shall be supported from the wall with bracket hangers, expansion bolted or fish plated to the wall. Provide details for review by Commissioner.
- G. For water piping (fluid less than 100F), provide insulated saddle with vapor barrier or pipe insulation plus protection shield with vapor barrier jacket. For steam, condensate, and hot-water heating piping 2 inches and smaller same as above. For hot-water heating piping 2-1/2 inches and larger, provide steel pipe covering protection saddles spot welded to pipe with insulation insert.
- H. Piping in trenches shall rest or hang from angle iron cross supports provided by Contract #2 Contractor.
- I. Hanger rods shall be of galvanized steel not exceeding six (6) feet in length of the following diameters. Trim excess rod to within 1" of the support. Supplementary steel shall be provided as necessary

PIPE SIZE	ROD DIAMETER
2 inches and below	3/8 in.
2-1/2 & 3 in.	1/2 in.
4 & 5 in.	5/8 in.
6 in.	3/4 in.
8 in. and above	7/8 in.

J. Support Schedule

All hanger components of hanger assembly shall be hot dip galvanized or cadmium plated.

TYPE	GRINNELL	NATIONAL	SUPER TOLCO	CARPENTER & PATTERSON	M-CO
Band	70	110/115	2	1A	105
Clevis	260	215	1	100	401
Clevis roller	181	250	324	140	610
Two rod roller hanger	171/177	255/260	322	109	605
Riser Clamp	261	420	6	126	510
Stanchion w/U-bolt	259	X	102	125	721
Wall Bracket	199	710	30H	139	353
Insulation Shield	167	307	220	265	125
Insulation Saddle	160-165	310-340	260-265	351-357	X

Beam Clamp	133/228	680/695	62	82/287	360/361
Insert	281/282	600	309/310	108/650	355
Insert	X	555/560 561	107F/109F 109	104M/104F 143	320
Guide	255/256	120	420/421	S794	650 651
Insulated Shield	X	Pro-Shield	X	265CVB 465CVB	123 124

2.5 VALVES - GENERAL

- A. All valves shall be of a design which the manufacturer lists for the service and shall be of materials allowed by the latest edition of the ASME Code for Pressure Piping for the pressure and temperature contemplated, unless a higher grade or quality is herein specified. All valves shall be of the same manufacturer, except for special applications.
- B. The system shall be supplied with gate or butterfly type isolation valves as specified herein, at all branches mains and risers.
- C. All valves shall be installed with the best workmanship and are to have neat appearance and be arranged so that they are easily accessible.
- D. Each valve shall have the maker's name or brand, the figure or list number and the guaranteed working pressure cast on the body and cast or stamped on the bonnet, or shall be provided with other means of easy identification.
- E. Check valves installed in the horizontal position shall be swing checks; valves installed in the vertical position shall be silent checks, except that all check valves in pump discharges shall be silent checks.
- F. Provide blow-off valves at all strainers, and where shown on the drawings.
- G. Provide valve operating chain on all gate and globe valves in Mechanical Equipment Rooms - 3" and larger, which are more than 6'-6" above the operating floor. Unit shall be complete with adjustable sprocket, chain and guide. Provide hook to keep chain out of the way.
- H. Generally, all valves are to be of the gate type, except that globe valves shall be used for throttling services and on traps, and pressure reducing and control valve by-passes. Globe valves used on by-passes shall have monel metal mountings.
- I. All valves 2 inches in diameter and smaller shall be all bronze with bronze bodies. Valves 2-1/2 inches in diameter and larger shall have iron bodies with bronze mountings unless otherwise specified.
- J. All flanged-end valves shall have renewable metal seat rings and discs. On gate valves these parts shall be of bronze, on all globe valves they shall be of bronze and suitable for throttling service.
- K. All screwed-end globe valves shall be of the union bonnet type, non-rising stem with renewable metal seats and discs.
- L. All valves shall have their bonnets back-seated to provide for packing under pressure.
- M. All gate valves shall be of the solid tapered wedge type, union bonnet, rising stem.

- N. All valves 5 inches in diameter and larger shall be furnished with an integral by-pass and a by-pass suitable for the operating pressure.
- O. Drain valves shall be provided on tanks, receivers, risers and where they may be required or necessary, or directed for draining the lines and equipment. Drain valves or plug cocks shall be provided at the low points for proper drainage, and where required or directed cocks and valves shall be provided with threaded ends for hose connections.
- P. All valves up to 2 inches in diameter shall have screw ends, 2-1/2" in diameter and over shall have flanged ends.
- Q. Isolation valves shall be provided at all pumps, tanks, reducing and automatic or mechanical flow control devices, radiation, coils and heat exchangers, and at all other apparatus requiring partial drainage of the system for periodic maintenance or inspection. The isolation valves shall be so located as to permit removal and/or service of the isolated equipment without draining complete or substantial portions of the system.
 - 1. Provide flanges or union(s) to permit removal of all equipment isolated as indicated above.
 - 2. The flow and control diagrams do not indicate the complete requirement for isolation valves in the system. Manual valves are depicted in flow diagrams to show relative positions of division 230923 control devices.

2.6 STRAINERS

- A. There shall be approved strainers in the inlet connections to each valve feeder and makeup connection, each water regulating valve, and each diaphragm valve, and where else indicated on the drawings. The intention is to protect by strainers, all apparatus of an automatic character, whose proper functioning would be interfered with by dirt on the seat, or by scoring of the seat.
- B. All strainers shall have cast iron, semi-steel or bronze bodies of ample strength for the pressure to which they shall be subjected, removable cylindrical or conical screens of monel or stainless steel and suitable flanges or tappings to connect with the piping they serve. They shall be of such a design as to allow blowing out of accumulated dirt, and to facilitate removal and replacement of a strainer screen, without disconnections of the main piping.
- C. All strainers shall be Y-type with removable screen.
 - 1. Two-inch and smaller or where installed in non-ferrous piping system, screwed or flanged, bronze material.
 - 2. 2-1/2" and larger in ferrous piping systems, flanged cast iron material. Brass screens for water 1/16" for 3" inclusive; 1/8" for 4" and above.

2.7 PRESSURE GAUGES

- A. Phosphorous bronze Bourdon tube type, cast aluminum 4-1/2" diameter case with blowout disc, stainless steel movement with bronze bushing brass socket and black numerals on a white face.
- B. Accuracy: 1/2 or 1% of scale range.
- C. Scale to be selected so that normal operating point is between 35% and 65% of full scale.

D. Each gauge to include brass petcock. Gauges on steam piping to include syphon.

E. Gauges to be installed:

1. Across water coils.
2. Across tube bundles (e.g. chiller evaporator, chiller condenser, convertors).
3. Suction and discharge of pumps.
(Compound gauge on fuel oil pump suction)
4. Inlet and outlet of pressure reducing valves.
5. Inlet and outlet of steam control valves.
6. Additional locations as shown on plans.

<u>Manufacturer</u>	<u>Series</u>
H.O. Trerice	500X
U.S.Gauge	Solfrunt
Albert A. Weiss	UG-1
Weksler Instruments	AA1

2.8 THERMOMETER

A. Mercury filled red reading column type, 9" long, with one piece aluminum case and sealed replaceable glass element. Brass stem with union connection and adjustable angle to permit reading from any angle. Black numerals on white background.

B. Accuracy: 1% of scale range.

C. Scale to be selected so that normal operating point is between 35% and 65% of full scale.

D. Each thermometer to be installed in an extension neck brass separable socket. Extension neck length to be coordinated with insulation thickness. Socket and thermometer insertion length to be minimum of 75% pipe diameter.

E. Thermometers to be installed:

1. Supply and return of water coils (single return on multiple coil bank)
2. Supply and return of tube bundles (e.g. chiller evaporator, chiller condenser, convertors)
3. Circulating pump discharge
4. Supply and return of water boilers.
5. Additional locations as shown on plans.

<u>Manufacturer</u>	<u>Series</u>
1. Taylor	E
2. H.O. Trerice	BX
3. Weksler Instrument	AA5

2.9 REMOTE READING THERMOMETER

A. Mercury actuated bronze Bourdon tube type, cast aluminum 4-1/2" diameter flanged ease, stainless steel movement with bronze bushing, brass socket, and black numerals on a white face.

B. Braided capillary tube and sensing bulb shall be stainless steel and fully ambient compensated for its entire length. Sensing bulb to be installed in a extension neck brass separable socket. Extension neck length to be coordinated with insulation thickness.

C. Accuracy 1% of scale range.

- D. Scale to be selected so that normal operating point is between 35% and 65% of full scale.
- E. Thermometers to be installed as shown on plans.
- F.

<u>Manufacturer</u>	<u>Series</u>
1. H.O. Trerice	M80300
2. U.S. Gauge Supertherm	9100.
3. Weksler Instruments	415A.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION - GENERAL

- A. Provide and erect in a workmanlike manner, according to the best practices of the trade, all piping shown on the drawings or required to complete the installation intended by these specifications.
- B. The drawings indicate schematically the size and location of piping. Piping shall be set up and down and offset to meet field conditions.
- C. Contract #2 Contractor shall inform himself from the general construction specifications and plans, of the exact dimensions of finished work and of the height of finished ceilings in all rooms where radiation, units, equipment or pipes are to be placed and arrange his work in accordance with the schedule of interior finishes, as indicated on the architectural drawings.
- D. All piping shall be run perpendicular and/or parallel to floors, interior walls, etc. Piping and valves shall be grouped neatly and shall be run so as to avoid reducing headroom or passage clearance. All valves, controls and accessories concealed in furred spaces and requiring access for operation and maintenance shall be arranged to assure the use of a minimum number of access doors.
- E. All pipe lines made with screwed fittings must be provided with as sufficient number of flanges or unions to make possible any taking down of the pipes without breakage of fittings.
- F. All piping shall be erected so as to insure a perfect and noiseless circulation throughout the system. No bull head tees will be permitted.
- G. All valves and specialties shall be so placed as to permit easy operation and access and all valves shall be packed at the completion of the work before final inspection.
- H. Provide proper provisions for expansion and contraction in all portions of pipe work, and to prevent undue strains on piping or apparatus connected therewith. Provide double swings at riser transfers and other offsets wherever possible, to take up expansion. Arrange riser branches to take up motion of riser.
- I. Approved bolted, gasketed, welded flanges shall be installed at all apparatus and appurtenances, and wherever else required to permit easy connection and disconnection. Screwed unions shall be used on piping 2" or less.
- J. All piping connections to coils and equipment shall be made with offsets provided with screwed or welded bolted flanges so arranged that the equipment can be serviced or removed without dismantling the piping.

- K. If after plant is in operation, any coils or other apparatus are stratified or air bound (by vacuum or pressure) they shall be repiped with new approved and necessary fittings, air vents, or vacuum breakers at no extra cost. If connections are concealed in furring, floors, or ceilings, this trade shall bear all expenses of tearing up and refinishing construction and finish, leaving same in as good condition as before it was disturbed.
- L. Make all changes in size and direction of piping with fittings. Do not use miter fittings, face, or flush bushing, close nipples or street elbows. Provide clean outs at all changes in direction and at other locations shown in drainage piping.
- M. Make all branch connections with tees, except that on steel piping forged steel "Weldolets" as manufactured by Bonney Forge may be used where the branch pipe is not larger than one half the size of the main pipe.
- N. Tubing shall be erected neatly in a workmanlike manner. Bends in soft copper tubing shall be made with approved tubing benders to prevent deformation of the tubing in the bends. Approved seat-to-pipe threaded adapters shall be provided for junctions with valves and other equipment having threaded connections.
- O. Vertical sections of main risers shall be constructed of pipe lengths welded together. No couplings shall be used.
- P. The ends of all pipe and nipples shall be thoroughly reamed to the full inside diameter of the pipe and all burrs formed in the cutting of the pipes shall be removed.
- Q. Piping shall be installed in accordance with the latest edition of the ASME Code for pressure piping, and all other applicable codes.
- R. All piping shall be concealed above furred ceilings in rooms where such ceilings are provided (except where specifically indicated otherwise on the drawings), or walls or partitions, except as otherwise indicated.
- S. Dissimilar piping shall be connected with dielectric connector as made by Ebco Company.
- T. Piping at all equipment and control valves shall be supported to prevent strains or distortions in the connected equipment and control valves. Piping shall be supported to allow for removal of equipment, valves and accessories with a minimum of dismantling and without requiring additional supports after these items are removed.
- U. Pipe nipples - any piece of pipe 3" in length and less shall be considered a nipple. All nipples with unthreaded portion 1-1/2" and less shall be extra heavy. Only shoulder nipples shall be used. No close nipples will be provided.
- V. Screw threads shall be cut clean and true; screw joints made tight without caulking. No caulking will be permitted. A non-hardening lubricant will be permitted. No bushings shall be used. Reductions, otherwise causing objectionable water or air pockets, to be made with eccentric reducers or eccentric fittings. All pipe shall be reamed out after cutting to remove all burrs.
- W. Pitch water piping upward one inch per 100 feet in direction of flow to ensure adequate flow without air binding, and to prevent noise and water hammer.
- X. Pitch drain piping 1/8 inch per foot in the direction of flow.
- Y. Branch connections to mains are to be made in such a manner as to prevent air trapping and permit free passage of air. To meet job conditions mains shall be set up to maintain headroom, and clear other trades.

- Z. Provide air vents at all high points in water piping. Provide oversized float operated automatic air vent at high points of equipment connections and in mechanical rooms or as shown on piping details. Provide manual vents at all other locations. When installed above inaccessible ceilings, valves shall be installed remote and identified on valve tag chart.
- AA. Avoid 90 degrees lift set-ups in supply lines by using 45 degree ells. Where 90 degree lifts exceed 12" install automatic air vent in supply lines. All lifts in return lines shall be installed with automatic air vents.
- BB. Pipe outlet of all air vents to an open sight drain if the vent is concealed or to within two feet of the floor within Machine Rooms.
- CC. All water piping shall pitch back to low points for drainage. Low points shall be provided with 3/4 inch hose cocks.
- DD. Provide drain valves at the heel of all interior main water risers. Provide drain valves at the heel of all perimeter water risers if shown on drawings. Pipe all drain valves to an indirect waste.
- EE. Miscellaneous drains, vents, reliefs, and overflows from tanks, equipment, piping, relief valves, pumps, etc., shall be run to the nearest open sight drain or roof drain. Provide drain valves whenever required for complete drainage of piping including the system side of all pumps.
- FF. Where pipe penetrates walls, partitions or slabs provide Schedule 40 steel sleeves with an internal diameter at least 2" larger than the outside diameter of the pipe. Set sleeves before pouring concrete or securely fasten and grout with cement. Floor sleeves shall project 1" above the finished floor. Pack void between pipe and sleeve with an approved firestop material. See Section 230000.
- GG. Provide escutcheons fastened to pipe and covering sleeve on all penetrations visible within occupied spaces, corridors, and mechanical equipment rooms. Escutcheons are to be chrome plated brass, Ritter No. 36A for vertical lines, Ritter No. 3A for all other piping.
- HH. Cross connection of any devices, or construction which will permit backflow connections between a water distribution system and any part of the drainage system shall not be installed.
- II. Provide domestic water connections from valved outlets to any equipment requiring same.
- JJ. Keep piping 2'-0" outside the vertical line of unprotected electrical equipment, or provide painted, watertight gutters or pans with pipe drains.

3.2 PIPING SUPPORT

- A. Piping shall not be hung from other piping or from equipment of other trades.
- B. Piping installed in existing buildings (or in new buildings where additional supports are required), shall be hung from supplemental steel attached to and spanning the existing (or new, in new buildings) steel structure or with chemical adhesive anchors. Use of vertical expansion shields shall not be permitted. Where vertical support into masonry or concrete structure cannot be avoided, use supplemental steel as noted above, or use chemical adhesive anchors.
 - 1. When attaching to existing concrete structure (or newly placed structure where additional supports are required), provide two chemical adhesive anchors at each

support point. The chemical anchors shall be separated by a minimum of 8". A 2.5x2.5x3/8 angle iron shall span the two chemical anchors. Drilling for chemical adhesive anchors must not interrupt or displace any existing rebar. Concrete insert shall be either external or internal threaded element by the chemical adhesive manufacturer.

2. When attaching to concrete rib construction, the chemical anchors shall be attached to the upper third of the rib. Do not attach to the bottom of concrete ribs.
 3. Minimum chemical anchor embedment shall be 3". The two chemical adhesive anchors shall be the same diameter as the attachment rod.
 4. Chemical adhesive product for solid concrete applications shall be Hilti HIT RE 500 or approved equal with either internally threaded inserts or threaded rod supplied by the chemical adhesive manufacturer. Inserts to be similar to Hilti HIS or approved equal. Threaded rod to be similar to Hilti HAS product or approved equal.
- C. Hanger rods shall not pierce ducts.
- D. All piping connected to pumps and compressors within 50 feet of such equipment, and where required or directed to eliminate vibration or isolate pipe from building structure, Contract #2 Contractor shall supply and install spring type antivibration isolators as called for in Section 230548 of these specifications.
- E. Where additional steel is required for the support of hangers, the Contract #2 Contractor shall furnish and install same subject to the approval of the Commissioner.
- F. All piping running on walls shall be supported by means of hangers suspended from heavy galvanized steel angle wall brackets. No wall hooks will be permitted.
- G. Lateral bracing of horizontal pipe shall be provided where required to prevent side sway or vibration. The lateral bracing shall be of a type approved by the Commissioner and shall be installed where directed by the Commissioner.
- H. All horizontal copper tubing shall be supported by hangers not over 6' apart for piping 1-1/4" and smaller. Space hangers no more than 10' apart for piping 1-1/2" and larger. All branches shall have separate hangers. Hangers shall be Clevis type (with copper bottom support for uninsulated brass pipe or copper tubing). If channel or angle iron trapeze hangers are used, the space on the hangers for uninsulated brass pipe or copper tubing shall be wrapped with lead shields to isolate tubing.
- I. Hanger rods attached to concrete inserts or piping racks shall not be used to support piping in Mechanical Rooms or for the support of individual pipes weighing in excess of 20 lbs. per linear foot.

3.3 PIPING JOINTS

A. Welding

1. Joints between sections of pipe and between pipe and fittings shall be fusion welded in accordance with the recommendations of the American Welding Society. Mitering of pipe to form elbows, matching straight runs to form tees or any similar construction shall not be done.
2. All welding shall be done as outlined in the latest edition of the ASME Code for pressure piping.

3. Welding process - all welding shall be done by the oxyacetylene or electric arc welding process in accordance with the requirements set forth in welding of pipe joints of the codes for pressure piping.
 4. Beveling and welding - all pipe 2-1/2 inches 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 provided all paint, rust, scale and oxide are carefully removed with hammer, chisel or file and bevel left smooth and clean. Joints shall be prepared and welded to assure thorough fusion of alignment and the production of a joint that shall develop the full strength of the pipe and that shall be leakproof in service.
 5. Welding tees - welding tees shall be used when specified hereinafter. Where necessary, branch connections shall be reinforced in an approved manner. For the smaller branches, where welding tees are unavailable, nozzles shall be welded to pipe. Where such nozzles are welded to the pipe, all cutting oxide which may drop inside the pipe shall be removed before welding the branch or section in place. Where branch size is one half the size of main or larger, use welding tees. Where branch size is two (2) sizes smaller than the size of main "Weldolets" or "Sockolets" may be used.
 6. Welding rods - the welding rod used for welding steel and wrought iron shall be approved welding rod in accordance with ASTM SPEC. A233.
 7. Welder shall be fully certified by New York City to certify welders for pressure piping.
- B. Flanged Joints
1. Use matched flange faces and 1/16" thick compressed gaskets.
 2. When connection to equipment with flat face flange, grind flange raised face flat and use full faced gaskets.
- C. Screwed Joints
1. Do not damage fitting surface, remove burrs, apply red lead and ground graphite in linseed oil to male threads only. Do not use wicking, cord or similar materials. Clean joint thoroughly of excess jointing material.
- D. Soldered Joints
1. 95-5 wire solder. Completely clean all surfaces and coat with a thin layer of flux.
- E. Brazed Joints
1. Conform to ASA-B31.1 and ASTM B-260-56T in accordance with the requirements of the manufacturers of the fittings and the brazing material.

3.4 CLEANING OF PIPING

- A. Plug all open ends of piping, valves and equipment except when work is being performed. Protect connections to equipment and control valves with temporary screens and flush piping with water. Remove dirt and debris collected.
- B. Thoroughly clean the piping to remove all organics, rust, and all foreign matters and to prepare the system for permanent treatment.

- C. Perform chemical cleaning after completing all pressure and leakage tests and thoroughly flushing the systems.
- D. Use cleansing agent which will not interact with any of the materials in the systems in any way to produce corrosions, form deposits, weaken, reduce the life or in any way have a detrimental effect on any system components.
- E. Fill the system with clean water and add sufficient cleaning preparation to provide a concentration adequate to perform complete cleaning: Add the cleaning preparation at a point which will assure good mixing.
- F. Provide temporary containers to accommodate the foam that may form and temporary pumps to circulate the chemical solution.
- G. Circulate the mixture of cleanser and water for a sufficient length of time to complete the cleaning.
- H. Drain the system, flush with clean water, clean all strainers and screens and refill the system.
- I. Cleaner for the new piping shall be Nalprep 330 as manufactured by the Nalco Chemical Co., or the approved equal.
- J. Entire cleaning operation shall be performed by a competent water treatment service in strict accordance with the manufacturer's recommendations. Provide written certifications after the cleaning operation is complete.

3.5 TESTS

- A. Tests all piping except drainage connections, including valves, fittings and joints hydrostatically at a pressure equal to at least 1-1/2 times the rated pressure, but no less than 200 psig for a minimum of four hours. Blank-off or remove all elements or equipment which may be damaged by the pressure. Open but do not back-seat valves. Inspect all joints and connections.
- B. Test drainage piping hydrostatically and with smoke in accordance with the local authorities.
- C. Repair all leaks, defects or damage revealed by resulting from the test and re-test the system.
- D. Do not insulate or conceal piping until the system has been tested and the results approved.
- E. Perform tests in the presence of the Commissioner.

3.6 AIR ELIMINATION

- A. The Contract #2 Contractor's attention is specifically directed to the problem of proper air elimination. In installing water piping systems and all equipment, the Contract #2 Contractor shall carefully plan the actual installation in such a manner that high points and air pockets be kept to a minimum and that they are properly vented where they are unavoidable. All air elimination devices called for on the drawings and in these specifications shall be provided and properly installed. In addition, Contract #2 Contractor shall furnish and install all other air elimination devices which may be required due to job conditions. The liability of the Contract #2 Contractor under the guarantee provisions of the contract is intended to cover his responsibility for a proper, continuous and automatic air elimination to assure even and balanced distribution of water to all equipment.

3.7 ANCHORS

- A. All anchors shall be separate and independent of all hangers and supports. Anchors shall be of heavy blacksmith construction suitable in every way for the work of this contract. Anchors shall be welded to the pipe and fastened to the structure with bolts.
- B. Anchors shall be fabricated and assembled in such a form as to secure the piping in a fixed position. They shall permit the line to take up its expansion and contraction freely in opposite directions away from the anchored points; and shall be so arranged to be structurally suitable for particular location, and line loading. Submit details for approval.

3.8 WATER BALANCE

- A. Balance all new water systems and those designated existing water system to the quantities shown with the following tolerances:
 - 1. Pumps: Design Flow plus 5%
 - 2. Coils: Design Flow plus 5%
- B. Balance in accordance with ASHRAE, AABC, or NEBB procedures and submit all readings.
- C. Water system balancing is to be performed by a professional organization, qualified by experience and practice to perform this service. Submit evidence of qualifications, balancing procedures, and report forms for approval prior to start of work.
- D. Submit three bound copies of the water balance report to the Commissioner. Balance Report to include the following data for each water system:

Pump Designation, location, system type.
Manufacturer, model number, size.
Suction and discharge pressure readings.
Balancing valve position.
Motor manufacturer, frame, horsepower, volts, phase, hertz, and RPM.
Motor amps - Design versus Actual.
Water coil GPM, entering water temperature, leaving water temperature and pressure drop (Design versus Actual) - Balancing valve position.
Tube bundle GPM, entering water temperature, Leaving water temperature, and pressure drop (Design versus Actual) - Balancing valve position.
Steam coil entering pressure, flow rate, air quantity, entering and leaving air temperature.

END OF SECTION

SECTION 22 05 48

EQUIPMENT BASES AND VIBRATION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 220000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #2 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 220000, General Provisions, and with the provisions of all applicable codes and laws.

1.3 QUALITY ASSURANCE

- A. Manufacturer shall:
 - 1. Determine vibration isolation sizes and locations.
 - 2. Provide piping and equipment isolation systems as scheduled or specified.
 - 3. Guarantee specified isolation system deflection.
 - 4. Provide installation instructions and drawings.
 - 5. Substitution of "Internally Isolated" mechanical equipment in lieu of the specified isolation of this section must be approved for individual equipment units by the acoustical consultant. This type of substitution will only be considered with a letter of guarantee from the equipment manufacturer that states that the "Internal Isolated" mechanical equipment is equivalent to the specified isolation outlined in this section.

1.4 SUBMITTALS

- A. Procedure
 - 1. Prepare and make the submissions listed below and in Section 220000 in accordance with the procedure specified in Section 220000.
- B. Shop Drawings
 - 1. Vibration isolation equipment.
 - 2. Submittal data shall include complete mounting details of each isolated piece of equipment, including static deflection, operating and free heights, and outside spring diameter.

3. Steel bases and concrete inertia bases shall be completely detailed.
4. Include clearly outlined procedures for installing and adjusting the isolators.
5. Performance report and calculations for vibration isolation equipment.
6. Manufacturers' certified reports on motorized equipment alignment and installation.

1.5 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 220000.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements specified herein, provide vibration isolation materials, bases and systems by one of the following or approved equal:

1. Kinetics Noise Control, Inc.
6300 Irelan Place
P.O. Box 655
Dublin, OH 43017
877.457.2695
www.kineticsnoise.com
2. Mason Industries, Incorporated
350 Rabro Drive
Hauppauge, New York 11788
631-348-0282
www.mason-ind.com
3. Vibration Mountings & Controls, Inc.
113 Main Street
Bloomingdale, NJ 07403
973-838-1780
www.vmc-kdc.com

- B. All products specified under this section shall be provided by one manufacturer.
- C. Where listed Mason Industries, Inc. (M.I.I) provided as a basis of design.
- D. Where exposed to corrosive elements: corrosion protected.

2.2 VIBRATION ISOLATIONS, GENERAL

- A. All mechanical equipment shall be mounted in accordance with the specifications below and with the specific requirements shown in the equipment schedules. The vibration isolation manufacturer shall provide supervision to ensure proper application, installation

and adjustment of the isolators. Upon completion of the installation and after the system is put into operation, the manufacturer shall make a final inspection and report. The Contract #2 Contractor shall submit this report to the Commissioner, in writing, certifying the proper performance of the installation.

- B. The isolation manufacturer shall supply all unit isolators, complete rails, fan and motor bases and structural steel forms for concrete inertia blocks, where called for, and shall be responsible for the selection of all vibration eliminators and shall guarantee to meet the requirements of this specification.
- C. Wherever rotational speed is mentioned as the disturbing frequency the lowest such speed in the system shall be used. All isolation devices shall be selected for uniform static deflections according to distribution of weight.
- D. Vibration isolators shall be designed or treated for resistance to corrosion. Steel components shall be PVC coated, or phosphated and painted with rust-resistant enamel. Nuts, bolts and washers shall be zinc-electroplated. Structural steel bases shall be thoroughly cleaned of welding slag and primed with metal etching primer and painted with rust-resistant enamel. Isolators exposed to the weather shall have all steel parts hot-dipped galvanized. Nuts, bolts and washers may be cadmium plated. Spring components shall be cadmium plated and neoprene coated.
- E. All fan units and air handling units (except fans mounted on slab on grade) shall be isolated as follows:

1.	Up to 450 RPM	75% efficiency (3-1/2" max. defl.)
2.	450 RPM to 850 RPM	90%
3.	850 RPM and Over	95%
- F. Submittals shall show disturbing frequency, required efficiency, designed deflection and outside diameter of springs, when pertinent.
- G. Horizontal pipe runs - all horizontal pipe runs within Mechanical Equipment Rooms and within 50 feet of final connections to all equipment having motors of 1/2 horsepower or larger, shall be isolated from building structure by means of spring hanger units designed for insertion in rods.
- H. All vibration isolators shall have either known undeflected heights or calibration markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.
- I. All isolators shall operate in the linear portion of their load versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer, and must be linear over a deflection range of not less than 50% above the design deflection.
- J. The ratio of lateral to vertical stiffness shall be not less than 1.0 nor greater than 1.5.
- K. The theoretical vertical natural frequency for each support point based upon load per isolator and isolator stiffness shall not differ from the design objectives for the equipment as a whole by more than + 10%.
- L. All neoprene mountings shall have a shore hardness of 40 to 65, after minimum aging of 20 days or corresponding oven-aging.

2.3 MOUNTINGS

- A. Spring Type:

1. Spring isolators shall incorporate the following:
 - a. Minimum diameter of 0.8 of the loaded operating height
 - b. Corrosion resistance where exposed to corrosive environment with:
 - i. Springs cadmium plated and neoprene coated.
 - ii. Hardware cadmium plated.
 - iii. All other metal parts hot dip galvanized.
 - c. Reserve deflection (from loaded to solid height) of 50% of rated deflection
 - d. Leveling device
 - e. 1/4" thick neoprene acoustical base pad.
 - f. Designed and installed so that ends of springs remain parallel.
 - g. Adequate operating clearance.
 - h. Non-resonant with equipment forcing frequencies or support structure natural frequencies.
 - i. Springs should not be welded to top and bottom plates.

2. Type "A": Spring isolators to be one of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	FDS
Mason Industries, Inc.	SLF
Vibration Mountings	Spring-Flex Series "A"

3. Type "A-S": Spring isolators shall incorporate seismic restraint and be one of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	SSLFH
Vibration Mountings	

4. Type "B": Spring isolators shall be the same as Type "A" except:

- a. Where operating weight differs from installed weight, provide built-in adjustable limit stops to prevent equipment rising when weight is removed. Stops not in contact during normal operation.
- b. Two layers of 1/4" neoprene base pad separated by 1/16" sheet steel.
- c. Tapped holes in top plate for bolting to equipment.
- d. Capable of supporting equipment at a fixed elevation during equipment erection.
- e. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	SLR
Vibration Mountings	AWR

5. Type "B-S": Spring isolators incorporating seismic restraint shall be one of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	SSL
Vibration Mountings	

6. Type "C": Spring hanger rod isolators shall incorporate the following:
- a. Spring element seated on a steel washer within a neoprene cup.
 - b. Steel retainer box encasing the spring and neoprene cup.
 - c. Neoprene bushing for lower rod hole to prevent steel-to-steel contact.
 - d. Spring diameters and hanger box lower hole size large enough to permit hanger rod to swing through a 30° arc before contacting the hole and short-circuiting the spring.
 - e. Requires Seismic Restraint.
 - f. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	Type 30
Vibration Mountings	

B. Elastomer Mounting Types

1. All elastomer isolators shall incorporate the following:
 - a. Bolt holes for bolting to equipment base.
 - b. Bottom steel plates for bolting to sub-base as required.
 - c. Unit type design molded in black oil-resistant neoprene.
 - d. All metal surfaces shall be neoprene covered.
 - e. Neoprene to be compounded to meet the following:
 - i. Not greater than 50 durometer.
 - ii. Maximum tensile strength 2000 psi.
 - iii. Minimum elongation 300%.
 - iv. Maximum compression set at 25% of the original deflection.

2. Type "D": Double deflection neoprene mount.

- a. Rated deflection minimum 0.35 inches.
- b. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	ND
Vibration Mountings	RD

3. Type "D-S": Double deflection neoprene mount.

- a. Rated deflection minimum 0.35 inches.
- b. Shall incorporate seismic restraint.
- c. One of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	RBA
Vibration Mountings	

4. Type "D-SA": All directional captive neoprene mount.

- a. Rated deflection minimum 0.25 inches.
- b. Shall incorporate seismic restraint.
- c. One of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	BR
Vibration Mountings	

5. Type "E": Double deflection elastomer hanger rod isolators incorporating the following:

- a. Molded unit type neoprene element.
- b. Steel retainer box encasing neoprene mounting.
- c. Clearance between mounting hanger rod and steel retainer box.
- d. One of the following.

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	FLS
Mason Industries	HD
Vibration Mountings	RHD

6. Type "F": Pad type neoprene mountings.

- a. 3/4-inch minimum thickness.
- b. 50 psi maximum loading.
- c. Ribbed or waffled design.
- d. 15% Deflection
- e. 16 Gauge galvanized steel plate between multiple layers of pad thickness.
- f. Suitable bearing plate to distribute load.
- g. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	NPD
Mason Industries	Super W
Vibration Mountings	SHEAR-FLEX

C. Combination spring and elastomer types:

1. Type "G": Combination spring/elastomer hanger rod isolators.

- a. Spring and neoprene isolator elements in a steel box retainer.
- b. Characteristics of spring and neoprene as described in Type "C" and Type "E" isolators.
- c. Factory pre-loading to 75% of rated load (for pre-compressed springs).

- d. Requires Seismic Restraint.
- e. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries	30N
Vibration Mountings	

- 2. Type "G-S": Combination spring/elastomer hanger rod isolators incorporating seismic upstop.

- a. Spring and neoprene isolator elements in a steel box retainer.
- b. Characteristics of spring and neoprene as described in Type "C" and Type "E" isolators.
- c. Factory pre-loading to 75% of rated load (for pre-compressed springs).
- d. Requires Seismic Restraint.
- e. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries	RW30N
Vibration Mountings	

- 3. Type "H": Thrust Restraints

- a. Use on all fan heads and axial or centrifugal fans where the air thrust exceeds 10% of the equipment weight.
- b. The thrust restraint consists of a TYPE "G" isolator with the same deflection as specified in the schedule for the mountings or hangers.
- c. Spring element contained within a steel frame designed so it can be preset for thrust at the factory and adjusted in the field to allow for a maximum of 1/4" movement at start and stop.
- d. Assembly furnished with one rod and angle brackets for attachment to both equipment and ductwork or the equipment and the structure.
- e. Restraints attached at the centerline of thrust and symmetrically on either side of the unit.
- f. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries	Type WB
Vibration Mountings	

2.4 Materials – Rooftop spring curbs

- A. Type RSC-1: Curb mounted isolation base (low deflection).

- 1. Integral spring and weather seal curb arrangement that fits under the equipment to be isolated and over the curb.

2. Top and bottom members constructed of extruded aluminum and connected by a flexible, water-proof neoprene membrane. The aluminum members seal against the curb with continuous closed cell neoprene sponge.
3. Cadmium plated springs with a 1" deflection and 50% additional travel to solid. Spring diameters no less than 0.8 of the spring height at rated load.
4. Wind resistance and seismic restraint shall be provided by resilient snubbers in the corners with a minimum clearance of 1/4" so as not to interfere with the spring action except in high winds or seismic activity.
5. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics Mason Industries Vibration Mountings	Type CMAB

B. Type RSC-2: Curb mounted isolation base (high deflection).

1. Integral spring and weather seal curb arrangement that fits under the equipment to be isolated and directly on top of the roof, spanning the joists.
2. Bottom member constructed of rectangular, tubular structural steel. Top member, supporting the equipment, constructed of an inverted steel AU" channel with cross member bracing.
3. Water-proofing by a flexible formed aluminum weather seal on all four sides of the base. Corner joints constructed of molded rubber.
4. Springs cadmium plated with deflections as called out in the schedule and 50% additional travel to solid. Spring diameters of no less than 0.8 of the spring height at rated load.
5. Wind resistance and seismic restraint shall be provided by means of resilient snubbers in the corners with a minimum clearance of 1/4" so as not to interfere with the spring action except in high winds or seismic activity.
6. The system should incorporate (for improved air-borne acoustical isolation), two layers of staggered joint 5/8" drywall directly attached to the top of the roof structure within the curb surrounding the ducts. All interfaces should be caulked. In addition, 4" thick, 1.5 pound density glass or mineral fiber shall cover the drywall surface under the unit and all sides of the plenum.
7. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics Mason Industries	Type RSC

Vibration Mountings

2.5 Materials – Equipment Bases

A. Equipment Bases:

1. Type "B-1A": Integral structural steel bases.
 - a. Reinforced as required to prevent base flexure at startup and misalignment of drive and driven units.
 - b. Fan bases complete with motor slide rails.
 - c. Drilled for drive and driven unit mounting plate.
 - d. Depth equal to 1/10 of the longest dimension of the base, not exceeding 14 inches.
 - e. Height saving brackets shall be employed in all mounting locations. Isolators shall be Type "A". When seismic restraint is required, isolators shall be Type "A-S."
 - f. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries	Type WSFL
Vibration Mountings	

2. Type "B-2A": Concrete inertia base
 - a. Formed in structural steel frame.
 - b. Structural base reinforced as required to prevent flexure, misalignment of drive and driven unit or stress transfer into equipment
 - c. Minimum base depth must equal to 1/12th or 8% of the longest base dimension.
 - d. Fan bases complete with motor slide rails.
 - e. Pump bases to provide base elbow supports. Bases complete with height saving brackets, reinforcing, equipment bolting provisions and Type "A" isolators (Type "A-S" isolators for seismic requirements) provided by vibration control supplier.
 - f. Base ready for concrete pour; concrete weighing not less than 140 lbs per cubic foot by others.
 - g. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries	Type KSL
Vibration Mountings	

2.6 Materials – Flexible Connections

A. Flexible Connectors:

1. Type "FC-1": Neoprene connector for general piping.
 - a. Rubber expansion joints shall be peroxide cured EPDM throughout with Kevlar tire cord reinforcement.
 - b. The raised face rubber flanges must encase solid steel rings to prevent pull out. Flexible cable wire is not acceptable.
 - c. Sizes 1-1/2" through 14"(40mm through 350mm) shall have a ductile iron external ring between the two spheres. Sizes 16" through 24" (400mm to 600mm) may be single sphere. Sizes 3/4" through 2"(20mm through 50mm) may have one sphere, bolted threaded flange assemblies and cable retention.
 - d. Control rods passing through 1/2"(12mm) thick Neoprene washer bushings large enough to take the thrust at 1000psi (0.7 kg/mm²) of surface area may be used on unanchored piping where the manufacturer determines the condition exceeds the expansion joint rating without them.
 - e. Minimum ratings through 14"(350mm) shall be 250psi at 170°F and 215psi at 250°F. (1.72MPa at 77°C and 1.48MPa at 121°C), 16"(400mm) through 24"(600mm) 180psi at 170°F and 150psi at 250°F. (1.24MPa at 77°C and 1.03 MPa at 121°C). Higher published rated connectors may be used where required.
 - f. Safety factors shall be a minimum of 3/1. All expansion joints must be factory tested to 150% of maximum pressure for 12 minutes before shipment.
 - g. Submittals shall include two test reports by independent consultants showing minimum reductions of 20 DB in vibration accelerations and 10 DB in sound pressure levels at typical blade passage frequencies on this or a similar product by the same manufacturer.
 - h. The piping gap shall be equal to the length of the expansion joint under pressure.
 - i. All expansion joints shall be installed on the equipment side of the shut off valves.
 - j. Connector to be one of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries	Type SAFEFLEX
Vibration Mountings	

2. Type "FC-2": Flexible stainless hose for use in inaccessible areas.
 - a. Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings.
 - b. 3-inch and larger shall be flanged.
 - c. 3-inch pipe size and smaller with male nipple fittings.
 - d. At equipment, hoses shall be installed on the equipment side of the shut-off valves horizontal and parallel to the equipment shafts wherever possible.

- e. Suitable for operating pressure with 4:1 minimum safety factor.
- f. Length as shown on manufacturer's certified drawings and shall be as tabulated:

Flanged

3" x 12" (75 x 300mm)	6" x 18" (150 x 450mm)	12" x 24" (300 x 600mm)
4" x 12" (100 x 300mm)	8" x 18" (200 x 450mm)	14" x 30" (350 x 750mm)
5" x 18" (125 x 450mm)	10" x 18" (250 x 450mm)	16" x 32" (400 x 800mm)

Male Nipples

1/2" x 12" (12 x 300mm)	1-1/4" x 12" (32 x 300mm)	2" x 12" (50 x 300mm)
3/4" x 12" (19 x 300mm)	1-1/2" x 12" (38 x 300mm)	2-1/2" x 18" (64 x 450mm)
1" x 12" (25 x 300mm)		

- g. Connectors to be one of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics Mason Industries Vibration Mountings	Type BFFL

- 3. Type "FC-3": Flexible duct connections to fans.

- a. 30 ounce wovenglass fiber coated with neoprene, sewn together at the edges and joints.
- b. 6" long and held in place with 1" wide bands of 12 ga. galvanized steel bolted to duct and to outlets and inlets of the units and fans with 1/8" stove bolts, 5" o.c. Metal connections 3" wide on either side of the flexible material, as provided by the manufacturer, may also be used.
- c. One of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Ventfabrics DuroDyne	Ventglas Insulflex

2.7 ISOLATION SCHEDULE

<u>EQUIPMENT TYPE</u>	<u>SERVING</u>	<u>ISOLATOR TYPE</u>	<u>MINIMUM STATIC DEFLECTION (INCHES)</u>
FLOOR MOUNTED	AHU-1, 2, 3, 4	Units externally isolated	1.0

AIR HANDLING		A-S,FC-3	
UNIT HEATERS	ALL	F	Max. 50 Durometer
ROOF TOP FANS	SEF-1, 2		
CURB MOUNT	EF-4, EF-6	RSC-1, FC-3	1.0
	RFL-1, EF-R1		
EXHAUST FANS	EF-R2, EF-R3	G-S, FC-1	1.0
	EF-R4A, EF-R4B		
VAV BOXES	ALL	E, FC-3	1.0
FAN COIL UNITS	FCU-1, 2, 3, 4		
	FCU-5, 7, 8	G-S, FC-3	1.0
	FLOOR MOUNTED	B-S	
PIPING	SUSPENDED	G, G-S	SEE SPEC
	RISERS	B-S, P-2	
	FLOOR MOUNTED	B-S	
DUCTWORK	SUSPENDED	G, G-S	SEE SPEC

PART 3 - EXECUTION

3.1 Inspection

- A. Examine all work prepared by others to receive work of this Section and report problems or defects affecting installation to the General Contractor/Construction Manager for correction.
- B. Inspect all components of the Work to insure no damage has occurred during shipment or storage.
- C. Accompany Acoustical Consultant, General Contractor/Construction Manager on a joint inspection, ideally within 2 weeks of the point in time when equipment systems are certified operable and adjusted.

3.2 Installation

- A. Install vibration isolation devices and systems in accordance with the manufacturer's instructions and certified submittal data.
- B. Installation of vibration isolators must not cause any change of position of equipment, piping or duct resulting in stresses or misalignment.
- C. No rigid connections between equipment and the building structure shall be made that degrades the performance of the vibration isolation systems herein specified.
- D. The contractor shall not install any equipment, piping, duct or conduit, which makes rigid connections with the building unless isolation is not specified. "Building" includes, but is not limited to, slabs, beams, columns, studs and walls.
- E. Coordinate work with other trades to avoid rigid contact with the building.

- F. Any conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.
- G. Correct, at no additional cost, all installations which are deemed defective in workmanship and materials at the contractor's expense.
- H. Floor Mounted Equipment:
1. 4-inch thick concrete housekeeping pads:
 - a. Over entire floor area of supported equipment.
 - b. Supporting all vibration isolation devices and bases.
 - c. Keyed with hairpins as required to be integral with the structural slab.
 - d. Incorporating approved seismic restraint anchor plates flush with the top of the housekeeping pad.
 2. Concrete per specification describing requirements.
- I. General Equipment Isolation:
1. Provide 2-inch operating clearance between concrete inertia bases and housekeeping pad and 1-inch clearance between equipment or structural bases and housekeeping pad.
 2. Isolation mounting deflection (minimum) as specified or scheduled on manufacturer's certified drawings.
 3. Position equipment, structural base and concrete bases on blocks or wedges at proper operating height.
 4. Provide operating load conditions prior to transferring base isolator loads to springs and removing wedges.
 5. Electrical conduit connections to isolated equipment shall be looped or installed with flexible conduit to allow free motion of isolated equipment.
 6. Install equipment directly on isolation system. Support rails between the equipment and isolators should not be used.
 7. Verify all installed isolators and mounting systems permit equipment motion in all directions.
 8. Adjust or provide additional resilient restraints to limit startup equipment lateral motion to 1/4-inch.
 9. Prior to startup, clean out all foreign matter between bases and equipment. Verify that there are no isolation short circuits in the base or isolators.

10. No rigid connections between rotating or vibrating equipment and building structure shall be made that degrades the vibration isolation system herein specified.
11. Coordinate work with other trades to avoid rigid contact with the "building". Inform other trades following, such as plastering, drywall, electrical or sheet metal, to avoid any contact which would reduce the vibration isolation.
12. Bring to the Architect's attention immediately, prior to installation, any conflicts with other trades which will result in unavoidable rigid contact with equipment or piping as described herein, due to inadequate space or other unforeseen conditions. Corrective work necessitated by conflicts after installation shall be at the contractor's expense.
13. Correct, at no additional cost, all installations which are deemed defective in workmanship or material as a result of project completion inspection or subsequent inspections due to owner complaints within a period of one year following acceptance.

J. Piping Isolation:

1. All piping shall be resiliently mounted, either floor supported or ceiling hung, such that piping will be isolated from the building structure (ie - no direct metal to metal contact of the piping with the building structure) in the following locations:
 - a. Inside Mechanical Equipment Rooms
 - b. Within 50-feet of vibrating equipment
 - c. Within 10-feet of noise critical (see Noise Control Section 230549 1.1.C.3) spaces (this includes piping under, over or adjacent to these spaces)
 - d. Inside noise critical (see Noise Control Section 230549 1.1.C.3) spaces itself (ie - piping run in ceiling of noise critical space)
 - e. All exposed piping in any occupied space
 - f. Pipe greater than 2-inches in diameter
 - g. First three hangers on both sides of an Acoustical Isolation Joint (AIJ) or when crossing into or out from box-in-box constructions
2. Horizontal pipe isolation: Use factory preloading for the first four isolators from the rotating equipment and for all piping greater than 6 inches in diameter. The first four isolators from the equipment shall have the same static deflection of the isolator used for the equipment itself. Subsequent isolators shall have a static deflection of 1/2 that of connected equipment with a minimum of 1". Use "G-S" isolators for subsequent hangers. Floor supported piping shall rest on type "B" isolators.

3. Riser isolation: Isolate the entire rise of all pipes in the locations described in 3.2.J.1. Risers shall be suspended from type "G-S" hangers or supported by type "A" mountings. Guide and anchor piping in shafts as required with approved resilient mounting designs as described below to prevent direct contact of piping with building structure. Steel springs shall be a minimum of 1" except in those expansion locations where additional deflection is required to limit load changes to $\pm 25\%$ of the initial load. Submittals must include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on the building structure, spring deflection changes and seismic loads. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist in the proposed design.
4. Provide flexible connections "FC-1" at all connections of pipe to rotating or vibrating equipment and as directed in the vibration isolation schedule.
5. Position isolators:
 - a. Close to building structure.
 - b. Between building structure and supplementary steel if required.
 - c. Not to contact acoustic rated walls.
6. Suspend isolators from rigid and massive support points.
7. Adjust as required all isolators to eliminate all contact of the isolated rod with the hanger rod box retainer or short circuiting of the spring.
8. Supplementary steel to be sized for a maximum deflection of 0.08 inches at the center span.
9. Resilient Piping Guides:
 - a. Weld steel guides to the pipe at a maximum spacing of 60°. The outside diameter of the opposing guide bars shall be smaller than the inside diameter of the pipe riser clamp in accordance with the standard field construction practice. Rigidly attach each end of the pipe anchor to an all-directional pipe anchor isolation mounting which, in turn, is rigidly fastened to the steel framing within the shaft.
 - b. The all-directional pipe anchor isolation mountings consists 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 shall not exceed 500 psi.

- c. Construct low temperature piping guides with a 360°, 10-gauge metal sleeve around the piping. Provide thermal insulation between the piping and the sleeve. Space the metal sleeve away from the piping with heavy duty neoprene and canvas duck isolation pad of thickness equal to thermal insulation. Provide urethane or other suitable thermal insulation in the voids between the pipe sleeve and isolation pad material. The metal sleeve outside diameter shall be smaller than the pipe riser clamp inside diameter in accordance with standard field construction practice. Rigidly attach the pipe riser clamp to the steel framing within the shaft.
- d. Mountings shall be Type VSG - M.I.I. or approved equal.

10. Resilient Piping Anchors:

- a. Weld the pipe riser clamp at anchor points to the pipe and to pairs of vertical resilient pipe anchor mountings, which, in turn, are rigidly fastened to the steel framing in the pipe shaft.
- b. The resilient pipe anchor mountings consist of a bolted assembly of steel plates with laminations of 1/2" thick, heavy duty neoprene and canvas duck isolation material. The mounting shall be capable of safely accepting loads developed by the installed piping. A heat shield shall be provided as required. The isolation material loading shall not exceed 500 psi.
- c. Resilient pipe anchor shall be Type ADA - M.I.I., or approved equal.

K. Ductwork Isolation:

- 1. Isolate all ductwork in mechanical rooms and outside of equipment rooms within 25 feet of vibrating equipment with Type "B-S" isolators (floor supported) or Type "G-S" hanger rod isolators with 1-inch static deflection (ceiling hung).
- 2. Provide flexible connections "FC-3" at all connections of ductwork to rotating or vibrating equipment and as directed in the vibration isolation schedule.
- 3. Position isolators:
 - a. Close to building structure.
 - b. Between building structure and supplementary steel if required.
 - c. Avoid contact to acoustic rated walls.
- 4. Suspend isolators from rigid and massive support points.
- 5. Adjust as required all isolators to eliminate all contact of the isolated rod with the hanger rod box retainer or short-circuiting of the spring.
- 6. Supplementary steel shall be sized for a maximum deflection of 0.08 inches at the center span.

3.3 Adjust and Clean

A. Check and adjust all isolators to insure there is no short circuiting such as:

1. Hanger rods touching boxes
2. Hold-down bolts not released
3. Bolts touching springs
4. Springs and/or neoprene overloaded
5. Bottom neoprene pads short-circuited by welding bottom plate to structure
6. Isolation device touching adjacent structures

3.4 Final Inspection

- A. On completion of installation of all vibration isolation devices herein specified, the local representative of the isolation materials manufacturer shall inspect the completed systems and report, in writing, any installation error, improperly selected isolation devices or other faults in the system that could affect the performance of the system. Contractor shall submit a report to the Architect, including the manufacturer's representative's final report, indicating all isolation reported as properly installed or requiring correction and include a report by the Contractor on steps taken to properly complete the isolation work.
- B. The Acoustical Consultant will subsequently inspect the systems for conformance to specifications and for proper installation methods. Contractor shall replace or repair, at his expense, any isolation devices that deviate from the specifications, approved shop drawings, and manufacturer's recommendations as a result of this inspection.

END OF SECTION

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SECTION 22 07 00

INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 220700, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #2 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 220000, General Provisions, and with the provisions of all applicable codes and laws.
- B. Conform to applicable performance standards, listings or approvals of the following organizations.
 - 1. National Fire Protection Association (NFPA)
 - 2. Underwriters Laboratories (UL)
 - 3. New York City Office of Technical Certification and Research (OTCR)
- C. All insulating materials shall comply with the following ratings:
 - 1. Flamespread -25
 - 2. Smoke Developed -50
 - 3. Fuel Contributed -50

1.3 SUBMITTALS

- A. Procedure: Prepare and make the submissions listed below and in Section 220000 in accordance with the procedure specified in Section 220000.
- B. Shop Drawings
 - 1. Insulating materials and jackets.
 - 2. Insulating cements, mastics and adhesives.
 - 3. Methods of installation.
 - 4. Pump enclosure details.
 - 5. Pipe shields.
 - 6. Schedule of insulation (system, material, thickness, cover, method of installation).

1.4 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 220000.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Type A - Fiberglass Insulation

1. The insulation should be sectional pipe jacketed with an embossed barrier laminate. 3.5 pound density insulation with a maximum thermal conductivity(k) of 0.29 Btu-in/hr-ft²-°F and rated to 850°F, composed of glass fibers bonded with a thermosetting resin. Insulation to be faced with vapor barrier of white flame resistant UL rated Kraft paper bonded to reinforced aluminum foil. Vapor barrier to have a maximum permeance of 0.02 perms.

2. Indoor Piping	Pipe Size:		
	1-1/2" & smaller	Over 1-1/2"	Fitting Type
	<hr/>		
Service:	Thickness (in.):		
Domestic Water	1"	1"	G
Horiz. Roof Drains	1"	1"	G

3. Manufacturers:

Owens-Corning, SSL II
Johns Manville - Micro-Lok HP
Knauf 1000° Pipe Insulation

B. Type G - Fiberglass insulation for valves, fittings, flanges (vapor seal insulation).

1. Molded, factory-formed fibrous glass with 3.5 PCF minimum density, max. barrier adhesive and wrapped with glass mesh tape. Each fitting to be finished with two coats of Benjamin Foster 30-36 vapor seal.

2. Finish with white 0.020", 25/50 rated PVC jacket. All joints between PVC jacket and pipe covering shall be sealed with vapor barrier tape. Fitting covers and jacketing to be precured.

3. Service:	Thickness:
Domestic Water	Same as piping
Roof Drains	Same as piping

4. Manufacturers:

Fibrous Glass Products, Inc.
Insulcoustic Corp.
Hamfab

C. Type J - Fiberglass for tanks and accessories.

1. Three pounds density, 450°F max. operating temperature, K Max = .3 at 200°F, mean semi-rigid board fibrous glass insulation, unfaced.

2. Service:	Thickness:
Irregularly shaped pipe accessories	1"

3. Manufacturers:

Owens-Corning, Type 703
Certaineed, Type IB
Knauf, Type elevated temperature board.
Manville, Type 814 Spin Glass

PART 3 - EXECUTION

3.1 INSULATION - GENERAL

- A. All insulating materials shall be applied only by experienced workmen, in accordance with the best covering practice. All piping, duct or equipment shall be blown out, cleaned, tested and painted prior to the application of any covering.
- B. At all openings insulation, insulate edges neatly and protect with sheet metal frames.
- C. All items below described in general indicate the type of covering required, however, all piping, ductwork or equipment that transmits heat or will form condensation shall be insulated.
- D. Insulate all piping, valves, fittings, and accessories that are part of the piping systems specified to be insulated in specification section 230700. Insulate valves and strainers to permit removal of bonnets or baskets without damage to insulation on valve or strainer bodies.
- E. Where existing insulation is damaged by requirements of the work, replace all damaged insulation to match existing insulation's thermal value.
- F. All insulation at duct access doors shall be set in sheet metal double-pan construction.
- G. No piping, ductwork, or equipment shall be insulated until tested and approved for tightness. All piping and ducts shall be dry when covered.

3.2 APPLICATION - PIPE INSULATION (TYPE A)

- A. Vapor barrier jacket: Seal longitudinal joints with vapor barrier adhesive, transverse joints sealed with vapor barrier strips and adhesive. Ends of pipe insulation sealed off with vapor barrier adhesive at all flanges, valves and fittings, and at not more than 20 feet on continuous runs of pipe.
- B. Finish for concealed pipe insulation: Secure all concealed pipe insulation with staples and vapor seal adhesive at longitudinal; standard all service jacket pasted on lap.
- C. Finish for exposed pipe insulation: Multiple layers (minimum 2) of glass weave jacket lap sealed with Childers CP-30. Alternatively, finish with white 0.020", 25/50 rated PVC pre-curved and pre-cut jacket, as manufactured by Proto LoSMOKE or Zeston, covering over all service jacket. For exposed vapor seal insulation, same finish over vapor sealed all service jacket.

3.3 APPLICATION - INSULATION AT PIPE HANGERS

- A. Provide pipe hangers insulation protection saddles and shields.
- B. Fill each pipe covering protection saddle with same insulation as specified for respective pipe or with suitable insulating cement.

- C. Where shields are specified at hangers on piping with fibrous glass covering, provide for load bearing calcium silicate between shields and piping as follows:
 - 1. For pipe covering without vapor barrier jacket, furnish at each shield 18" long calcium silicate section with canvas jacket continuous between shield and insulation.
 - 2. For pipe covering with vapor barrier jacket, remove bottom half section of fibrous glass and replace with half section of calcium silicate. Make vapor barrier jacket continuous between shield and insulation.

3.4 APPLICATION - TANK INSULATION (TYPE J)

- A. Point joints with lagging cement prior to application of finish. Finish with two layers of 8 oz. glass mesh weave. Coat each layer of weave with vapor barrier adhesive.
- B. Insulation shall be fastened with welded pins or stick clips on flat surfaces and with stainless steel bands on irregular surfaces.

END OF SECTION

SECTION 22 08 00

COMMISSIONING OF PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 22, and other Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes commissioning process requirements for Plumbing systems, assemblies, and equipment.
- B. Related Sections:
 - 1. Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.3 DESCRIPTION

- A. Commissioning: Commissioning is a systematic process of ensuring that all building systems, including the mechanical and electrical systems, have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The Commissioning Agent (CxA) shall provide the Owner with an unbiased, objective view of the system's installation, operation and performance. This process does not eliminate or reduce the responsibility of each system designer to provide a complete design or installing subcontractors to provide a finished product. Commissioning is intended to enhance the quality of each system installation, startup and transfer to beneficial use by the Owner.
- B. Commissioning during the construction phase is intended to achieve the following specific objectives, according to the Contract Documents:
 - 1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 - 2. Verify and document proper performance of equipment and systems.
 - 3. Verify that Operation & Maintenance documentation is complete and transferred to Owner.
 - 4. Verify that the Owner's operating personnel are adequately trained.
 - 5. Verify a contract is in place for a post occupancy review with O&M staff within 10 months after Substantial Completion.
- C. The Commissioning process shall be a team effort and encompass, as well as coordinate, the traditionally separate functions of system documentation, system installation, equipment startup, control system calibration, testing, balancing and verification and performance checkouts.

- D. The CxA will work closely with the construction team, cooperating on and coordinating all Cx activities with the Commissioner, Owner's representative, Trade Contractors, subcontractors, manufacturers and equipment suppliers.
- E. The Cx process shall not reduce the responsibility of the construction management group (CM/GC) to comply with the Contract Documents.

1.4 DEFINITIONS

- A. Refer to Division 01 Section "General Commissioning Requirements" for definitions.

1.5 SUBMITTALS

- A. Refer to Division 01 Section "General Commissioning Requirements" for CxA's role.
- B. Refer to Division 01 Section "Submittals" for specific requirements. In addition, provide the following:
 - C. Certificates of readiness
 - D. Certificates of completion of installation, prestart, and startup activities.
 - E. O&M manuals
 - F. Test reports

1.6 QUALITY ASSURANCE

- A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.7 COORDINATION

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to coordination during the commissioning process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by the contractor for the equipment being tested. For example, the plumbing contractor of Division 22 shall ultimately be responsible for all standard

testing equipment for the plumbing system in Division 22, except for equipment specific to and used by TAB in their commissioning responsibilities. A sufficient quantity of two-way radios shall be provided by each subcontractor.

- B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.
- C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.
- D. Data logging equipment and software required to test equipment, if provided by the CxA, shall not become the property of the Owner.
- E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 - EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS

- A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for commissioned components, equipment, and systems.
- B. Red-lined Drawings:
 - 1. The contractor will verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings.
 - 2. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.
 - 3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
 - 4. The contracted party, as defined in the Contract Documents will create the as-built drawings.
- C. Operation and Maintenance Data:
 - 1. Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
 - 2. The CxA will review the O&M literature once for conformance to project requirements.
 - 3. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the contractor.
- D. Demonstration and Instruction:

1. Contractor will provide demonstration and instruction as required by the specifications.
2. A complete training plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any instruction.
3. An instruction agenda for each training session must be submitted to the CxA one (1) week prior the training session.
4. The CxA shall be notified at least 72 hours in advance of scheduled tests so that testing may be observed by the CxA and Owner's representative. A copy of the test record shall be provided to the CxA, Owner, and Architect.
5. Engage a Factory-authorized service representative to instruct Owner's maintenance personnel to adjust, operate, and maintain specific equipment.
6. Instruct Owner's maintenance personnel on procedures and schedules for starting and stopping, trouble shooting, servicing, and maintaining equipment.
7. Review data in O&M Manuals.

3.2 CONTRACTOR'S RESPONSIBILITIES

- A. Perform commissioning tests at the direction of the CxA.
- B. Attend construction phase controls coordination meetings.
- C. Attend domestic water balancing review and coordination meetings.
- D. Participate in Plumbing systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
- E. Provide information requested by the CxA for final commissioning documentation.
- F. Prepare preliminary schedule for Plumbing system orientations and inspections, operation and maintenance manual submissions, training sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, testing and balancing and task completion for owner. Distribute preliminary schedule to commissioning team members.
- G. Update schedule as required throughout the construction period.
- H. During the startup and initial checkout process, execute the related portions of the prefunctional checklists for all commissioned equipment.
- I. Assist the CxA in all verification and functional performance tests.
- J. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.
- K. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA (45) days after submittal acceptance.
- L. Coordinate with the CxA to provide (48) hour advance notice so that the witnessing of equipment and system start-up and testing can begin.

- M. Notify the CxA a minimum of (2) weeks in advance of the time for start of the balancing work. Attend the initial balancing meeting for review of the balancing procedures.
- N. Participate in, and schedule vendors and contractors to participate in the instruction sessions.
- O. Provide written notification to the CM/GCC and CxA that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.
 - 1. Plumbing equipment including backflow preventers, domestic water heaters, pumps, plumbing fixtures, and all other equipment furnished under Division 22 and contract document.
 - 2. Gas piping, sanitary waste and vent piping, storm drainage piping, sump pumps and , sewage ejectors.
- P. The equipment supplier shall document the performance of his equipment.
- Q. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.
- R. Balance Contractor
 - 1. Attend initial commissioning coordination meeting scheduled by the CxA.
 - 2. Submit the site specific balancing plan to the CxA and Commissioner for review and acceptance.
 - 3. Attend the balancing review meeting scheduled by the CxA. Be prepared to discuss the procedures that shall be followed in balancing the Plumbing system.
 - 4. At the completion of the balancing work, and the submittal of the final balancing report, notify the Plumbing contractor and the CM/GC.
 - 5. At the completion of balancing work, and the submittal of the final balancing report, notify the Plumbing Contractor and the CM/GC.
 - 6. Participate in verification of the balancing report, which will consist of repeating measurements contained in the balancing reports. Assist in diagnostic purposes when directed.
- S. Provide instruction of the Owner's operating staff using expert qualified personnel, as specified.
- T. Equipment Suppliers
 - 1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner, to keep warranties in force.
 - 2. Assist in equipment testing per agreements with contractors.
 - 3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
- U. Refer to Division 01 Section "General Commissioning Requirements" for additional contractor responsibilities.

3.3 OWNER'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for Owner's Responsibilities.

3.4 DESIGN PROFESSIONAL'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for Design Professional's Responsibilities.

3.5 CxA'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for CxA's Responsibilities.

3.6 TESTING PREPARATION

- A. Certify in writing to the CxA that Plumbing systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
- B. Certify in writing to the CxA that Plumbing instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- C. Certify in writing that balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
- D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- E. Inspect and verify the position of each device and interlock identified on checklists.
- F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.7 DOMESTIC WATER BALANCING VERIFICATION

- A. Prior to performance of Domestic Water Balancing work, provide copies of reports, sample forms, checklists, and certificates to the CxA.
- B. Notify the CxA at least ten (10) days in advance of testing and balancing Work, and provide access for the CxA to witness balancing Work.
- C. Provide technicians, instrumentation, and tools to verify testing and balancing of Plumbing systems at the direction of the CxA.
 - 1. The CxA will notify testing and balancing subcontractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.
 - 2. The balancing subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
 - 3. Failure of an item includes a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final balancing report.

4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.8 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
- B. Scope of Plumbing testing shall include entire Plumbing installation. Testing shall include measuring capacities and effectiveness of operational and control functions.
- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- D. The CxA along with the Plumbing contractor, balancing subcontractor shall prepare detailed testing plans, procedures, and checklists for Plumbing systems, subsystems, and equipment.
- E. Tests will be performed using design conditions whenever possible.
- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. The CxA may direct that set points be altered when simulating conditions is not practical.
- H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- I. If tests cannot be completed because of a deficiency outside the scope of the Plumbing system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.9 PLUMBING SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 22 sections. Provide submittals, test data, inspector record, and certifications to the CxA.
- B. Plumbing Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 22. Assist the CxA with preparation of testing plans.
- C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment: Test requirements are specified in Division 22 piping Sections. Plumbing Contractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA.

- D. Plumbing Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, fuel gas, and sanitary waste and vent piping, storm drainage piping, sprinkler and domestic water distribution systems.
 - E. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.
 - F. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The systems shall be evaluated shall include, but not limited to:
 - 1. Electric Water Heaters
- 3.10 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT
- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.
- 3.11 APPROVAL
- A. Refer to Division 01 Section "General Commissioning Requirements" for approval procedures.
- 3.12 DEFERRED TESTING
- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to deferred testing.
- 3.13 OPERATION AND MAINTENANCE MANUALS
- A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.
 - B. Refer to Division 01 Section "General Commissioning Requirements" for the AE and CxA roles in the Operation and Maintenance Manual contribution, review and approval process.
- 3.14 INSTRUCTION OF OWNER PERSONNEL
- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to instruction.
 - B. Plumbing Contractor. The contractor shall have the following instruction responsibilities:
 - 1. Provide the CxA with an instruction plan two weeks before the planned training.
 - 2. Provide designated Owner personnel with comprehensive orientation and instruction in the understanding of the systems and the operation and maintenance of each piece of Plumbing equipment.

3. 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 will be repaired or adjusted as necessary and the demonstration repeated.
4. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the instruction.
5. The instruction sessions shall 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.
6. Hands-on instruction 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.
7. The plumbing contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls.
8. Instruction shall occur after functional testing is complete, unless approved otherwise by the Owner.

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SECTION 22 20 00

PUMPING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 220000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #2 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 220000, general provision, and with the provisions of all applicable codes and laws.

1.3 SUBMITTALS

- A. Procedure: Prepare and make the submissions listed below and in Section 220000 in accordance with the procedure specified in Section 220000.
- B. Shop Drawings
 - 1. Air conditioning condensate pump.
 - 2. Pump related accessories.
 - 3. Pump curves.

1.4 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 220000.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Construct all apparatus of materials and pressure ratings suitable for the conditions encountered during continuous operation.
- B. Provide casing connections for vent, drain, suction and discharge pressure gauges.
- C. Balance impellers and all other moving components statically and dynamically.
- D. Completely align and level pumps, motors and bases. Where pumps and motors are shipped as a unit, realign them in the field.
- E. Install and align mechanical seals in accordance with the manufacturer's recommendations.
- F. Provide water supply for cooling and lubricating of seals and/or packing.

- G. Match centrifugal pump impellers and casings so that at specified operating conditions, the impeller diameter is not more than 90% of the maximum diameter impeller which can satisfactorily operate in the casing.
- H. Pumps must operate stably without pulsation, vibration or internal recirculation. Pump operating characteristics at the design point must be such that a variation of 10% in head results in not more than 15% variation in GPM and does not affect the stability of operation of the pump.
- I. Motor sizes scheduled are minimum for the specific pumps indicated on pump schedules. When submitting pumps other than those specifically selected, size motors so that when operating at rated RPM, the pump motor brake horsepower does not exceed the nominal motor rating despite variations in pumping head or when operated singly or in parallel with other pumps serving the same system.
- J. Motors to be high efficiency type with guaranteed minimum efficiency rated in accordance with IEEE standard 112, method B - General Electric Company "Energy Saver" or equal.

Manufacturer: Bell & Gossett Series 100 or approved equal
 Taco Circulator Pump Series 110
 Grundfos UPS Series

PART 3 - EXECUTION

3.1 EQUIPMENT

- A. Install equipment in conformance with manufacturer's recommendations.

END OF SECTION

CONTRACT # 3
HVAC and FIRE PROTECTION WORK

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SECTION 21 00 00

GENERAL PROVISIONS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install all work of this Section as shown on the drawings, as specified herein, and/or as required by job conditions.
- B. Submit and secure approval for all shop drawings (including coordination drawings), calculations, system components, from the local AHJ and the City of New York's insurance company, prior to the start of installation.

1.2 REFERENCES

- A. The installation and equipment is to conform to:
 - 1. 2008 New York City Building Code (NYCBC) applicable bulletins and notices, and applicable reference standards cited therein, including:
 - a. NFPA 13-2002
 - b. NFPA 14-2003.
 - 2. 2008 New York City Fire Code (NYCFC)
 - 3. Applicable Local Laws
- B. All work shall comply with this division (i.e., 210000) and Section 230000, General Provisions.
- C. All wiring between the deluge control panel and the associated zone input and output devices shall be the responsibility of Contract #3 Contractor and shall comply with Part 1 and Part 3 of Section 283000, Addressable Fire Alarm System.

1.3 DESCRIPTION

- A. General Description.
 - 1. Fire protection for the new building shall consist of Complete sprinkler protection throughout renovated space
 - 2. Prior to the submittal of shop drawings and hydraulic calculations, Contract #3 Contractor shall submit necessary forms and documents to the New York City Department of Building (DOB) to assume applicant of record for sprinkler and standpipe scope of work. A copy of these forms and documents shall be included with the shop drawing and hydraulic calculation submittal. Before requesting acceptance of work, Contract #3 Contractor shall submit necessary forms and as-built shop drawings and hydraulic calculations to amend the application. A copy of these forms and as-built shop drawings and hydraulic calculations shall be included with the closeout documentation.
- B. Major Components.
 - 1. Two (2) 4" sprinkler zone control assemblies (one for the Ground Floor and Control Room Level and one for the Mezzanine Level)

2. One (1) 3" deluge valve assembly including associated zone input and output devices (i.e., heat detectors, pull station, alarm bell, solenoid valve, etc.)
- C. Work Starts at.
1. Connections to the existing sprinkler/standpipe system.
- D. Additional Components and Work.
1. Complete galvanized test and drain system piped to discharge to the building exterior (or other location as approved by the Commissioner).
 2. Complete hanger and earthquake bracing assemblies. All hanger and bracing components shall be galvanized.
 3. Required accessories, drains and test connections.
 4. Rough cutting and patching.
 5. Coordinate all fire protection wiring requirements with Sections 26 and 28.
- E. General Design:
1. All piping and sprinklers shall be of the concealed type in areas where ceilings exist. Exposed piping and sprinklers shall be installed in areas without ceilings.
 2. All fire protection work shall be coordinated with other trades, the building's architectural features and with the ceilings, soffits, and partitions. Special care should be taken in areas where sprinkler heads are centered in ceiling tiles or with other ceiling features.
 3. Do not run exposed piping in front of windows and skylights. Keep all exposed piping as high as possible and as tight to walls and ceilings/decking as possible. Exposed piping and sprinklers shall be installed in coordination with the buildings structural and architectural features. Concealed piping should be elevated +/- 6" above the ceiling. Coordinate all piping with lights, diffusers, and all other equipment above the ceilings. Provide any additional piping, offsets, and hanger assemblies required to meet the aesthetic considerations of this project. Do not locate piping in areas where it would interfere with door swings or required head clearances or egress paths.
 4. Provide all required drain and control valves. All valves shall be a maximum of 7'-0" above the finished floor unless noted otherwise.
 5. Do not attach any hanger assemblies directly to the underside of any roof assemblies. When supporting fire protection piping and equipment at the underside of roof construction, use "unistrut" type supplemental steel to span adjacent roof structure and attach equipment hangers to the "unistrut".
- F. Related work specified elsewhere.
1. Finished patching
 2. Electrical wiring
 3. Fire extinguishers
 4. Painting of exposed fire protection piping located in public spaces

1.4 SUBMITTALS

A. Procedure.

1. Prepare and make the submissions listed below and in Section 230000.

B. Materials.

1. Pipe and Fittings (including copper tubing and fittings)
2. Wall Plates
3. Sleeves
4. Control Valves
5. Check Valves
6. Drain and Auxiliary Valves
7. Sprinkler Zone Control Assemblies
8. Pressure Reducing Valve Assemblies
9. 2.5" Fire Department Valves
10. 1.5" Hose Rack assemblies
11. Deluge Valve Assembly including Control Panel and associated Input Zone and Output Devices
12. Hanger and Earthquake Bracing Assemblies
13. Valve tags, charts, pipe markers, and equipment signage including hydraulic summary placards for sprinklers systems
14. Fire Stopping Assemblies
15. Sprinklers, escutcheons, and head guards
16. Spare Sprinkler Cabinet
17. Hose Rack Cabinets

C. Shop Drawings.

1. Provide dimensional installation piping layout(s) coordinated with all trades. Include all sprinklers, piping, pipe sizes, fittings, drains and auxiliary drain, hangers and locations, valves with identification numbers, alarm equipment, and all other necessary information required for a complete shop drawing. Each drawing shall accurately list the size, type and schedule of all pipe and fittings used on the project.
2. Contract #3 Contractor shall verify location and pipe sizes of those portions of the existing sprinkler/standpipe system necessary to perform his hydraulic calculation including fire service piping, backflow preventer manufacturer and model, fire pump manufacturer and model, and fire pump room arrangement.
3. Determine any deviations from the contract documents (drawings and specifications) and clearly indicate them on in writing.
4. Submitted shop drawings shall be clear and legible. Minimum text size shall be 1/8". All sprinkler information must stand out on the shop drawings (i.e., bold piping, etc. or lighter background). Reverse reading drawings are not acceptable. Do not draw piping intersecting with other piping that does not actually connect. Poor quality printings, reverse reading drawings and drawings with excessive unnecessary information (i.e., field fabrication notes, etc.) will not be reviewed and will be returned for resubmission.
5. With initial drawing submittal, include a complete, schematic type, riser diagram indicating all system components, hydraulic reference points, and elevations at each floor. Diagram shall include all information from the municipal water main connection up to and including each sprinkler control assembly.
6. With initial drawing submittal, provide a full height building cross-section indicating floor elevations, types of construction, and locations of ceilings, walls/partitions, and sprinkler piping. Include a complete drawing index with each submittal and on the first drawing in the fire protection shop drawing set.
7. Provide a complete drawing index with each submittal and on the first drawing in the fire protection shop drawing set.
8. On projects where there are multiple drawings per floor, include a key plan for each drawing.

9. Include a site plan indicating the municipal water main, test hydrants (i.e., gauged and flowing hydrants), and fire department connection.
10. All shop drawings submitted shall be signed and sealed by a Professional Engineer licensed in New York State.

D. Hydraulic Calculations.

1. Each calculation shall contain a water summary sheet indicating pressure and flow required at the fire pump and the pressure available at the required flow. Each cover sheet shall also include the shop drawing number and floor/level associated with the remote area. This information shall be included on associated shop drawing(s).
2. Calculations are to be brought back to the municipal water main. Calculations must print out results in a consecutive format representing reverse direction of water flow. Calculations, which do not conform to this requirement will be sent back unreviewed.
3. Contract #3 Contractor shall verify location and pipe sizes of those portions of the existing sprinkler/standpipe system necessary to perform his hydraulic calculation including fire service piping, backflow preventer manufacturer and model, fire pump manufacturer and model, and fire pump room arrangement.
4. Calculations shall include a 10 psig design margin between the required pressure and the available water supply pressure at the required flow.
5. Hydraulic reference points shall be clearly indicated on drawings. Do not use "pipe numbers"; provide consecutively numbered reference points at all areas indicated on hydraulic calculations starting at the connection to the municipal water main.
6. All sprinklers in the remote area must be flowed in the calculations (i.e., do not exclude sprinklers in small rooms, closets, etc). Do not include any unsprinklered spaces in the determining the square footage of the remote area.
7. The remote area must be the minimum square footage indicated in the Contract Drawings. A reduction in the remote area square footage is not permitted with the use of quick response sprinklers.
8. Grid calculations shall include "Peaking" process (per NFPA requirements) to ensure calculation of most remote area.
9. **HYDRAULIC SUMMARY DATA MUST BE INCLUDED ON SHOP DRAWINGS.** Summary data shall include: location, file number, density, remote area square footage, number of sprinkler heads flowing, flow & pressure required at municipal water main.
10. Provide a calculation indicating the required pressure at the FDC required to supply the greatest sprinkler and hose stream demand.
11. All calculations submitted shall be signed and sealed by a Professional Engineer licensed in New York State.

E. Samples.

1. Submit three (3) samples on each of the following items:
 - a. Sprinklers including escutcheons and cover plates
 - b. Sprinkler head guards

F. Closeout Documentation.

1. At completion of installation work, provide complete "As-Built" documentation including revised shop drawings and hydraulic calculation that have been updated to reflect any minor changes to the design to accommodate field conditions, and the Operations and Maintenance Manual.

G. Operating and Maintenance Manual.

1. Before requesting acceptance of work, furnish five (5) printed and bound sets of the Operations and Maintenance Manual.
2. Each Manual shall include:
 - a. Title Page identifying the project name & location, and Contract #3 Contractor's emergency contact information
 - b. Table of Contents with tabbed sections
 - c. A section providing a brief description of systems and components, and basic operating features
 - d. A section providing the Manufacturer's name, (include address and telephone number) model number, service manual, spare parts lists, wiring diagrams and descriptive literature for all components.
 - e. A section providing maintenance instructions, listing of possible breakdowns and repairs of major components
 - f. A section providing instructions for start-up and operation of major components including a detailed and simplified one line color-coded flow and wiring diagrams, and copy of fire protection systems' valve tag chart
 - g. A section that includes all as-built shop drawing and hydraulic calculations
 - h. A section that includes the following witnessed certificates:
 - 1) Contractor's Material And Test Certificate for Above Ground Piping (NFPA 13-2002, Figure 16.1)
 - 2) Contractor's Material And Test Certificate for Underground Piping (NFPA 13-2002, Figure 10.10.1)
 - 3) Certificates shall include all required signatures along with printed names and titles of all individuals conducting the tests and witnesses.
 - i. A section that includes a copy of the first year's required inspections, testing and maintenance contract and copy of NFPA 25-2002.
 - j. A section that includes a CD of all approved fire protection as-built drawings, both .pdf and .dwg file types.

1.5 CLEARANCE FROM ELECTRICAL EQUIPMENT

- A. Piping (except for piping directly supplying sprinklers for such room):
1. Prohibited, except as noted, in:
 - a. Electric Rooms and Closets.
 - b. Telephone Equipment Rooms and Closets.
 - c. Elevator Machine Rooms.

2. Prohibited, except as noted, over or within 5 feet of:
 - a. Transformers.
 - b. Substations.
 - c. Switchboards.
 - d. Motor control centers.
 - e. Standby power plant.
 - f. Bus ducts.
3. When over or within 5 feet unavoidable, provide drip pans under piping over electrical equipment.

1.6 QUALITY ASSURANCE

A. Quality of Materials.

1. All equipment and materials to be UL listed. All equipment and materials shall also be and Factory Mutual approved (unless noted otherwise).
2. New, best of their respective kinds and free of defects.
3. Electrical equipment: Listed by Underwriters Laboratories or bearing their label.
4. Secure approval from Commissioner, and all authorities having jurisdiction for materials, equipment, and installation prior to installation.
5. Obtain fire pump, pressure maintenance pump, controllers and automatic transfer switch through one source from a single manufacturer for each type of equipment.

B. Warranty.

1. All fire protection work shall be free from defects in workmanship and materials for a period of one (1) year from date of final acceptance shall meet all local and state codes. Contract #3 Contractor shall repair all defects, which develop or are discovered within this period, to the satisfaction of the City of New York, at no additional cost.
2. Provide (as part of the contract) all inspections, testing and maintenance required for the one (1) year period following final acceptance. Required inspections, testing and maintenance shall be those defined in NFPA 25-2002.

1.7 BASE BID MANUFACTURERS

A. Base bid on materials or equipment specified by:

1. Name of manufacturer.
2. Brand or trade name.
3. Catalogue reference.

B. Where two or more manufacturers are named, choice optional with bidder.

PART 2 PRODUCTS

2.1 PIPE

A. Above Ground.

1. Schedule 40, except where otherwise permitted, seamless or welded mild steel, ASTM A-135, A-795 or A-53 for size 1" and larger.
2. Schedule 10 steel pipe may be used for size 2.5" through 6".
 - a. No threaded or cut grooved connections on Schedule 10 pipe.
3. Minimum Wall 0.188" may be used for size 8"
4. Only Schedule 40 pipe is permitted on standpipe system.
5. Galvanized pipe shall be used for test and drain piping, above ground piping between fire department connection and check valve, piping for auto-ball drip, and for any above ground piping subject to alternate wetting and drying such a deluge water curtain piping.
6. Provide chrome-plated pipe for any exposed test and drain piping at the building exterior.
7. Copper tubing shall be used where wall cavity dimensions prevent use of black pipe. Copper tubing shall be drawn, seamless, Type K, manufactured in accordance with ASTM B-75, B-88 or B-251..

2.2 FITTINGS

A. Above Ground.

1. Cast iron threaded: Standard weight, ANSI B-16.4.
2. Cast iron flanged fittings and flanges: Standard weight, ANSI B-16.1.
3. Malleable iron: Threaded and banded, standard weights, ANSI B-16.3.
4. Steel welding: Standard seamless steel, ANSI B-16.9 and ASTM A-234.
5. Steel flanges: ANSI B-16.5, ASTM A-181 Grade 1 up to 300 PSI.
6. Grooved end malleable iron fittings, and bolted clamp type malleable iron couplings with rubber sealing gaskets for rolled grooved end pipe, 250-PSI WWP. Allowed for size 1¼" and larger. Similar to: VICTAULIC Co.
7. Plain end fittings and bushings are NOT PERMITTED.
8. All reducing fittings shall be tapered. Reducing couplings are allowed for one "nominal" pipe size reduction (i.e.: 6" x 4", 3" x 2 ½", etc).
9. Provide galvanized fittings shall be used in conjunction with galvanized pipe.
10. Provide chrome-plated fittings for any exposed test and drain fittings at the building exterior.
11. Copper fittings shall be wrought copper and copper alloy solder joint pressure fittings in accordance with ASME B16.22, or cast copper alloy solder joint pressure fittings in accordance with ASME B16.18.

2.3 WALL PLATES

- A. Chrome plated, heavy gauge steel, hinged split ring wall plate with spring steel inserts and positive locking tab. For exposed piping through interior floors, walls, and ceilings. Similar to: ARGCO series.
- B. Chrome plated, heavy duty, forged brass, one piece, wall plate with setscrew. For exposed piping through exterior walls. Similar to: ARGCO series.

2.4 SLEEVES

- A. Install galvanized steel, schedule 40, pipe sleeves for pipes passing through floors, walls, and partitions. Sleeves shall be sized per NFPA requirements. Floor sleeves shall project 1" above finished floor to prevent seepage.
- B. All sleeves passing through any rated construction shall be sealed with a UL listed fire and smoke resistive assembly
- C. Grout-in all sleeves through concrete walls and floors.
- D. All sleeves passing through exterior walls shall be schedule 40 galvanized steel pipe with integral water stop. Seal shall be interlocking expandable synthetic rubber links, assembled with corrosion resistant bolts, nuts, and pressure plates. Similar to: LINK-SEAL

2.5 VALVES

- A. General:
 - 1. Above ground valves shall be UL and FM approved. Similar to: VICTAULIC except as noted.
- B. Above ground Valves.
 - 1. 2" and smaller:
 - a. Butterfly type, slow close indicating valve with built-in tamper switch, threaded or grooved, 175 PSI. Similar to MILWAUKEE, Model No. BB-SCS02 OR BB-VSCS02 ("Butterball").
 - 2. 2 ½ " to 6":
 - a. Butterfly type, Tight closing, epoxy coated ductile iron, elastomer encapsulated disc, grooved, 300 PSI WWP, with stainless steel shaft, lifetime bearings, handwheel gear operator with position indicator, and built-in tamper switch. Similar to: VICTAULIC, Series 705W OR 705W RD ("FireLock").
- C. Check valves.
 - 1. 2" and smaller:
 - a. Swing type, bronze, threaded, rubber disc, 200 PSI WWP. Similar to: NIBCO, Model KT-403-W.
 - 2. 2 ½" and larger:
 - b. Grooved, 250 PSI. Similar to: VICTAULIC, Series 717 ("FireLock").
- D. Drain and Auxiliary Drain Valves.
 - 1. Threaded bronze angle or globe type with composition disc, 175 PSI. Similar to: NIBCO KT-65, KT-211, KT-67, and KT-301.
 - 2. Provide valves (not plugs) as required and at indicated locations for complete drainage of systems.

3. Pipe all drain and sprinkler test piping to the building exterior. Drains that drain to a floor drain, sump pit, or mop sink, will only be permitted with approval from the Commissioner. Provide any required pipe, fittings, and labor to terminate drains at approved coordinated locations.
4. At system low points where drain piping does not extend to a drain receptacle, provide a threaded hose and adapter at the valve outlet (where permitted by the Commissioner).

E. Automatic Ball Drip Valves.

1. 3/4" bronze, threaded, angled. Similar to: POTTER-ROEMER Model 5984.
2. Pipe to an approved drain location.

2.6 SPECIALTY VALVES

A. Sprinkler Control Assemblies.

1. Grooved manifold body, including a grooved control valve with tamper switch, waterflow switch, pressure gauge with maintenance valve, and a test & drain valve assembly.
2. Similar to: VICTAULIC Model 747M.

B. Pressure Reducing Valve Assemblies.

1. Pilot operated, globe style body with grooved ends including a pilot assembly and pressure gauges with maintenance valves.
2. UL Listed, 300 lb rating
3. Similar to: WILKINS, Model ZW209FP.

C. 2 1/2" Fire Department Valves

1. 2-1/2" cast brass valve with red hand wheel. Female NPT inlet x Male hose thread outlet, 300 psi rating. Hose thread type shall comply with local requirements.
2. Similar to: Potter Roemer, Model 4065-B.
3. Provide 2-1/2" x 1-1/2" reducer with rocker lugs, brass, hose thread. Similar to: Potter Roemer, Model 2810-B-RL.
4. Provide 1-1/2" cap with rocker lugs, brass, hose thread. Similar to: Potter Roemer, Model 4625-B-RL.
5. Provide written statement under company letterhead with product submittal that the submitted hose thread type has been confirmed with New York City Fire Department.

D. 1 1/2" Hose Rack Assemblies

1. 1 1/2" angle valve with red hand wheel, 300 lb., brass, double female NPT.
2. 1 1/2" hose rack nipple, brass, hose thread. Hose thread type shall comply with local requirements.
3. 1 1/2" hose rack, red glossy polyester finish with instruction decal.
4. 1 1/2" adjustable pressure restricting device, brass.
5. 75' interior standpipe hose, lined FM Approved.
6. 1 1/2" adjustable fog nozzle, brass.
7. Similar to: POTTER-ROEMER, Model 2507-10

E. Deluge Valve Assembly

1. Grooved unit with alarm switches to actuate building fire alarm system and local electric alarm bell, drains, gauges, test apparatus with required accessories. The deluge valve shall be a low differential, latch and actuator design that allows the valve to be reset without opening the valve. The low differential design shall not be subject to water columns. The valve shall include a release solenoid valve to actuate the valve.
2. The valve shall be made of high-strength, low-weight ductile iron, and have easy access to all internal parts. All internal parts shall be replaceable. Maintenance and service shall be possible without removing the valve from its installed position. The rubber clapper seal shall be easily replaceable without removing the clapper from the valve. The valve shall be painted inside and out to increase corrosion resistance. The valve body shall be tapped for main drain and all available trim configurations
3. Body: Ductile iron conforming to ASTM A-536, grade 65-45-12. Clapper: Aluminum bronze UNS-C95500, Latch: Aluminum bronze UNS-C95500, Shaft: Stainless 17-4, Clapper Seal: Peroxide cured EPDM - ASTM D2000, Bushings/Seat O-rings: Nitrile, Springs: Stainless Steel (300 Series), Diaphragm: Peroxide cured EPDM with fabric reinforcement. Dry valve shall be UL listed and Factory Mutual approved.
4. Similar to: VICTAULIC, Series 769 FireLock NXT Deluge Valve.
5. Deluge Valve Control Panel and Associated Input Zone and Output Devices
 - a. Control Panel: SYSTEM SENSOR, model PDRP-2001, OR Approved Equal
 - b. Heat Detectors:
 - i. Fixed Temperature/Rate of Rise: Conventional heat detector, single-circuit type, normally open. Detector shall be UL Listed, rated for activation at either 194°F, and shall activate by means of a combination fixed temperature/rate-of-rise thermal sensor where rate-of-rise element is activated by a rapid rise in temperature, approximately 15°F per minute. SYSTEM SENSOR, model 5602, OR Approved Equal
 - ii. Fixed Temperature: Conventional mechanical heat detector, single-circuit type, normally open. Detector shall be UL Listed, rated for activation at 194°F, and shall activate by means of a fixed temperature thermal sensor. SYSTEM SENSOR, model 5604, OR Approved Equal
 - c. Pull Station: Single action, break glass initiating station with normally open (NO) contacts. Pull station shall be provided with 6 inch wire leads and suitable for either flush or surface mounting. EDWARDS, model 270A-SPO, OR Approved Equal. Provide protective pull station enclosure. EDWARDS, model STI-3150, OR Approved Equal.
 - d. Waterflow Pressure Switch: Included with deluge valve assembly
 - e. Release Solenoid: included with deluge valve assembly
 - f. Alarm Bell: 6" with underdome strikers and operating mechanisms with an operating voltage of 24VDC. Alarm bell shall be UL Listed and suitable for either surface or semi-flush mounting. SYSTEM SENSOR, model SSM24-6, OR Approved Equal.
 - g. All wiring between the deluge control panel and associated devices (i.e., heat detectors, pull station, alarm bell, solenoid valve, etc.) shall be the responsibility of Contract #3 Contractor. Submittals and all work shall be in accordance with Part 1 and Part 3 of Design Specification 283100.
 - h. Power to the deluge control panel shall be responsibility of Division 28.
 - i. All wiring between the deluge control panel and the main fire alarm control panel shall be responsibility of Division 26.

2.7 ALARM ACTUATING DEVICES (Coordinate with Division 28)

- A. Closed circuit OS&Y type valve tamper switches to operate within two revolutions of valve wheel.
 - 1. Built-in models or Similar to: POTTER Electric Signal Co. model OSYSU-2.
- B. Closed circuit waterflow indicators with retarding device to prevent false alarms from line surges.¹
 - 1. $\frac{1}{2}$ " and smaller:
 - a. Similar to POTTER Electric Signal, Model VSR-S
 - 2. 2" and larger:
 - a. Similar to: POTTER Electric Signal, Model VSR-FE-2
- C. All wiring from devices to main fire alarm panel to be responsibility of Division 28.

2.8 VALVE TAGS, CHARTS, PIPE MARKERS AND EQUIPMENT SIGNAGE

- A. Tags.
 - 1. Brass 18 gauge with $\frac{1}{2}$ " stamped numbers and $\frac{1}{4}$ " letters filled with black paint. Not less than $1\frac{1}{2}$ " inches round with $\frac{3}{16}$ " top hole.
 - a. Similar to: SETON Style No. 65542.
 - 2. Provide on all valves and controls identifying numbered metal tags, with letter to indicate system (FP) fastened by heavy brass hook and chain.
 - a. Similar to: SETON Style Nos. 16197 and 16182.
- B. Charts.
 - 1. Provide (two) frame mounted and laminated: Valve tag charts along with a diagrammatic/schematic diagram showing essential features of system.
 - 2. All fire protection control, test and drain valves shall be tagged.
 - 3. Valve numbering and lettering shall correspond to designation on the metal valve tags.
 - 4. Valve tag chart shall indicate valve location, function, and area controlled. Minimum size is 11" x 17".
- C. Markers.
 - 1. Provide $\frac{1}{2}$ " wide self-adhesive pipe markers with flow arrows at reasonable locations (not to exceed 30' intervals) and in accordance with Section 230000, on all concealed and exposed piping.
 - a. Similar to: SETON brand style Nos. M4268 and M4167.
- D. Signage.
 - 1. Provide proper signage on all fire protection valves and devices, describing device and function in accordance with NFPA requirements.

2.9 PIPE HANGERS and EARTHQUAKE BRACING

A. Top Beam Clamps.

1. Carbon steel, galvanized, clamp body with hardened steel cup point setscrew and locknut. Body shall be tapped through to permit extended adjustment of threaded rod. Similar to: TOLCO Figures 65 and 66.
2. Provide retaining straps for all beam clamps.

B. Hanger Rods.

1. Carbon steel, galvanized, continuous thread sized in accordance with NFPA 13 requirements. Similar to: TOLCO Figure 99.
2. Do not bend hanger rods. Use appropriate offsetting brackets/clamps.

C. Swivel Rings.

1. Carbon steel, galvanized. (For sizes 1" and larger). Similar to: TOLCO Figure 2.

D. Expansion Anchors.

1. Maximum loading, including pipe contents, covering and all required loads shall be 75 percent of rated load, SAE 110M, slotted type, plated with dull zinc finish. Similar to: HILTI Drop-In Anchor (HDI).
2. Use only at locations approved by the Commissioner.

E. Side Beam Brackets.

1. Carbon steel, galvanized, flush back plate with threaded eye socket, for pipe sizes 1" through 4".
2. Similar to: TOLCO Fig. 57.

F. Split Ring Hangers.

1. Carbon steel, galvanized, split ring hanger.
2. Similar to: ERICO, Model NI 429.

G. Steel Rod Couplings.

1. Carbon steel, galvanized
2. Similar to: TOLCO Fig. 70.

H. Earthquake Bracking.

1. Carbon steel, galvanized, UL/FM approved. Similar to: TOLCO Figures 906, 907, 908, 909, 910, 975, and 1000.

I. Other Hanger Materials.

1. All other hanger materials, assemblies and methods shall be UL/FM approved for their intended application.
2. All hanger and bracing material must be galvanized.

2.10 SPRINKLERS

A. General.

1. Cast brass, closed, quick response bulb type, standard spray with 1/2" discharge orifice.
2. Include complete sprinkler head descriptions on shop drawings. Provide make, model, temperature rating, and Sprinkler Identification Number (SIN) for all sprinklers.
3. Similar to: VIKING Corp. models unless noted otherwise.
4. Utilize ordinary temperature ratings, except as noted. Utilize high temperature ratings where subject to abnormal heating and conditions such as near heaters, heating lines, and in blast of heaters.
5. On exposed piping, use upright heads wherever possible and pendent type where necessary.
6. All sprinkler heads shall be quick response type (unless noted otherwise).

B. Sprinkler Types.

1. Exposed upright or pendent type, 1/2", brass. Similar to: VIKING Corp., SIN VK300 and VK302. Commissioner shall select finish.
2. Horizontal sidewall type, 1/2", brass. Similar to: VIKING Corp., SIN VK305. Commissioner shall select finish and style.
3. Extended coverage horizontal sidewall type, 3/4" brass, 8.0 K-Factor. Similar to VIKING Corp., SIN VK630. Commissioner shall select finish.
4. Concealed pendent type, 1/2", brass, adjustable, with cover plate. Similar to: VIKING Corp., SIN 462. Commissioner shall select finish.
5. Dry horizontal sidewall type, 1/2", brass, adjustable with escutcheon plate. Similar to: VIKING Corp., SIN VK156. Commissioner shall select finish.
6. Extended coverage horizontal sidewall type, 3/4", brass, 8.0 K-Factor, recessed with thread-on recessed escutcheon. Similar to: VIKING Corp., SIN VK630. Commissioner shall select finish.
7. Exposed "open" pendent type, 1/2", brass. Similar to: VIKING Corp., SIN VK302 with thermal element removed. Commissioner shall select finish.

C. Accessories.

1. Escutcheons shall be listed for the specific sprinklers they are used with. Similar to VIKING Corp., Model E-2.
2. Sprinkler head guards shall be listed for specific sprinkler heads they are protecting. Similar to VIKING Corp., Model D-1.

2.11 CABINETS

A. Spare Sprinkler Cabinet.

1. Enameled red steel. Similar to: POTTER-ROEMER, Model 6162.
2. Equipped with a minimum of two (2) sprinklers of each type and temperature rating used on the project, but not less than twelve (12) sprinklers. Concealed covers shall be provided when required by sprinkler type.
3. Equipped with a sprinkler wrench(s) that is needed to remove and install the types of sprinklers included in the cabinet.
4. Equipped with a list of each type and temperature rating of sprinklers used on the project.

B. Hose Rack Assembly Cabinets.

1. Cabinet shall be sized to accommodate a 1.5" Hose Rack Assembly and 2.5" Fire Department Valve. Approximate size will be 24" wide x 36" high x 8" deep. Refer to Architectural drawings for space limitations.
2. Cabinet construction shall be of minimum 20-gauge sheet metal box, with a minimum 20-gauge tubular steel door and minimum 18-gauge frame.
3. Cabinet shall be semi-recessed mounted with 2" trim.
4. Door style shall be full glass panel with lock OR as otherwise specified by the Commissioner.
5. Finish shall be powder-coated with an electrostatically applied, thermally fused, recoatable white polyester finish OR custom finish as otherwise specified by the Commissioner.
6. Labeling shall be: "STAGE FIRE HOSE VALVE"
7. Similar to POTTER-ROEMER, Series 1200.

2.12 FIRE STOPPING

A. All fire stopping shall be UL listed assemblies.

1. Similar to: HILTI Firestop Systems.

PART 3 EXECUTION

3.1 PIPING – GENERAL

- A. Approximately as indicated, modify to suit building conditions, avoid interferences with other trades and maintain pitch.
- B. Provide additional offsets, fittings, valves, drains, etc., where required by construction and work of other trades.
- C. Run in chases, recesses, shafts, hung ceilings and beam cuts where applicable. Do not cover before examination and testing.
1. Run parallel with or at right angles to walls, other piping, neatly spaced with plumb risers.
 2. Maintain 1" clearance between hubs, coverings and adjoining work.
- D. Provide reducing fittings for changes in pipe size.
1. No bushings or street elbows permitted.
 2. Grooved reducing couplings are acceptable for decreases of one nominal pipe size. (i.e.: 6" x 4", 3" x 2 1/2", etc.).
- E. Concealed piping in hung ceilings.
1. Obtain ceiling heights from Architectural Drawings.
- F. Use extra heavy pipe for nipples where unthreaded portion of pipe is less than 1 1/2 inches long. No close nipples permitted.

G. Joints.

1. In accordance with manufacturer's instructions.
2. Provide dielectric fittings wherever pipes of dissimilar materials are connected; location of such fittings shall be clearly noted on shop drawing.
3. Screwed piping: Clean-cut of exact length, ream pipe after cutting and threading, apply approved compound on male threads only, apply graphite on drain plugs.
4. Use extra heavy pipe for nipples where unthreaded portion of pipe is less than ½ inches long. Use close nipples only where necessary.
5. Ductile iron bell and spigot piping.
 - a. Push-on rubber gasket joints, ANSI A21.11.
 - b. Mechanical stuffing box type: Bolted assembly, ANSI A21.11.

H. Brazed Joints:

1. Copper tubing shall be connected using brazed joints.
2. Brazing filler metal shall be in accordance with AWS A5.8 (classification BCuP-3 or BCuP-4).

I. Mechanical outlet fittings.

1. Must be equal to VICTAULIC #920 for sizes available, and #920N, where a #920 is not available in the required size. No other types or styles will be permitted.

J. Flanged piping with full-faced rubber gaskets.

K. Welded piping: (Shop application only, NO FIELD WELDING)

1. Oxyacetylene or electric arc process in accordance with latest accepted practice and in accordance with Underwriters Laboratories.
2. Performed only by welders meeting qualifying tests for strength welds in pressure piping of ANSI.
3. Provide, have tested, and submit for review, standard sample welds for each welder before he commences work.
4. Remove foreign matter from ends of pipe before tacking and welding, align pipe ends concentric, then tack weld to prevent misalignment during welding.
5. Welding fittings.
 - a. Factory made, forged steel.
 - b. Fabricated: Not permitted.
6. Connections.
 - a. One-half size of main or smaller, Weld-o-lets or Thread-o-lets permitted.
 - b. Larger connections: Regular welding tees.
 - c. Hammer, clean and flush out piping after welding to remove scale, slag, welding beads, etc.

3.2 SLEEVES

- A. Provide required clearance between piping and sleeves as required by NFPA 13.
- B. Provide reduced clearances and flexible couplings wherever possible and increased clearances where necessary, unless noted otherwise.

3.3 PIPING SUPPORT

- A. Maximum loading, including pipe contents, covering and all required loads, 75% of rating.
 - 1. Support piping so as to secure in place, maintain required pitch and prevent vibration.
 - 2. Design and installation shall be in accordance with NFPA 13.
 - 3. Provide for expansion and contraction.
 - 4. No piping shall be hung from other piping, ductwork, conduit, ceiling structure, etc.
- B. Suspended Horizontal Piping:
 - 1. Chain, strap, perforated bar and wire hangers: NOT PERMITTED.
 - 2. Suspension from inserts, beam clamps, steel fishplates, cantilever brackets, or other approved methods with threaded rods with double nuts tightly made up.
 - 3. Where overhead construction does not permit fastening hanger rods in required locations, provide additional steel framing as required and reviewed.
 - 4. Maximum hanger spacing per NFPA 13 requirements.
- C. Vertical Piping.
 - 1. Riser clamps, bolted on each side of pipe and bearing equally on structure.
 - 2. Similar to: TOLCO Riser Clamp Fig. 6.
 - 3. Minimum clamp spacing: At every floor (or at a maximum of 15' on center).
 - 4. At offset from vertical: By hanger on horizontal branch close to riser or base fitting on foundation.
- D. If removal of existing fireproofing is required for installation purposes, such removal shall be kept to a minimum. Contract #3 Contractor shall replace all removed fireproofing with new, to the satisfaction of the Commissioner at no additional cost to the City of New York.
- E. Contract #3 Contractor shall provide all supplementary structural steel required or spanning between, or connecting to, building structural members, for the hanging or support of piping. Welding to or drilling into building structural members will not be permitted without the approval of the City of New York and the Commissioner.
- F. Supports: Hang or support sprinkler piping from overhead construction in accordance with NFPA 13, and maintain maximum headroom as practical.
- G. Underground Piping: All underground piping shall be laid on 6" sand and backfilled with clean fine earth compacted to 12" above pipe. Complete backfill with available earth free of large boulders and sharp rocks. Tamp and overfill to allow for settlement.

3.4 CLEANING AND ADJUSTING

- A. Brush and clean work, prior to concealing, painting, and acceptance. Perform in stages, if directed.
- B. Painted or exposed work that is soiled or damaged must be cleaned and repaired to match adjoining work before final acceptance.
- C. Remove debris from the inside and outside of all material and equipment.
- D. Flush piping at least twice after installation and before final connections are made in a manner as directed and/or approved by the Commissioner, and in accordance with NFPA 13 requirements. Make all temporary connections and furnish all appliances required for the purpose of proper flushing at no extra expense to the City of New York.

- E. Adjust alarm-indicating devices to meet the requirements of the New York City Fire Department.
- F. Remove and properly dispose of all unused or waste material.

3.5 TESTS

- A. Provide required labor, equipment and connections for the following tests of the Combined Standpipe and Sprinkler System.
 - 1. All acceptance testing as required by NFPA 13 including:
 - a. Pressure Test – The entire system shall be subjected to a hydrostatic test pressure of two hundred twenty five (225) psig for two (2) hours in accordance with NFPA 13.
 - b. Pressure reducing valve shall be functionally tested in accordance with NFPA 13, section 16.2.4
 - 2. Submit results of all testing for review within 1 week of completion of the test. Also include the results of all testing in O&M manuals.
 - 3. Pay for cleanup and restoration or replacement of damaged work of others due to testing (which section 210000 is responsible for)

3.6 VALVES

- A. Provide control valves where indicated in the contract drawings or required. All valves shall be accessible.
- B. Seal valves in proper position and provide approved tag and/or signage indicating purpose of valve. Indicate accurate field pressure settings of any pressure-activated valves.
 - 1. Provide control valves with 24 volt closed circuit supervisory tamper switches, (see Alarm Actuating Devices section of this specification), mounted in accordance with manufacturer's requirements.
 - 2. Install all valves at a maximum of 7'-0" above the finished floor unless otherwise indicated on contract drawings.

3.7 SPRINKLERS

- A. All sprinklers shall be used in accordance with all conditions, requirements, and limitations of their listing and in accordance with NFPA 13 and all other applicable codes.
- B. Install sprinklers, in hung ceiling areas, center of tile OR wood panels and align heads symmetrically with ceiling tile or panel. Install sprinklers in gypsum and plaster ceilings symmetrically and align with adjacent ceiling fixtures.
- C. Install all concealed sprinklers on return bends.
- D. Provide factory applied custom finishes and colors as selected by the Commissioner.
- E. Refer to Architectural ceiling plans for preferred locations of sprinklers. Refer to architectural sections and details for required pipe routing. Notify the Commissioner of any conflicts.

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SECTION 210800

COMMISSIONING OF FIRE SUPPRESSION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 21 and other Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes commissioning process requirements for Fire Suppression systems, assemblies, and equipment.
- B. Related Sections:
 - 1. Division 21, Division 01 Section "General Commissioning Requirements" for general commissioning process description.

1.3 DESCRIPTION

- A. Commissioning: Commissioning is a systematic process of ensuring that all building systems, including the mechanical and electrical systems, have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The Commissioning Agent (CxA) shall provide the Owner with an unbiased, objective view of the system's installation, operation and performance. This process does not eliminate or reduce the responsibility of each system designer to provide a complete design or installing subcontractors to provide a finished product. Commissioning is intended to enhance the quality of each system installation, startup and transfer to beneficial use by the Owner.
- B. Commissioning during the construction phase is intended to achieve the following specific objectives, according to the Contract Documents:
 - 1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 - 2. Verify and document proper performance of equipment and systems.
 - 3. Verify that Operation & Maintenance documentation is complete and transferred to Owner.
 - 4. Verify that the Owner's operating personnel are adequately trained.
 - 5. Verify a contract is in place for a post occupancy review with O&M staff within 10 months after Substantial Completion.
- C. The Commissioning process shall be a team effort and encompass, as well as coordinate, the traditionally separate functions of system documentation, system installation, equipment startup, control system calibration, testing, and performance checkouts.

- D. The CxA will work closely with the construction team, cooperating on and coordinating all Cx activities with the Commissioner, Owner's representative, Trade Contractors, subcontractors, manufacturers and equipment suppliers.
- E. The Cx process shall not reduce the responsibility of the CM to comply with the Contract Documents.

1.4 DEFINITIONS

- A. Refer to Division 01 Section "General Commissioning Requirements" for definitions.

1.5 SUBMITTALS

- A. Refer to Division 01 Section "General Commissioning Requirements" for CxA's role.
- B. Refer to Division 21 and Division 01 Section "Submittals" for specific requirements. In addition, provide the following:
 - C. Certificates of readiness
 - D. Certificates of completion of installation, and startup activities.
 - E. Test reports
 - F. O&M manuals

1.6 QUALITY ASSURANCE

- A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.7 COORDINATION

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to coordination during the commissioning process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by the contractor for the equipment being tested. For example, the fire protection contractor of Division 21 shall ultimately be responsible for all standard testing equipment for the plumbing system in Division 21. A sufficient quantity of two-way radios shall be provided by each subcontractor.

- B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.
- C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.
- D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 - EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS

- A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for commissioned components, equipment, and systems.
- B. Red-lined Drawings:
 - 1. The contractor will verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings.
 - 2. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.
 - 3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
 - 4. The contracted party, as defined in the Contract Documents will create the as-built drawings.
- C. Operation and Maintenance Data:
 - 1. Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
 - 2. The CxA will review the O&M literature once for conformance to project requirements.
 - 3. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the contractor.
- D. Demonstration and Instruction:
 - 1. Contractor will provide demonstration and instruction as required by the specifications for fire suppression systems.
 - 2. A complete instruction plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any instruction.

3. A instruction agenda for each training session must be submitted to the CxA one (1) week prior the instruction session.
4. The CxA shall be notified at least 72 hours in advance of scheduled fire pump test so that testing may be observed by the CA and Owner's representative. A copy of the test record shall be provided to the CxA, Owner, and Architect.
5. Engage a Factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.
6. Engage a Factory-authorized service representative to instruct Owner's maintenance personnel to adjust, operate, and maintain Fire Pump.
7. Instruct Owner's maintenance personnel on procedures and schedules for starting and stopping, trouble shooting, servicing, and maintaining units.
8. Review data in O&M Manuals.

3.2 CONTRACTOR'S RESPONSIBILITIES

- A. Fire Protection Contractor. The commissioning responsibilities applicable to the Fire Protection Contractor of Division 21 are as follows (all references apply to commissioned equipment only):
 - B. Perform commissioning tests at the direction of the CxA.
 - C. Attend construction phase coordination meetings.
 - D. Participate in Fire Suppression systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
 - E. Provide information requested by the CxA for final commissioning documentation.
 - F. Prepare preliminary schedule for Fire Suppression system orientations and inspections, operation and maintenance manual submissions, training sessions, flushing and cleaning, pressure testing, equipment start-up, and task completion for owner. Distribute preliminary schedule to commissioning team members.
 - G. Update schedule as required throughout the construction period.
 - H. During the startup and initial checkout process, execute the Pressure testing of all piping system.
 - I. Assist the CxA in all verification and functional performance tests.
 - J. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.
 - K. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA 45 days after submittal acceptance.
 - L. Coordinate with the CxA to provide (72) hour advance notice so that the witnessing of equipment and system start-up and testing can begin.
 - M. Participate in, and schedule vendors and contractors to participate in the instruction sessions.

- N. Provide written notification to the CM/GC and CxA that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.
 - 1. Fire Suppression equipment including pumps, piping, and all other equipment furnished under this Division.
 - 2. Automatic sprinkler system.
 - 3. Fire stopping in fire rated construction, including caulking, gasketing and sealing of smoke barriers.
- O. The equipment supplier shall document the performance of his equipment.
- P. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.
- Q. Equipment Suppliers
 - 1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner, to keep warranties in force.
 - 2. Assist in equipment testing per agreements with contractors.
 - 3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
- R. Provide instruction of the Owner's operating staff using expert qualified personnel, as specified.
- S. Refer to Division 01 Section "General Commissioning Requirements" for additional contractor responsibilities.

3.3 OWNER'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for Owner's Responsibilities.

3.4 DESIGN PROFESSIONAL'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for Commissioner Responsibilities.

3.5 CxA'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for CxA's Responsibilities.

3.6 TESTING PREPARATION

- A. Certify in writing to the CxA that Fire Suppression systems, subsystems, and equipment have been installed, tested, calibrated, and started and are operating according to the Contract Documents.
- B. Certify in writing to the CxA that Fire Suppression instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

- C. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- D. Inspect and verify the position of each device and interlock identified on checklists.
- E. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- F. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.7 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
- B. Scope of Fire Protection testing shall include entire Fire Suppression installation. Testing shall include measuring capacities and effectiveness of operational and control functions.
- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions.
- D. The Fire Suppression contractor shall prepare detailed testing plans, procedures, and checklists for Fire Suppression systems, subsystems, and equipment and submit for CxA review.
- E. Tests will be performed using design conditions whenever possible.
- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. The CxA may direct that set points be altered when simulating conditions is not practical.
- H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- I. If tests cannot be completed because of a deficiency outside the scope of the Fire Suppression system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.8 FIRE SUPPRESSION SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 21 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

- B. Fire Suppression Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of sprinkler distribution systems.
 - C. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems in the Division 21. The following equipment and systems shall be evaluated:
- 3.9 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT
- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.
- 3.10 APPROVAL
- A. Refer to Division 01 Section "General Commissioning Requirements" for approval procedures.
- 3.11 DEFERRED TESTING
- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to deferred testing.
- 3.12 OPERATION AND MAINTENANCE MANUALS
- A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.
 - B. Refer to Division 01 Section "General Commissioning Requirements" for the AE and CxA roles in the Operation and Maintenance Manual contribution, review and approval process.
- 3.13 TRAINING OF OWNER PERSONNEL
- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to instruction.

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SECTION 23 00 00

GENERAL PROVISIONS FOR HVAC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Division shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install all work of this Division as shown on the drawings, as specified herein, and/or as required by job conditions.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #3 Contractor.
- C. Perform the work in accordance with the above requirements and the provisions of all applicable codes and laws.
- D. Standard Specifications and Abbreviations
- E. The following abbreviations used in the Specifications refer to organizations publishing specifications and standards. These shall be construed to mean the latest standard adopted and published at the date of advertisement for bids and such specifications are made part of the Contract Documents to the same extent as if written out in full.

ADA	Americans with Disabilities Act
ADC	Air Diffusion Council
AHDGA	American Hot Dip Galvanizing Association
AISC	American Institute of Steel Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
ARI	American Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing Materials
AWS	American Welding Society
AWWA	American Water Works Association
BS & A	New York City Board of Standards and Appeals
FIA	Factory Insurance Association
FS	Federal Specifications
IGSPHA	International Ground Source Heat Pump Association
MCAA	Mechanical Contractors Association of America
MSS	Manufacturers Standardization Society of Valve and Fittings Industry
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
OSHA	Occupational Safety Health Act
OTCR	New York City Office of Technical Certification and Research (formerly MEA)
PDI	Plumbing and Drainage Institute

PPI	Plastics Pipe Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
SSPC	Steel Structures Painting Council
STI	Steel Tank Institute
UL	Underwriters Laboratories, Inc.
USDC	United States Department of Commerce
USPHS	United States Public Health Service

1. Conform to ANSI - 31.1.0 and addenda for basic materials and methods of installation for closed piping systems with pressures in excess of 30 PSI, and for pipe welding regardless of system pressures.
2. Conform to ASME Boiler and Pressure Vessel Code Section VIII and FM requirements for construction of unfired pressure vessels.

1.2 INTENT

- A. It is the intention of the specifications and drawings to provide for finished work, tested and ready for operation, subject to the requirements of the contract documents, including but not limited to Paragraphs B below.
- B. The drawings show, among other things, the intent of the system components and routing. Some fittings and accessories are shown, but it is not the intent to show all similar or other fittings and accessories that will be required in order to install the systems in a coordinated way, as finished work. The Contract #3 Contractor shall include all fittings and accessories as may be required in order to accomplish the coordination of the various building systems, to ensure the systems fit within the spaces provided, regardless of whether these fittings and/or accessories are shown on the drawings.

1.3 WORK INCLUDED

- A. The work under this Division shall include all labor, material, equipment plant, services and administrative tasks required to complete and make operable the mechanical work shown on the Drawings and specified herein, including but not limited to, the following:
 1. Preparation and submission of shop drawings, diagrams and illustrations.
 2. Procuring all necessary permits and approvals, and paying all required fees and charges in connection with the work of this Division.
 3. Protection, testing, cleaning, adjustment and guarantee of the work of this Division to safely, properly and continuously operate.
 4. As-built drawings, operating and maintenance instructions and manuals.
 5. Identification labels, tags, charts and diagrams.
- B. Requirements of Construction Waste Management, Section 017419.
 1. The Commissioner has established that as many of the surplus and waste material as economically feasible shall be reused, salvaged, or recycled. To that end, the Contract #3 Contractor shall participate in the development of the Waste Management Plan, and collect, sort and deposit in designated containers, their waste, non-returned surplus materials and rubbish in accordance with the approved Plan.
 2. Project Diversion Goals are stated in Section 017419 - Construction Waste Management. The Contract #3 Contractor shall meet or exceed the minimum percentage of waste stated there for diversion from landfill. Specific

items/categories shall be in accordance with the Documents and as established in the Plan.

1.4 RELATED WORK

- A. DDC General Conditions
- B. Division 1, Section 018113 – Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings
- C. Division 1, Section 018113 – Sustainable Design Requirements (LEED Building)
- D. Division 1, Section 017419 - Construction Waste Requirements
- E. Division 1, Section 018119 - Construction IAQ Requirements

1.5 WORK NOT INCLUDED

- A. Finish patching of all construction cut under this Division.
- B. Waterproofing of roof penetrations for the work of this Division.
- C. Concrete and masonry work except as specified.
- D. Painting, except as noted.
- E. Removal, patching, or otherwise handling of hazardous materials. See paragraph 230000 3.10.F

1.6 SITE INVESTIGATION

- A. Examine the drawings and specifications of all trades, and the site, and from these investigations be responsible for the nature and location of work, general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads, etc.

1.7 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of systems and work required. Do not scale the Drawings. Consult the architectural drawings and details, and the drawings of other trades, for exact location of equipment.
- B. Drawings shall be used in layout of work. Check reference drawings to verify spaces in which the work will be installed. Maintain maximum headroom and space conditions. Where headroom or space conditions appear inadequate, Commissioner shall be notified before proceeding with installation.

- C. If directed by the Commissioner, make minor modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- D. The drawings are schematic and diagrammatic.
 - 1. Symbols and diagrams are used to indicate the various items of work and the complete systems, but not necessarily have dimensional significance; neither do they necessarily delineate all related and subsidiary parts and equipment.
 - 2. The work shall be installed complete and ready for operation in conformity with the intent expressed on the drawings and in the specifications.
 - 3. Coordinate the work with the requirements of the architectural and structural drawings for dimensions, locations and clearances.
 - 4. Locations of items exposed to view shall be taken from the architectural drawings or located as directed.

1.8 COORDINATION WITH OTHER TRADES

- A. Closely schedule the work so that work will be installed at the proper time without delaying the completion of the entire project.
- B. Where the work will be installed in close proximity to the work of other trades, or where there is evidence that the work will interfere with the work of other trades, arrange space conditions to make a satisfactory adjustment. If work is installed before coordinating with other trades, make necessary changes to the work to correct the condition without additional cost to the City of New York.
- C. Prepare complete set of drawings showing all necessary slab openings and structural supports that require structural framing. Drawings shall clearly indicate sizes and location relative to established column lines. Drawings shall be completed in sufficient time to allow for structural steel fabrication so as not to delay project schedule.
- D. Shop drawing submissions shall demonstrate a knowledge of the work of other trades, and shall show the locations of the work of other trades which affects the work of Contract #3.

1.9 EQUIPMENT DEVIATIONS

- A. Where an item of equipment is proposed, other than that detailed or specified on the drawings, which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical or electrical layouts, such redesign, and new drawings required therefore, with approval of the Commissioner, shall be prepared without cost to the City of New York.
- B. Where such approved deviation requires a different quantity and arrangement of equipment from that specified or indicated on the drawings, provide required equipment, wiring, piping, connections, valves, and structural supports, and any other additional equipment required by the deviation, at no additional cost to the City of New York.
- C. It is the intent of these specifications that wherever a manufacturer of a product or a catalog number is specified, and terms "or equal" or "or approved equal" are used, the substituted item must conform in all essential respects to the specified item including operating efficiency, noise generated, and method of operation. Consideration will not be given claims that the substituted item meets performance requirements with lesser construction. Performance as delineated in schedules and in the specifications shall be interpreted as minimum performance.

1.10 EQUIPMENT AND SYSTEMS CRITERIA

- A. The criteria of design and performance to produce the required operation are based on equipment shown or scheduled.
- B. The equipment must conform to the structural design provisions for loads applied to the structure, to the dimensions established by drawings for machine spaces and other clearances, and for inlet and outlet locations and proper relationship to associated equipment, piping and ducts.
- C. The descriptions cover basic equipment and operation but not all the details of design and construction.
- D. The use of singular in descriptions does not limit the quantities of items to be furnished to provide the operation specified. Furnish all equipment required to produce specified performance under installed conditions.
- E. Factory wiring, interconnections, piping and connections shall conform to these specifications for the field work.
- F. Provide all trim, enclosures and accessories required to make a complete installation.
- G. Finish mechanical equipment, motors, controls and similar apparatus with machinery enamel, prime coat and finish coat. Provide prime coat suitable for field painting and other protective treatments and coatings as specified.
- H. Acoustical performance of equipment and systems.
 - 1. Noise levels from operation of motor driven equipment, whether air-borne or structure-borne, and noise levels created by or within air-handling equipment and air distribution and control media shall not exceed sound pressure levels determined by the noise criterion curves in the ASHRAE Guide as follows:

Space	Rating
Theater 1 and Theater 2	PNC-20
Rehearsal Studios	PNC-25
Lobbies and Public Circulation Areas	PNC-35 to 40
Offices, Dressing Rooms	PNC-30 to 40

- 2. Octave band sound pressure levels will be obtained for ambient room conditions with equipment not operating and also with the installed equipment operating per plans and specifications.
- 3. For testing purposes, sound pressure levels will be measured 3'-0" above the floor.

1.11 APPROVALS

- A. Obtain all approvals in accordance with Division 1 - General Requirements.
- B. Submit to the Commissioner for approval a list of manufacturers of equipment proposed for the work.

- C. Intent to use exact make specified does not relieve the Contract #3 Contractor of responsibility for submitting the required list.
- D. Where any specific materials, process or method of construction, or manufactured article is specified by name or by reference to catalog number of a manufacturer, or other standards, the intent is not to take precedence over the basic duty and performance specified, noted on drawings, or as required for intended results. In all cases, verify the duty specified with the specific characteristics of the equipment offered for approval.
- E. Equipment of one type shall be products of one manufacturer.

1.12 SUBMITTALS

- A. Procedure
 - 1. Prepare and make the submissions listed below in accordance with the procedure specified in this Section.
- B. Shop drawings
 - 1. Coordination Drawings.
 - 2. Guarantees and Warrantees.
 - 3. Operating and Maintenance Manual.
 - 4. Record As-Built Drawings.
 - 5. Identification Markings.
 - 6. Fire rated penetration safing.

1.13 SUBMITTALS PROCEDURE

- A. Refer to Division 1 - General Requirements for number of copies and routing procedure of submittals.
- B. Shop drawings shall be submitted for each item listed in each specification section of this division or specified on plans.
- C. Submittals shall include the following information on a cover sheet:
 - 1. Job Name
 - 2. Contract #3 Contractor's Name
 - 3. Manufacturer's Name
 - 4. Specification Section
 - 5. Paragraph Number
 - 6. Contract #3 Contractor Submission Number
 - 7. List drawings and/or sheets included
 - 8. List variations from specifications and drawings
 - 9. Space for Commissioner's Review Stamp
- D. Submittals shall consist of following applicable items:
 - 1. Manufacturer's Drawings.
 - a. Equipment listed in each section, include material specifications, operating characteristics and finishes.
 - 2. Installation Drawings.
 - a. Coordinated scale drawings of equipment including interconnecting piping and ductwork.
 - b. Coordinate space requirements for equipment and services.

- c. Include connections, anchorages and fastenings.
 - d. Make allowance for clearances for access to and maintenance equipment.
 3. Wiring and Control Diagrams.
 - a. Electric wiring diagrams and automatic control diagrams and sequences of operation. The wiring diagrams must be complete and coordinated with the equipment actually installed.
 4. Provide composite shop drawings showing work of all related construction, when required to ensure full coordination and proper fitting of the work, and when directed by the Commissioner.
 5. Provide drawings showing dimensions and locations of concrete work required for the mechanical work.
 6. Samples: Color samples for prefinished items.
 7. Reports:
 - a. Manufacturer's certified pressure tests on vessels.
 - b. Manufacturer's certified performance tests on operating equipment.
 - c. Field pipe testing reports and certificates of approval.
 - d. Welder's certificates and field test report.
 - e. Field operating test results for operating equipment.
 - f. Performance report on the balancing of air and water systems.
 - g. Performance report and calculations for vibration isolation equipment.
 - h. Manufacturer's certified reports on motorized equipment alignment and installation.
- E. If submissions of catalog cuts of standard manufactured items show different types, options, finishes, performance requirements, or other variations, those features proposed shall be clearly identified.
 1. If any variations from the catalog description are proposed or required, such variations must be clearly noted on the cut.
 2. Shop drawings shall clearly indicate all details, sectional views, arrangements, working and erection dimensions, kinds and quality of materials and their finishes, and other information necessary for proper checking and for fabrication and installation of the items, and shall include all information required for making connections to other work.
 3. Shop drawings shall be numbered consecutively, and drawings related to various units comprising a proposed assembly shall be submitted simultaneously so that units may be checked individually and as an assembly.

4. Keep on the site, in good order, a complete up-to-date set of approved shop drawings. All shop drawings shall be available for inspection by the Commissioner.
5. The approval of shop drawings will be general, and shall not be construed as permitting any departure from the contract requirements other than those specifically brought to the Commissioner's attention and so approved.
 - a. If the shop drawings show any variations from contract requirements because of standard shop practices or other reasons, such variations shall be clearly identified on the drawings in order that, if acceptable, suitable action may be taken for proper adjustment in other work affected thereby.
 - b. Failure to identify such variations will not relieve the Contract #3 Contractor of responsibility for executing the work in accordance with the Contract even though such shop drawings have been approved and the work installed.
 - c. Approval shall not relieve the Contract #3 Contractor of responsibility for any error in details, dimensions, etc., that may exist on shop drawings nor for the furnishing of materials or work required by the Contract and not indicated on the shop drawings.
 - d. Approval shall not be construed as approved departure from details or instructions previously furnished by the Commissioner.
 - e. Approval with a requirement for resubmission is an approval contingent upon satisfactory resubmission within 30 days. Failure to comply shall result in a revocation of the contingent approval.

F. Shop Drawing Schedule

1. The Contract #3 Contractor shall submit, within 30 days of the award of his contract, a schedule of all proposed shop drawing submissions.
2. The schedule shall include the following information.
 - a. Item to be submitted
 - b. Date of submission
 - c. Latest date for approval
 - d. Manufacturers of the specified item.
3. Items not specifically listed as "approved equal" should be listed for consideration at this time.

G. Submittals will be reviewed for conformance with the contract drawings and specifications. The Commissioner's review stamp will be affixed to submittals. One of the following actions will be taken.

1. **NO EXCEPTION** - Submittal appears to comply with the contract drawings and specifications. Contract #3 Contractor is not relieved of responsibility to meet the requirements of the contract drawings and specifications due to errors, omissions, or conflicts with other equipment or trades.

2. EXCEPTIONS AS NOTED - Submittal appears to comply with the contract drawings and specifications except for the items noted by the Commissioner. Contract #3 Contractor is not relieved of responsibility to meet the requirements of the contract drawings and specifications due to errors, omissions, or conflicts with other equipment or trades.
3. REVISE AND RESUBMIT - In the opinion of the Commissioner the nature and/or quantity of exceptions is sufficient to require resubmission to demonstrate compliance. Submittals must be returned within 30 days for contingent acceptance to remain valid. Submittals will become rejected if not returned within 30 days.
4. REJECTED - Submittal does not comply with contract drawings and specifications.

1.14 LEED BUILDING SUBMITTAL REQUIREMENTS:

- A. Provide for all field-applied adhesives, sealants (used as fillers), and paints: Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, paints and coatings applied on the interior of the building. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.15 GUARANTEES AND SERVICES

- A. All workmanship, installation materials and equipment shall be maintained and serviced for the guarantee period at no additional cost to the City of New York.
- B. Leave entire system installed under Contract #3 in perfect working order, and, without additional charge, replace any work or material which develops defects within the guarantee period, including all other work damaged as a result of such defects.
- C. Non-durable, expendable items such as air filter media are not subject to replacement after the date of acceptance.
- D. The guarantee period shall be extended as follows:
 1. For heating systems, one year plus the time necessary to include one continuous heating season from November 1st to April 1st.
 2. For air-conditioning systems, one year plus the time necessary to include one continuous cooling season from May 1st to October 1st.
- E. Manufacturers' Warranties
 1. The manufacturer shall warrant that the equipment which he has furnished is free from defects in material and workmanship. Obligations under this warranty shall be as follows:
 - a. The equipment manufacturer or supplier shall provide and pay for all labor, parts, accessories, materials, freight and other services to repair or replace any equipment or part thereof which, in the course of installation, start-up and testing is found to be defective.

- b. For a period of one year from date of acceptance by the City of New York, the manufacturer shall replace any defective equipment or part thereof; freight costs for return of defective parts, labor for parts replacement, and replacement of lost refrigerant, are the responsibility of the Contract #3 Contractor.
 - c. The manufacturer shall provide an additional warranty on all refrigeration compressors under the same terms as Paragraph a, for a period of four years.
 - d. Tank linings - guarantee all internal metal surfaces against corrosion for ten years.
 - e. Performance - where equipment is specified by size, guarantee that it will have the capacity specified in the system in which it is installed.
2. The final acceptance of the equipment will be made after the manufacturer has adjusted his equipment, balanced the various systems, demonstrated that it fulfills the requirements of the drawings and specifications, and has furnished all the required certificates of inspection and approval.

1.16 SYSTEM SERVICE

- A. Contract #3 Contractor shall provide routine and preventive service during the warranty period.
- B. Contract #3 Contractor shall submit to Commissioner for approval a comprehensive plan covering items to be maintained and service to be performed. Plan shall include checklist for use by service personnel.
- C. Commissioner shall accompany Contract #3 Contractors' service personnel, and receive instructions on proper service of equipment.
- D. Service performed shall include a complete check out of each piece of equipment at least twice during 1 year warranty period. The first shall occur approximately half way through the warranty period (change of season) and the second shall occur at the conclusion of the warranty period and prior to commencement of the City of New York's service. Each system and/or piece of equipment shall be inspected, operated through its complete range of operation, and adjusted as required. This inspection shall be the same as performed at the initial start-up of the item or system. In addition, there shall be monthly service inspections of each piece of equipment. During the monthly inspections, equipment shall be checked for items such as dirty filters, belt wear, lubrication, unusual sounds or unusual operating conditions. Monthly inspections shall also include recording of system operating temperatures and pressures.
- E. Contract #3 Contractor shall include all labor and material to perform the service, including replaceable items such as filters and belts.
- F. Service on the following items shall be included:
 - 1. Fans, air handling units
 - 2. Filters
 - 3. Temperature controls
 - 4. Water Treatment
 - 5. Unit and Cabinet Heaters
 - 6. Domestic water heaters
 - 7. Fire Protection Systems (Sprinkler)

1.17 PERMITS AND CERTIFICATES

- A. Prior to proceeding with any installation, prepare and submit to the proper authorities, for their approval, all required working drawings. Provide all necessary notices, obtain all permits and pay all local, state and federal taxes, fees and other costs in connection with the work.
- B. The Contract #3 Contractor shall be responsible for performing all special inspections required by New York City Building Code.

1.18 COORDINATION DRAWINGS

- A. Sheet metal shop drawings that have been coordinated with architectural and structural drawings shall be submitted to Commissioner for approval. Drawings must be returned from Commissioner either "No Exception" or "Exceptions as Noted" prior to being used as basis for coordination drawings. Refer to Section 233000 for sheet metal shop drawing requirements.
- B. After sheet metal drawings have been revised per Commissioners comments, reproducible copies shall be sent to the others trades in the following sequence for the inclusion of their work:
 - 1. Contract #2 Contractor
 - 2. Contract #4 Contractor
 - 3. Contract #3 Contractor
- C. Prior to inclusion of sprinkler piping and equipment, Contract #3 Contractor shall have submitted sprinkler plans and calculations to Commissioner for approval and to the Fire Department for review.
- D. After all trades have included their work on the coordination drawing and noted conflicts, all trades shall meet to resolve conflicts and agree to acceptable solutions. Each trade shall sign coordination drawings. Items not shown on coordination drawing is responsibility of omitting contractor and that contractor is subject to additional costs incurred by other trades.
- E. The Commissioner are not part of the coordination drawing process. The Commissioner will provide assistance relative to acceptability of installations.
- F. Submit final signed coordination drawing to Commissioner. Only submit items that are different from previously approved shop drawings. Revisions shall be clearly indicated.
- G. Any work fabricated or installed prior to sign off by all trades shall be removed and re-installed in conformance with coordination drawings.

PART 2 - PRODUCTS

2.1 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Furnish manufacturers operating and maintenance instructions, parts lists and sources of supply for replacements in accordance with Division 1 - General Requirements.
- B. Provide the following:
 - 1. Complete sets of final and correct shop drawings, maintenance and replacement parts manuals, and operating instructions, for equipment supplied.

2. Bind each set within a common binder. Index and organize with a table of contents, to permit quick and convenient reference.
- C. Two days of instruction in operation and maintenance of equipment to City of New York's maintenance force. Design a 2-week period, convenient to City of New York, during which qualified personnel, including manufacturers' technicians and Professional Engineer licensed in the State of New Yorks will be available for City of New York's instruction. City of New York shall have the right to record the instruction sessions in video and/or audio format.
- D. Master Operating Manual (submit in quadruplicate)
1. Manufacturer's mechanical and electrical equipment parts lists of all components of the systems listed on the equipment schedules, control diagrams and wiring diagrams of controllers. List shall give system number, unit number, manufacturer's model number, and manufacturer's drawing numbers.
 2. Step by step operating instructions for each system including preparation for starting, summer operation, winter operation, shutdown and draining.
 3. Maintenance instructions for each type of equipment.
 4. Possible breakdowns and repairs for each type of equipment.
 5. List of nearest local suppliers for all equipment.
 6. Manufacturer's literature describing each piece of equipment listed on the equipment schedules, control diagrams and wiring diagrams of controllers and a copy of the air balance report.
 7. As-installed control diagrams by the control manufacturer.
 8. Description of sequence operation by the control manufacturer.
 9. Recommended trouble shooting procedures in the event of foreseeable mechanical system failure.
 10. Complete "As-Installed" color coded wiring diagrams of all systems and all electrical motor controller connections and interlock connections of all other mechanical equipment.
 11. Chart of the tag numbers, location and function of each valve.
 12. Copies of the following test reports:
 - a. Air Balance.
 - b. Water Balance.
 - c. System Performance.
 - d. Required Pressure Tests.

2.2 IDENTIFICATION MARKINGS

- A. General - apply after insulation and field painting are completed.

B. Valve Identification

1. Furnish and attach to each valve a 2" diameter tag of solid brass with number and service abbreviated as noted on contract drawings. Numbers to correspond to consecutive numbers on valve chart identifying each individual valve.
2. Securely attach tags to the stem of valves with brass "S" hooks.
3. Provide valve charts mounted on 1/4" masonite and covered with heat, bonded plastic laminate. They shall identify each valve by a number, service, its functions and list any remarks concerning special features of the valve; its location and the contract drawings which reference the valve.
4. Provide one such mounted valve chart in each Mechanical Equipment Room.
5. In addition, furnish one unmounted folded copy of the valve charts for each instruction manual.

C. Piping Identification

1. Provide identification for all bare or covered piping for all services, in spaces with or without ceilings, so as to be readable from the floor (even in the case of spaces with removable and/or hard ceilings – for identification if the ceilings are later removed). Piping shall be identified by prefabricated acrylic plastic markers. Markers shall be snap on or secured with bands (6" and over). Colors and lettering shall conform to ANSI Standard 13.1-1981. Seton Name Plate Company or the approved equal. Generally they shall be located at changes of direction, take-offs, valves, where pipes pass through walls and at intervals not greater than 30'-0" on straight runs, and shall indicate direction of flow at each marker.
2. Underground piping shall be provided with underground warning tapes, buried above piping run to identify by color and text, the utility below. Non-metallic piping shall be provided with warning tape having metallic core bonded between two polyethylene films. Seton Name Plate Company or the approved equal.

D. Ductwork Identification: Provide identification for all bare or insulated ductwork for all services, so as to be readable from the floor (even in the case of spaces with removable and/or hard ceilings – for identification if the ceilings are later removed). Ductwork shall be identified by service and associated unit tag number, and direction of airflow, using prefabricated acrylic plastic markers. Markers shall be self adhesive vinyl. Seton Name Plate Company 76470 or 76471, or the approved equal. Generally they shall be located at changes of direction, take-offs, where ducts pass through walls and at intervals not greater than 30'-0" on straight runs.

E. Underground piping shall be provided with underground warning tapes, buried above piping run to identify by color and text, the utility below. Non-metallic piping shall be provided with warning tape having metallic core bonded between two polyethylene films. Seton Name Plate Company or the approved equal.

F. Equipment Identification

1. Identify all equipment listed in equipment schedules that is located in mechanical rooms, on roof, outside adjacent to building, above ceilings, and other locations that are not exposed in finished areas. Identification shall be by unit tag (per

drawings), on a permanently attached minimum 1-1/2" x 3-1/2" nameplate of white core laminated bakelite with black surface and incised letters, located where it is legible and accessible. Where possible, mount plates in the same location on all similar pieces of equipment.

2. Each unit shall bear a manufacturer's nameplate with the following information:
 - a. Manufacturer's name and address.
 - b. Serial and model number.
 - c. Rated capacity.
 - d. Temperature pressure or other limitations.
3. Attach or mount adjacent to all controls and starters, a nameplate indicating which equipment it controls.

PART 3 - EXECUTION

3.1 COORDINATION AND LAYOUT

- A. Study Drawings and Specifications to insure completeness of work required. Include supplementary items normal to manufacturers' requirements or standard accepted trade practices as necessary to complete work, though not specifically indicated or specified.
- B. Verify measurements and conditions in field before starting work.
- C. Examine materials to which work is to be applied and notify the Commissioner, in writing, of any conditions existing which are detrimental to proper and expeditious installation of work. Starting of work shall be construed as acceptance of conditions.
- D. Confer with other trades, install work to avoid interference with other trades, and possible necessary adjustments to conform to structural conditions and work of other trades.
- E. Coordinate and set inserts and locate openings in floors and walls in new construction.
 1. Locate pipes and ducts to avoid interference with other work shown on the drawings and as directed by the Commissioner.
 2. Keep all concealed pipes and ducts within the enclosing construction provided.
 3. Arrange exposed work neatly in parallel runs and parallel with walls or structure, with uniformly spaced hangers and supports, and within the spaces assigned for each kind of work.
- F. Make coordinated layouts showing concrete work required for housekeeping pads, equipment bases and inertia masses which are cast in place, including the location of anchors and dowels.
 1. Coordinate the scheduling and placing of the concrete to suit the mechanical work schedules.
 2. Concrete housekeeping pads are to cover the full area of each piece of equipment.
 3. Concrete bases are to be of dimension and heights to suit the equipment.
 4. The forming and placing of concrete will be provided under this specification section.

3.2 SERVICE OF EQUIPMENT AND SYSTEM PRIOR TO FINAL ACCEPTANCE

- A. Maintain all equipment and systems installed until final acceptance by the Commissioner and the City of New York, and take such measures as necessary to insure adequate protection of all equipment and materials during delivery, storage, installation and shut-down conditions.
- B. This responsibility shall include all provisions required to meet the conditions incidental to the delays pending final test of systems and equipment.
- C. After installation of systems has been completed, operate the system to determine the capability of the equipment and controls to conform to the requirements of the drawings and specifications prior to performance testing.

3.3 EQUIPMENT INSTALLATION

- A. Locate and set equipment anchor bolts, dowels and aligning devices for all equipment requiring them. Refer to concrete work coordination. Level the equipment and grout solid between the equipment and the surface below. Grout to be premixed Embecco or Five Star Grout mixed in accordance with manufacturer's specifications.
- B. The field assembly, installation and alignment of equipment is to be done under field supervision provided by the manufacturer or with inspections, adjustments and approval by the manufacturer.
- C. Equipment startup: Each manufacturer of equipment shall provide qualified personnel to inspect and approve equipment and to supervise the operating tests of the equipment.
- D. Equipment and system test operation.
 - 1. Notify the Commissioner in advance of beginning the equipment and system test operation.
 - 2. Each piece of equipment shall be operated in its system as long as required to provide proper functioning.
 - 3. Perform an operating test of each complete system for twenty-four hours continuous operation as a minimum, or as long as required to provide coordination and proper functioning of all related systems and controls.
 - 4. The operating criteria for each test shall be determined in advance with the Commissioner's approval whenever seasonal conditions will not produce a full design load on any equipment or system.
 - 5. Certify to the City of New York that all equipment is functioning properly.
 - 6. Should the apparatus fail to meet the contract requirements, adjust, repair or replace all defective or inoperative parts and again conduct the complete performance tests.

3.4 CLEANING AND ADJUSTING

- A. Blow out, clean and flush each system of piping, and equipment as required to thoroughly clean the systems.
 - 1. Clean all materials and equipment, and leave in condition ready to operate and receive succeeding finishes where required.

2. Adjust and align all equipment interconnected with couplings or belts.
 - a. Adjust valves of all types and operating equipment of all types to provide proper operation.
 - b. Remove and clean elements in all steam trap bodies.
 - c. Clean all strainers.
- B. Lubricate equipment as recommended by the manufacturer, during temporary construction use, and provide complete lubrication just prior to acceptance.
- C. Permanent equipment operated during construction shall not be abused or be used in service different from its design application.
 1. Temporary disposable filters shall be used during temporary operation.
 2. All expendable media, including belts used for temporary operation and similar expendable materials shall be replaced just prior to acceptance.
 3. Packing boxes of equipment operated during construction must be replaced just prior to system acceptance, using materials and methods specified by the supplying manufacturer.
- D. Equipment furnished with factory finishes shall be retouched and repainted as required to present a new appearance.
- E. Provide and maintain protection for all of the work whether completed or in progress. Provide coverings and enclosures as required.
- F. New and existing operating equipment and systems shall be clean and dust free inside and out. Concealed and unoccupied areas such as plenums, pipe and duct spaces and Equipment Rooms shall be free of rubbish and swept clean at time of acceptance.

3.5 TESTING AND BALANCING

- A. Tests shall be performed in accordance with Division 1 - General Requirements, and the following.
- B. Provide the services of an independent air and water balancing and testing firm which specializes in balancing and testing of heating, ventilating and air conditioning systems, and which is acceptable to the City of New York. All instruments used shall be accurately calibrated and maintained in good working order. If requested, the balancing shall be conducted in the presence of the Commissioner/City of New York.
- C. Balancing shall not begin until the system has been completed and is in full working order. After completion of the balancing and testing submit copies of the results to the Commissioner.
- D. Perform tests and make necessary adjustments to obtain the flow and distribution of air and water required to produce the operating criteria called for by the contract documents, in accordance with the latest standards of the National Environmental Balancing Bureau and the Associated Air Balance Council.
 1. Occupied spaces shall be draft free upon completion.
 2. Provide any necessary baffles at registers and diffusers.
 3. Maintain the specified acoustical performance of the systems.

4. Mark final position of dampers and balancing valves.
- E. Upon completion of the installation, test and balance all equipment and systems under field operating conditions to demonstrate its compliance with specification requirements. Submit three copies of the test report to the Commissioner. Refer to specification sections 230523 and 233000 for details of report requirements.
- F. Should any part of the system fail to meet the contract requirements, adjust, repair or replace all defective or inoperative parts again conduct the complete performance tests.
- G. The Commissioner and City of New York shall be notified, in writing, at least 48 hours prior to scheduled test dates.

3.6 PAINTING

- A. Thoroughly clean all surfaces, requiring prime painting, of rust, loose scale, oil and grease.
 1. Dry surfaces before painting.
 2. Do not paint controls, nameplates, or labels.
- B. Paint all equipment not painted at the factory with one prime coat.
- C. Provide field painting as follows:
 1. All exposed iron work, including uninsulated ferrous piping and conduit system components, hangers, supports, equipment bases, and apparatus; prime coat, red lead.
 2. Uninsulated ductwork and casing exposed to view and exposed galvanized surfaces of conduit and piping and of equipment prime painted at the shop: Prime coat, zinc chromate for galvanized surfaces.
 3. Inside of all ductwork where visible through registers and grilles: One coat of flat black paint.

3.7 CONNECTIONS TO EQUIPMENT

- A. Provide mechanical connections to equipment and fixtures requiring such connections which are supplied by City of New York or under other divisions.
- B. Provide unions, nipples, adapters, valves, flexible connections, and other trim required for final connections for each such fixture or item of equipment, as required for complete and perfect operation.

3.8 WORKMANSHIP

- A. Perform all work in a practical, neat and workmanlike manner with mechanics skilled in work, and using the best practices of the trade involved.
- B. No work shall be concealed until it has been inspected and approved by the Commissioner.
- C. Workmanship or materials not meeting with requirements of the specifications and drawings and satisfaction of the Commissioner shall be rejected and immediately replaced in an acceptable manner, without additional cost to the City of New York.

3.9 LUBRICATION

- A. All equipment furnished, installed or connected under this division, shall be inspected for proper lubrication when connected and before operation of the equipment is begun.
- B. The Contract #3 Contractor for the work of this division will be held responsible for any damage to equipment that is operated without having been properly lubricated.

3.10 REMOVALS AND RELOCATIONS

- A. All components of abandoned systems and abandoned portions of systems shall be removed, and, unless specifically noted to be relocated and reused, become the City of New York's property. Contract #3 Contractor shall dispose of removed materials as directed by the City of New York.
- B. Where portions of systems noted for removal remain in use, permanently seal the point of disconnection so as not to interfere with the system operation.
- C. Where interferences between the existing system components and new work require relocation of the existing components to clear that interference, they may be reused, except where specifically noted to the contrary, providing that their condition is noted by the Commissioner and they are approved by him as equivalent to new.
- D. Where existing system components are required to be replaced, all new components shall be provided.
- E. System components include all accessories, cables, controls, conduits, hangers, bases and supports and outlets.
- F. The work specified under Contract #3 specifically excludes the removal or patching of "hazardous materials." This includes but is not limited to asbestos, PCBs or any other material having been designated by the Environmental Protection Agency as a hazardous material. If Contract #3 Contractor finds anything which is suspected of being a hazardous material, it should be immediately brought to the City of New York's attention.

3.11 USE OF PREMISES AND CLEANING

- A. Remove and dispose of all waste materials and rubbish due to all construction operations under the contract, except as otherwise noted, and keep the building free from rubbish and dirt caused by Contract #3 Contractor's subcontractors' employees. During the entire progress of the work, rubbish removal shall be made frequently so as to prevent any potential safety or health hazard.
- B. Upon completion of the work, remove all protection, paint, putty, and other stains from all fixtures and glass and leave the premises thoroughly broom cleaned.

3.12 CUTTING, ALTERING AND PATCHING

- A. Provide all cutting, chasing, drilling, altering and rough patching required for the work of this division.
 - 1. Including the restoring of existing work cut for or damaged by installation of new work, and where present work is removed.
 - 2. All materials and workmanship required in connection with cutting, altering and rough patching shall match the existing work in every respect.

- B. Do all shoring, bracing, cutting, patching, piecing out, filling in, repairing and refinishing of all present work as made necessary by the alteration and the installation of new work.
- C. All holes and openings occurring in the existing floors after equipment, partitions, floors, steel work, conduits and pipes are removed or installed shall be closed up with materials similar to the adjacent work.
- D. The size and location of items requiring an opening, chase or other provisions to receive it shall be given by the trade requiring same in ample time to avoid undue cutting of any new work to be installed. These provisions shall not relieve the Contract #3 Contractor from keeping informed as to the required opening, chases, etc., nor from responsibility for the correctness thereof, nor for cutting and repairing after the new work is in place.
- E. Include all cutting, repairing and patching in connection with the work that may be required to make the several parts come together properly and fit it to receive or be received by the work of other trades, as shown on the drawings and/or specified, or reasonably implied by the drawings and specifications.
- F. All repairing, patching, piecing-out, filling-in, restoring and refinishing shall be neatly done by mechanics skilled in their trade to leave same in condition satisfactory to the City of New York.
- G. Materials and their methods of application for patching shall comply with applicable requirements of the specifications. Materials and workmanship not covered by the specifications and items of work exposed to view adjoining existing work to remain shall conform to similar materials and workmanship existing in or adjacent to the spaces to be altered.
- H. Cutting, repairing and patching shall include all items shown on the drawings, specified in the specifications or required by the installation of new work or the removal of existing work.
- I. Remove partitions, walls, suspended ceilings, etc., as necessary to perform the required alterations or new construction work. Avoid damage to construction and finishes that are to remain.
- J. Protect and be responsible for the existing building, facilities and improvements. Any disturbance or damage to the work, the existing building, and improvements, or any impairments of facilities resulting from the construction operations, shall be promptly rectified, with the disturbed, damaged, or impaired work, restored, repaired or replaced at no extra cost.
- K. All alterations which are not indicated on the drawings nor specified herein but necessary to make good existing work disturbed by reason of the work shall be restored to a condition satisfactory to the City of New York.
- L. All holes in masonry floors and walls are to be core drilled.
- M. Disturbed concrete and/or cement floor areas shall be patched with approved type latex mortar. When cement mortar is used for patching, the surfaces shall be depressed a minimum depth of 1".
- N. Reinstall all weather protection work in waterproof manner.
- O. Openings in roofs. Openings in roofs shall be kept properly plugged and caulked at all times, except when being worked on, to preclude the possibility of flooding due to storms or other causes. After completion of work, openings shall be permanently sealed.

- P. Temporary openings. All temporary openings cut in walls, floors or ceilings for pipe or ductwork shall be closed off with non-combustible fiber cement boards containing no asbestos or other hazardous material, except when mechanics are actually working at the particular opening.

3.13 TEMPORARY HEAT

- A. Provide all labor, fuels, materials, tools, appliances and equipment and perform all operations necessary to maintain sufficient temporary heat to insure uninterrupted progress in the work and to protect all work and materials against injury from dampness and cold until issuance of the Commissioner's Final Certificate. In addition to the foregoing, the Contract #3 Contractor shall provide temporary heat to the extent itemized below, but not limited to the following:
1. During the placing, setting and curing of all concrete, an ambient temperature of 50 degrees F shall be maintained in the areas involved.
 2. During the placing, setting and/or curing of interior masonry, metal furring, plaster, tile; and taping and spackling of drywall an ambient temperature of 60 degrees F shall be maintained in the space involved.
 3. In spaces where resilient floor coverings are stored an ambient temperature of 70 degrees F shall be maintained, and such temperature shall be maintained 48 hours before, during and 48 hours after installation in each space where such covering is required.
 4. Except as noted above, all areas in which work is in progress, shall be maintained at 45 degrees F during working hours.
- B. The medium and procedure of providing temporary heat at all times shall be subject to the approval of the City of New York and Commissioner.
- C. Only heaters employing tanked gas will be permitted. The use of oil or coke as fuels will not be permitted. Provide thermal protection under heating units and pails of sand adjacent thereto.
- D. Prior to starting the metal lathing, or drywall spackling, the work shall be sufficiently advanced for temporary heat to be produced by the permanent heating system.
- E. After the permanent heating system or portion of the system is substantially complete and acceptable to the City of New York for temporary heating use, the Contract #3 Contractor may, at the City of New York's discretion, be permitted to use such heating facilities for temporary heat.
- F. The Contract #3 Contractor in using the permanent heating system for temporary heating agrees to the following:
1. After the Commissioner and the City of New York approve and accept the project heating system, or portion thereof, for temporary heating purposes, the heating system shall be turned over to the Contract #3 Contractor. When the Contract #3 Contractor has no further need for temporary heat, the heating system shall be returned to the City of New York.
 2. That portion of the project's heating system and other related mechanical equipment termed the temporary heating system shall be limited to equipment and the necessary piping, traps, valves, strainers, controls, pumps, starters, wiring and all other apparatus and equipment necessary to cause the temporary heating system to function correctly.

- G. Permanent duct work and air handling systems may not be utilized for temporary heat. The permanent boilers and piping systems may not be utilized for temporary heating without the operation of the permanent water treatment system.
- H. These provisions for temporary heating do not alter the requirements of the "General and Supplementary General Conditions" with respect to "Guarantees" and/or any "General Guaranty" contained herein.

3.14 TEMPORARY COOLING

- A. Provide all labor, materials, tools, appliances and equipment and perform all operations necessary to maintain sufficient temporary cooling to insure uninterrupted progress in the work and to protect all work and materials against injury from dampness and heat until issuance of the Commissioner's Final Certificate. In addition to the foregoing, the Contract #3 Contractor shall provide temporary cooling to the extent itemized below, but not limited to the following:
 - 1. In spaces where millwork and/or cabinetry will be stored and/or installed, a maximum ambient temperature of 78 degrees F and maximum relative humidity of 60% shall be maintained, and such conditions shall be maintained 48 hours before installation, and continuously after installation in each space where such installation has occurred or where millwork and/or cabinetry items are stored.
 - 2. In spaces where electronic equipment will be installed, maximum ambient temperature of 78 degrees F and maximum relative humidity of 60% shall be maintained, and such conditions shall be during installation, and continuously after installation in each space where such installation has occurred.
- B. The medium and procedure of providing temporary cooling at all times shall be subject to the approval of the City of New York and Commissioner.
- C. After the permanent cooling system or portion of the system is substantially complete and acceptable to the City of New York for temporary cooling use, the Contract #3 Contractor may, at the City of New York's discretion, be permitted to use such cooling facilities for temporary cooling. Prior to such permanent cooling system components being used, all permanent overcurrent protection, conduit, wiring and controls shall be in place to protect the equipment and personnel. All piping pressure tests shall be performed prior to use of piping systems for temporary cooling purposes. Temporary cooling equipment shall be provided with overcurrent protection as required, coordinated with Contract #4 Contractor.
- D. The Contract #3 Contractor in using the permanent cooling system for temporary cooling agrees to the following:
 - 1. After the Commissioner and the City of New York approve and accept the project cooling system, or portion thereof, for temporary cooling purposes, the cooling system shall be turned over to the Contract #3 Contractor. When the Contract #3 Contractor has no further need for temporary cooling, the cooling system shall be returned to the City of New York, after having been serviced and any normal maintenance having been performed.
 - 2. That portion of the project's cooling system and other related mechanical equipment termed the temporary cooling system shall be limited to equipment and the necessary chiller(s), cooling tower(s), heat exchanger(s), piping, valves, insulation, water treatment systems(s), strainers, controls, pumps, starters, permanent wiring, permanent overcurrent protection, permanent controls and all other apparatus and equipment necessary to cause the temporary cooling system to function correctly.

- E. Permanent duct work and air handling systems may not be utilized for temporary cooling. The permanent chiller(s), cooling tower(s) and piping systems may not be utilized for temporary cooling without the operation of the permanent water treatment system.
- F. These provisions for temporary cooling do not alter the requirements of the "General and Supplementary General Conditions" with respect to "Guarantees" and/or any "General Guaranty" contained herein.

3.15 PENETRATIONS THROUGH FIRE SEPARATIONS

- A. Pack annular space between sleeve and pipe (insulation) and/or conduit in fire rated construction with fire retardant putty, sealant and/or caulk. Material shall be non asbestos based and installed in accordance with manufacturers instructions for fire rating required.
- B. Penetrations of multiple items and penetrations with annular space greater than 1/2" shall be provided with approved backing material in accordance with manufacturers instructions.
- C. Fire retardant sealer and system shall meet ASTM E-84, ASTM E-814, and UL-1479.
- D.

<u>MANUFACTURER</u>	<u>MODEL</u>
Dow Corning	Firestop 2001
Nelson	CLK,FSP
Standard Oil	Fyre Putty
3M	CP-25

3.16 WASTE MANAGEMENT

- A. Comply with the requirements established by the Contract #1 Contractor 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.

3.17 SEIMSIC ANALYSIS

- A. The following steps were used to determine the Seismic Design Category for this project.
 1. Based on 2008 New York City Building Code table 1604.5, the project is considered Occupancy Category III.
 2. Site Class D was selected as the default for unknown soil site conditions.
 3. The USGS web application determined the following based on the geographical location of the project building:
 - a. $S_s = 0.363g$
 - b. $S_1 = 0.070g$.
 4. 2008 New York City Building Code Tables 1615.1.2 (1) and 1615.1.2 (2) were used to determine the following:
 - a. $F_A = 1.51$
 - b. $F_V = 2.4$
 5. 2008 New York City Building Code Equations 16-38 and 16-39 were used to determine the following:

- a. $S_{MS} = F_A S_S = 1.51 \times 0.147 = 0.548g$
 - b. $S_{M1} = F_V S_1 = 2.4 \times 0.049 = 0.168g$
6. 2008 New York City Building Code Equations 16-40 and 16-41 were used to determine the following:
- a. $S_{DS} = 2/3 \times S_{MS} = 2/3 \times 0.548g = 0.365g$
 - b. $S_{D1} = 2/3 \times S_{M1} = 2/3 \times 0.168g = 0.112g$
7. 2008 New York City Building Code Tables 1616.3 (1) and 1616.3 (2) were used to determine the following:
- a. Seismic Design Category D based on Short-Period Response Accelerations table
 - b. Seismic Design Category C based on 1-Second Response Accelerations table
8. Based on the more severe of the seismic design categories listed above, the Seismic Design Category for this project has been determined as Seismic Design Category D.

3.18 SEISMIC RESTRAINT

- A. Provide seismic restraint of all mechanical, electrical, plumbing and fire protection systems as required per 2008 New York City Building Code Sections 1614, ASCE 7-05, and referenced sections and publications.
- B. Importance Factor (I_p) for this project shall be as follows:
 - 1. Mechanical, electrical, plumbing and fire protection systems installed by Contract #3 Contractor required to function as part of life-safety systems shall have Importance factor (I_p) equal to 1.5. Life-safety systems shall include: Theater 1 Smoke Exhaust, Emergency Lighting, Exit Signage, Fire Alarm and Fire Protection (sprinkler) systems.
 - 2. All mechanical, electrical, plumbing and fire protection systems installed by Contract #3 Contractor not required to function as part of life-safety systems shall have Importance Factor (I_p) equal to 1.0.
- C. Provide seismic analysis and calculations for all mechanical, electrical, plumbing and fire protection system components installed by Contract #3 Contractor except the following:
 - 1. Mechanical and electrical components where the component importance factor (I_p) is equal to 1.0 and either:
 - a. Flexible connections between the components and associated ductwork, piping and conduit are provided.
 - b. Components are mounted 4 ft or less above a floor level and weigh 400 lb or less.
 - 2. Mechanical and electrical components where the component importance factor (I_p) is equal to 1.0 and:
 - a. Flexible connections between the components and associated ductwork, piping and conduit are provided.
 - b. The components weigh 20 lb or less or, for distribution systems, weighing 5 lb/ft or less.

- D. Seismic restraint calculations shall be provided for all connections of components to the structure. Calculations must be stamped by a Professional Engineer licensed in the State of New York with at least three years' experience in seismic design experience.
- E. Analysis must indicate calculated dead loads, seismic static loads, capacity of materials utilized for connection to equipment and structure. Analysis shall detail anchoring methods, bolt diameter, embedment and/ or welded length. All seismic restraint devices shall be designed to accept without failure, the lateral forces acting through the center of gravity.

END OF SECTION

SECTION 230013 – HVAC CONTRACTOR WORK
ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

1.01 SCOPE FOR ASBESTOS ABATEMENT WORK

- A. The "General Conditions" apply to the work of this Section.
- B. The Asbestos abatement contractor shall remove asbestos containing materials as needed to perform the other work of this Contract when discovered during the course of work. When required, the Asbestos abatement contractor shall replace the ACM with non-asbestos containing materials. An allowance of **\$5,000.00** for the **HVAC Contractor** is herein established for this incidental work when so ordered and authorized by the Commissioner.
- C. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE RULES AND REGULATIONS OF THE ASBESTOS CONTROL PROGRAM AS PROMULGATED BY TITLE 15 CHAPTER 1 OF RCNY AND NEW YORK STATE DEPARTMENT OF LABOR INDUSTRIAL CODE RULE 56 CITED AS 12 NYCRR, PART 56 WHICHEVER IS MORE STRINGENT AS PER LATEST AMENDMENTS TO THESE LAWS AND AS MODIFIED HEREIN BY THESE SPECIFICATIONS.
- D. ALL DISPOSAL OF ASBESTOS CONTAMINATED MATERIAL SHALL BE PER LOCAL LAW 70/85.
- E. THE ASBESTOS ABATEMENT CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT CERTAIN METHODS OF ASBESTOS ABATEMENT ARE PROTECTED BY PATENTS. TO DATE, PATENTS HAVE BEEN ISSUED WITH RESPECT TO "NEGATIVE PRESSURE ENCLOSURE" OR "NEGATIVE-AIR" OR "REDUCED PRESSURE" AND "GLOVE BAG".
- F. THE ASBESTOS ABATEMENT CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR AND SHALL HOLD THE DEPARTMENT OF DESIGN AND CONSTRUCTION AND THE CITY HARMLESS FROM ANY AND ALL DAMAGES, LOSSES AND EXPENSES RESULTING FROM ANY INFRINGEMENT BY THE ASBESTOS ABATEMENT CONTRACTOR OF ANY PATENT, INCLUDING BUT NOT LIMITED TO THE PATENTS DESCRIBED ABOVE, USED BY THE ASBESTOS ABATEMENT CONTRACTOR DURING PERFORMANCE OF THIS AGREEMENT.
- G. "Asbestos" shall mean any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumingtonite-grunerite), crocidolite (riebeckite), tremolite, anthrophyllite and actinolite.

- H. Prior to starting, the Asbestos abatement contractor must notify the Commissioner of the Department of Design and Construction if he/she anticipates any difficulty in performing the Work as required by these Specifications. The Asbestos abatement contractor is responsible to prepare and submit all filings, notifications, etc. required by all City, State and Federal regulatory agencies having jurisdiction.

The Asbestos abatement contractor is responsible for submitting the Asbestos Project Notification Form (ACP-7 Form) to the Department of Environmental Protection, Asbestos Control Program, as per Title 15, Chapter I of RCNY and to the NYSDOL as per Industrial Code Rule 56.

The Asbestos abatement contractor is responsible for preparing, and submitting Asbestos Variance Application (ACP-9). If a Variance is required, the Asbestos abatement contractor is responsible to retain a NYSDOL Asbestos Project Designer, as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required variance.

The HVAC contractor is responsible for preparing and submitting an Asbestos Abatement Permit and/or Work Place Safety Plans (WPSP) that may be required for the completion of the Contract or incidental work. If such plans are required, the Asbestos abatement contractor is responsible to retain a NYSDOL Licensed Design Professional as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required plans.

The Asbestos abatement contractor is responsible for the submission of all required documents to the NYCDEP to acquire the appropriate Asbestos Project Conditional Closeout (ACP-20) and/or Asbestos Project Completion Forms (ACP-21) on a timely basis for the completion of the incidental work encountered under this contract.

The Asbestos abatement contractor will be required to attend an on-site job meeting with the Construction Project Manager prior to the start of work to examine conditions and plan the sequence of operations, etc.

The Asbestos abatement contractor shall have a NYSDOL/NYCDEP Asbestos Supervisor onsite to oversee the work and conduct a final visual inspection as required by both Title 15, Chapter 1 of the RCNY and NYSDOL Industrial Code Rule 56.

- I. All work shall be done during regular working hours unless the Asbestos abatement contractor requests authorization to work in other than regular working hours and such authorization is granted by the Commissioner. (Regular work hours are those hours during which any given facility, in which work is to be done, is customarily open and functioning, normally between the hours of 8:00 A.M. and 4:00 P.M. Monday - Friday.) If such work schedule is authorized by the Commissioner, the work shall be done at no additional cost to the City.

- J. The Commissioner may order that work be done in other than regular working hours as herein by defined and this order may require the Asbestos abatement contractor to pay premium or overtime wages to complete the work. If the Commissioner orders work in other than regular working hours, the Asbestos abatement contractor shall multiply the unit price for that portion of the work requiring premium wages by 1.50 when computing payment in accordance with Paragraph 1.09. All requests for premium payment must be supported by certified payroll sheets and field sheets approved by the Construction Project Manager.

1.02 QUALIFICATIONS OF ASBESTOS ABATEMENT CONTRACTOR

- A. Requirements: The asbestos abatement contractor must demonstrate compliance with the special experience requirements set forth in subparagraphs (1) through (5) below. The asbestos abatement contractor must, submit documentation demonstrating compliance with all listed requirements. Such documentation shall include without limitation, all required licenses, certificates, and documentation.
1. The asbestos abatement contractor must, whether an individual, corporation, partnership, joint venture or other legal entity, must demonstrate for the three year period prior to the work, that it has been licensed by the New York State Department of Labor, as an "Asbestos abatement contractor".
 2. The asbestos abatement contractor must, for the three year period prior to the work, have been in the business of providing asbestos abatement services as a routine part of its daily operations.
 3. The asbestos abatement contractor proposing to do asbestos abatement work must be thoroughly experienced in such work and must provide evidence of having successfully performed and completed in a timely fashion at least five (5) asbestos abatement projects of similar size and complexity. The aggregate cost of these projects must be at least \$250,000.00 in each of the three years.
 4. For each project submitted to meet the experience requirements set forth above, the asbestos abatement contractor must submit the following information for the project; name and location of the project; name title and telephone number of the owner or the owner's representative who is familiar with the asbestos abatement contractor's work, brief description of the work completed as a prime or sub-asbestos abatement contractor; amount of contract or subcontract and the date of completion.
 5. The asbestos abatement contractor must demonstrate that it has the financial resources, supervisory personnel and equipment necessary to carry out the work and to comply with the required performance schedule, taking into consideration other business commitments. The asbestos

abatement contractor must submit such documentation as may be required by the Department of Design and Construction to demonstrate that it has the requisite capacity to perform the required services of this contract.

- B. Insurance Requirements: The asbestos abatement contractor must provide asbestos liability insurance in the following amount: 1 million dollars per occurrence, 2 million dollars aggregate (combined single limit). The City of New York shall be named as an additional insured on such insurance policy.
- C. Throughout the specifications, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics thereof.

1.03 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITIES

The Asbestos abatement contractor will visit the subject location within one (1) working day of notification to ascertain actual work required. If the project is identified as being "urgent", then work shall commence no later than 48 hours from the time of notification. In this event, the asbestos abatement contractor shall immediately notify when applicable EPA NESHAPS Coordinator, NYSDOL Asbestos Control Bureau and NYCDEP Asbestos Control Program of start of the work and file the necessary Asbestos Notifications and any applicable Variance Applications with the regulatory agencies cited above..

In the event that the project is not classified as "urgent" the Asbestos abatement contractor shall notify the EPA NESHAPS Coordinator, NYSDOL and NYCDEP by submitting the requisite asbestos project notification forms, postmarked 10 days before activity begins if 260 linear feet or more and/or 160 square feet or more of asbestos containing material will be disturbed.

The following information must be included in the notification:

- A. Name and address of building City or operator;
- B. Project description:
 - 1. Size - square feet, number of linear feet, etc;
 - 2. Age - date of construction and renovations (if known);
 - 3. Use - i.e., office, school, industrial, etc.
 - 4. Scope - repair, demolition, cleaning, etc.
- C. Amount of asbestos involved in work and an explanation of techniques used to determine the amount;

- D. Building location/address, including Block and Lot numbers;
- E. Work schedule including the starting and completion dates;
- F. Abatement methods to be employed;
- G. Procedures for removal of asbestos-containing material;
- H. Name, title and authority of governmental representative sponsoring project.

1.04 WORK INCLUDED IN UNIT PRICE

The Asbestos abatement contractor will be paid a basic unit price of **\$25.00** per square feet for the removal and disposal of asbestos containing material and replacement of the same with non-asbestos containing materials.

Unit price shall include all costs necessary to do the work of this Contract, including but not limited to: labor, materials, equipment, utilities, disposal, insurance, overhead and profit.

1.05 AIR MONITORING – ASBESTOS ABATEMENT CONTRACTOR

- A. "Air Sampling" shall mean the process of measuring the fiber content of a known volume of air collected during a specific period of time. The procedure utilized for asbestos follows the NIOSH Standard Analytical Method 7400 or the provisional transmission electron microscopy methods developed by the USEPA and/or National Institute of Standard and Technology which are utilized for lower detectability and specific fiber identification.
- B. Air monitoring of Asbestos abatement contractor's personnel will be performed in conformance with OSHA requirements, (All costs associated with this work are deemed included in the unit price.).
- C. Qualifications of Testing Laboratory:

The industrial hygiene laboratory shall be a current proficient participant in the American Industrial Hygiene Association (AIHA) PAT Program. The laboratory identification number shall be submitted and approved by the City. The laboratory shall be accredited by the AIHA and New York State Department of Health Environmental Laboratory Approval Program (ELAP).

Note: Work area air testing and analysis before, during and upon completion of work (clearance testing) will be performed by a Third Party Air Monitor under separate Contract with the City.

1.06 THIRD PARTY MONITORING AND LABORATORY

- A. The NYCDDC, at its own expense, will employ the services of an independent Third Party Air Monitoring Firm and Laboratory. The Third Party Air Monitor will perform air sampling activities and project monitoring at the Work Site.
- B. The Laboratory will perform analysis of air samples utilizing Phase Contrast Microscopy (PCM) and/or Transmission Electron Microscopy (TEM).
- C. The Third Party Air Monitoring Firm and the designated Project Monitor shall have access to all areas of the asbestos removal project at all times and shall continuously inspect and monitor the performance of the Asbestos abatement contractor to verify that said performance complies with this Specification. The Third-Party Air Monitor shall be on site throughout the entire abatement operation.
- D. The NYCDDC will be responsible for costs incurred with the Third Party Air Monitoring Firm and laboratory work. Any subsequent additional testing required due to limits exceeded during initial testing shall be paid for by the Asbestos abatement contractor.

1.07 PAYMENT REQUEST DOCUMENTATION

- B. The following information shall be included for each payment request:
 - 1. Description of work performed.
 - 2. Linear footage and pipe sizes involved.
 - 3. Square footage for boiler & breaching insulation removed.
 - 4. Square footage of non pipe and boiler areas removed, patched, enclosed, sealed, or painted.
 - 5. Square footage of encapsulation, sealing, patching, and painting involved.
 - 6. Total cost associated with compliance with the assigned task.
 - 7. Architectural, Electrical, HVAC, Plumbing, etc. work incidental to the Asbestos Abatement Work.
 - 8. A certified copy (in form 4312-39) to the Comptroller or Financial Officer of the New York City to the effect that the financial statement is true.

HVAC CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

9. A signed copy (in form 6506q-6) of certificate of compliance with non-discriminatory provisions of the Contract.
 10. Attach a copy of valid workmen compensation insurance.
 11. Valid asbestos insurance per occurrence.
 12. General liability insurance when required.
- C. Each payment request shall include a grand total for all work completed that billing period, the landfill waste manifests and a copy of waste transporter permit. The Department of Design and Construction will inspect the work performed, review the cost and approve or disapprove requests for payment.
- D. EXPOSURE LOG: With this final payment, the Asbestos abatement contractor shall submit a listing of the names and social security numbers of all employees actively engaged in the abatement work of this Contract. This list shall include a summary showing each part of the abatement work in which the employee was engaged and the dates thereof.

1.08 QUANTITY CALCULATIONS

In order to determine the square footage involved for the various pipe sizes of pipe insulation that might be encountered, the following table is to be used.

PIPE INSULATION SIZE O.D.	PIPE SIZE O.D.	SQUARE FOOTAGE PER LINEAR FOOT
2-1/2"	1/2"	0.65
2-3/4"	3/4"	0.72
3"	1"	0.79
3-1/4"	1-1/4"	0.85
3-1/2"	1-1/2"	0.92
4"	2"	1.05
4-1/2"	2-1/2"	1.18
5"	3"	1.31
6"	3-1/4"	1.57
7"	3-1/2"	1.83
8"	4"	2.09
9"	5"	2.36
10"	6"	2.62
12"	8"	3.14
14"	10"	3.67
16"	12"	4.19
18"	14"	4.71

1.09 METHOD OF PAYMENT

Payment shall be made in accordance with Items A through R below. Payment shall be calculated based on the actual quantity of the item performed by the asbestos abatement contractor, times the unit price specified below. Credits may apply to certain times, as specified below.

- A. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING PIPE INSULATION:** Actual linear footage, multiplied by the square footage factor listed for the respective pipe size in Section 1.09, multiplied by the unit price in Section 1.05.

EXAMPLE: 100 lin.ft. of 1/2" pipe and 100 lin.ft. of 6" pipe, including elbows, tees, Flanges, etc.

$$100 \times 0.65 = 65 \text{ sq.ft.} \quad 65 \times \text{unit price} = \text{Payment}$$

$$100 \times 2.62 = 262 \text{ sq.ft.} \quad 262 \times \text{unit price} = \text{Payment}$$

- B. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER INSULATION:** (all types including Silicate Block and including the removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

EXAMPLE: Item B. removal and replacement of 1000 S.F. of boiler insulation (incl. Silicate block)

$$1000 \text{ S.F.} \times (1.5) \times \text{the Unit Price} = \text{Payment}$$

- C. **REMOVAL, DISPOSAL AND REPLACEMENT OF TANK INSULATION:** (all types including removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.
- D. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER UPTAKE, & BREACHING INSULATION:** (all types including stiffening angles and wire lath) Payment shall be made at 2.0 times the unit price per square foot.
- E. **REMOVAL, DISPOSAL AND REPLACEMENT OF DUCT INSULATION:** Payment shall be made at 1.0 times the unit price per square foot.
- F. **REMOVAL, DISPOSAL AND REPLACEMENT OF SOFT ASBESTOS CONTAINING MATERIAL:** (Including sprayed-on fire proofing and sound proofing) Payment shall be made at 1.0 times the unit price per square foot of surface area. Area of irregular surfaces must be calculated and confirmed with DDC representative.
- G. **ACOUSTIC PLASTER REPAIR AND/OR ENCAPSULATION:** Payment shall be made at 0.5 times the unit price per square foot.

HVAC CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- H. **PATCHING OR REPAIR** of items listed in A through F will be paid at 0.33 times the unit price per square foot.
- I. **REMOVAL, DISPOSAL AND REPLACEMENT OF WATERPROOFING ASBESTOS CONTAINING MATERIAL:** (including friable and non-friable waterproofing material from interior and exterior walls, floors, foundations, penetrations, louvers, vents and openings other than windows, doors and skylights) Payment shall be made at 0.5 times the unit price per square foot.
- J. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING ELECTRICAL WIRING INSULATION:** (including friable and non-friable wiring insulation) Payment shall be made at 0.33 times the unit price per square foot.
- K. **PAINTING:** Payment shall be made at 0.05 times the unit price per square foot.
- L. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING PLASTER:** from ceilings and walls, including any wire lath and disposal as asbestos containing waste. Payment shall be made at 0.80 times the unit price per square foot.
- M. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING FLOOR TILES, CEILING TILES, TRANSITE PANELS:** (including any adhesive, glue, mastic and/or underlayment) and disposal as asbestos containing waste. Payment shall be made at 0.40 times the unit price per square foot. If multiple layers are discovered, each additional layer shall be paid at 0.20 times the unit price per square foot.
- N. **ADDITIONAL CLEAN UP/HOUSEKEEPING OF WORK AREA:** (excluding pre-cleaning of work area required by regulations) HEPA vacuuming and wet cleaning of asbestos contaminated surface. Payment shall be made at 0.20 times the unit price per square foot. When GLOVE BAG is employed to remove ACM, cost of HEPA vacuuming and wet cleaning of floor area up to 3 feet on each side of glove-bag shall be included in unit price and no extra payment will be made.
- O. **REMOVAL, DISPOSAL OF ASBESTOS-CONTAINING ROOFING MATERIAL:** including mastic, flashing and sealant compound and provide temporary asbestos-free roof covering consisting of one layer of rolled roofing paper sealed with asphaltic roofing compound. Payment shall be made at 0.8 times the unit price per square foot. Credit at a rate of 0.33 times the unit price will be taken for each square foot of temporary roof covering which the Asbestos abatement contractor is directed not to install.
- P. **PICK-UP AND DISPOSAL OF GROSS DEBRIS:** (excluding any waste generated from abatement under Item A-R) at a rate of \$150 per cubic yard for asbestos contaminated waste and \$75 per cubic yard for non-asbestos

contaminated waste. This cost includes all labor and material cost associated with work.

- Q. **REMOVAL OF ASBESTOS-CONTAINING BRICK, BLOCK, MORTAR, CEMENT OR CONCRETE:** along with all surfacing materials including wire lath and/or other supporting structures and disposal as ACM waste. Payment shall be made at a rate of \$25.00 per cubic foot of material removed.
- R. **REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING WINDOW/DOOR CAULKING:** including friable and non-friable caulking, weather-stripping, glazing, sealants or other waterproofing materials applied to windows, doors, skylights, etc. Payment shall be made at the rate of \$400.00 per opening regardless of size or configuration. This cost includes labor, consumable materials, set-up/breakdown, removal and disposal, as required.

Note 1: CREDIT: For items listed in A through F, a credit at a rate of 0.33 times the unit price, times the respective multiplier (for each item) will be taken for each square foot of insulation which the asbestos abatement contractor is not directed to reapply.

Note 2: MINIMUM PAYMENT: The minimum payment per call at any individual job sites or various job sites during the same day will be eight hundred dollars (\$800.00).

Note 3: All payments shall be made as described in paragraph 1.09 herein.

Note 4: WORKING HIGHER THAN 12 FEET ABOVE FLOOR LEVEL OR WORK REQUIRING COMPLEX SCAFFOLDING OR CONSTRUCTION WORK PLATFORMS: Provisions are made in this Contract to compensate the Asbestos abatement contractor for work performed in locations that are difficult to access due to work at elevations that are significantly higher than the normal work level. The unit price for these items will be paid at 1.20 times the unit price described in Paragraphs 1.09, A through R for those portions of the work that are more than twelve (12) feet above the grade for that would be judged as the normal working level.

1.10 GUARANTEE

- A. Work performed in compliance with each task shall be guaranteed for a period of one year from the date the completed work is accepted by the Department of Design and Construction.
- B. The Commissioner of The Department of Design and Construction will notify the Asbestos abatement contractor in writing regarding defects in work under the guarantee.

1.11 OCCUPANCY OF SITE NOT EXCLUSIVE

Attention is specifically drawn to the fact that contractors, performing the work of other Contracts, may be brought upon any of the work sites of this Contract. Therefore, the

Asbestos abatement contractor shall not have exclusive rights to any site of his work and shall fully cooperate and coordinate his work with the work of other contractors who may be brought upon any site of the work of this Contract. This paragraph applies to those areas outside the regulated Work Area as defined by Title 15, Chapter I of RCNY.

1.12 SUBMITTALS

A. Pre-Construction Submittals:

1. Attend a pre-construction meeting scheduled by the City of New York Department of Design and Construction. This meeting shall also be attended by a designated representative of the City of New York third party air monitoring firm, facility manager and the Construction Project Manager. At this meeting, the Asbestos abatement contractor shall present three copies of the following items:
 - a. Asbestos abatement contractor's scope of work, work plan and schedule.
 - b. Asbestos project notifications, approved variances and plans to Government Agencies.
 - c. Copies of Permits, clearance and licenses if required.
 - d. Schedules: the Asbestos abatement contractor shall provide to the Construction Project Manager a copy of the following schedules for approval. Once approved, schedules shall be maintained and updated as received. Asbestos abatement contractor shall post a copy of all schedules at the site:
 - (1) A construction schedule stating critical dates of the project including, but not limited to, mobilization, Work Area preparation, demolition, gross removal, fine cleaning, encapsulation, inspections, clearance monitoring, and phase of refinishing and final inspections. The schedule shall be updated biweekly, at a minimum.
 - (2) A schedule of staffing stating number of workers per shift per activity, name and number of supervisor(s) per shift, shifts per day, and total days to be worked.
 - (3) Submit all changes in schedule or staffing to the Construction Project Manager prior to implementation.

HVAC CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- e. Written description of emergency procedures to be followed in case of injury or fire. This section must include evacuation procedures, source of medical assistance (name and telephone number to nearest hospital) and procedures to be used for access by medical personnel (examples: first aid squad and physician). NOTE: Necessary Emergency Procedures Shall Take Priority Over All Other Requirements of These Specifications.
- f. Material Safety Data Sheets (MSDS) for encapsulants, sealants, firestopping foam, cleaners/disinfectants, spray adhesive and any and all potentially hazardous materials that may be employed on the project. No work involving the aforementioned will be allowed to proceed until MSDS are reviewed.
- g. Worker Training and Medical Surveillance: The Asbestos abatement contractor shall submit a list of the persons who will be employed by him /her to perform the removal work. Present evidence that workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101.
- h. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.
 - (1) The Asbestos abatement contractor shall provide a permanently bound log book of minimum 8-1/2" x 11" size at the entrance to the Worker and Waste Decontamination enclosure system as hereinafter specified. Log book shall contain on title page the project name, name, address and phone number of the Asbestos abatement contractor; name, address and phone number of Asbestos abatement contractor and City's third party air monitoring firm; emergency numbers including, but not limited to local Fire/Rescue Department. Log book shall contain a list of personnel approved for entry into the Work Area.
 - (2) All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted. Any significant events occurring during the abatement project shall be entered into the log. Upon completion of the job, the Asbestos abatement contractor shall submit the logbook containing a day-to-day record of personnel log entries countersigned by the Construction Project Manager every day.

HVAC CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- i. Worker's Acknowledgments: Submit statements signed by each employee that the employee has received training in the proper handling of ACM, understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.
- B. During Construction Submittals:
 1. Security and safety logs showing names of person entering workspace, date and time of entry and exit, record of any accident, emergency evacuation, and any other safety and/or health incident.
 2. Progress logs showing the number of workers, supervisors, hours of work and tasks completed shall be submitted daily to the Construction Project Manager.
 3. Floor plans indicating Asbestos abatement contractor's current work progress shall be submitted for review by the Construction Project Manager.
 4. All Asbestos abatement contractors' air monitoring and inspection results.

C. Project Closeout Submittals:

Upon completion of the project and as a condition of acceptance, the Asbestos abatement contractor shall present two copies of the following items, bound and indexed:

1. Lien Waivers from Asbestos abatement contractor, Sub-Asbestos abatement contractors and Suppliers,
2. Daily OSHA air monitoring results,
3. All Waste Manifests (Asbestos and Construction Debris), seals and disposal logs,
4. Field Sign-In/Sign-Out Logs for every shift,
5. Copies of all Building Department Forms and Permits,
6. A Letter of Compliance stating that all the work on this project was performed in accordance with the Specifications and all applicable Federal, State and Local regulations,
7. All Warranties as stated in the Specifications,
 - a. Fully executed disposal certificates and transportation manifest.

8. Project Record: The Asbestos abatement contractor shall maintain a project record for all small and large asbestos projects. During the project, the project record shall be kept on site at all times. Upon completion of the project, the project record shall be maintained by the building owner. The project record shall be submitted to DDC as part of the close out documents. The project record shall consist of:
- a. Copies of licenses of all asbestos abatement contractors involved in the project;
 - b. Copies of NYCDEP and NYSDOL supervisor and handler certificates for all workers engaged in the project;
 - c. Copies of all project notifications and reports filed with NYCDEP, NYSDOL and USEPA for the project, with any amendments or variances;
 - d. Copies of all asbestos abatement permits, including associated approved plans and work place safety plan;
 - e. A copy of the air sampling log and all air sampling results;
 - f. A copy of the abatement asbestos abatement contractor's daily log book;
 - g. Copies of all asbestos waste manifests;
 - h. A copy of all Project Monitor's Reports (ACP-15).
 - i. A copy of each ATR-1 Form completed for the asbestos project (if required).
 - j. A copy of each Asbestos Project Conditional Closeout Report (ACP-20) if required.
 - k. A copy of the Asbestos Project Completion Form (ACP-21).

1.13 PROTECTION OF FURNITURE AND EQUIPMENT

Cover all furniture and equipment that cannot be removed from Work Areas. Movable furniture and equipment will be removed from Work Areas by the Asbestos abatement contractor prior to start of work. At the conclusion of the work (after final air testing), the Asbestos abatement contractor will remove all plastic covering on walls, floors, furniture, equipment and reinstall furniture and equipment. He shall remove and store all sheaths, curtains and drapes, and reinstall same following final clean up.

1.14 UTILITIES

A. General:

All temporary facilities shall be subject to the approval of the Commissioner. Prior to starting work at any site, locations and/or sketches (if required) of temporary facilities must be submitted to the Construction Project Manager for the required approval.

B. Water:

The Department of Design and Construction will furnish all water needed for construction, at no cost to the Asbestos abatement contractor in buildings under their jurisdiction. However, it is the responsibility of the Asbestos abatement contractor to ensure that hot water is provided for showering in the decontamination unit. The Asbestos abatement contractor shall furnish, install and maintain any needed equipment to meet these requirements at his own expense.

C. Electricity:

The Department of Design and Construction will furnish all electricity needed for construction, at no cost to the Asbestos abatement contractor in a building, under their jurisdiction. The Asbestos abatement contractor is responsible for routing the electric power to the abatement Work Area.

All temporary lighting and temporary electrical service for Work Area shall be in weatherproof enclosures and be ground fault protected.

- D. In leased spaces, arrangements for water supplies and electricity must be made with the landlord. However, all such arrangements must be made through and are subject to approval of the Department of Design and Construction. Utilities will be provided at no cost to the Asbestos abatement contractor. However, it is the Asbestos abatement contractor's (or the HVAC contractor's) responsibility to furnish and install a suitable distribution system to the Work Area. This system will be provided at no cost to the City.

1.15 FEES

The Asbestos abatement contractor shall be responsible for any and all fees or charges imposed by Local, State or Federal Law, Rule and Regulation applicable to the work specified herein, including fees or charges which may be imposed subsequent to the date of the Bid opening.

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SECTION 23 00 50

DEMOLITION AND REMOVALS FOR HVAC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall comply with the General Requirements of Division 1.

1.2 WORK INCLUDED

- A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the demolition as shown on the drawings and specified herein, including, but not limited to, the following:
1. Removal and capping of existing mechanical and electrical systems as appropriate to condition.
 2. Disposal of material, equipment, and items removed during demolition work.
 3. Protection of persons, trees, property, adjacent structures, utilities and other materials to remain.
 4. Obtain all necessary permits from authorities.

1.3 CONDUCT OF WORK

- A. The existing facility will be in operation during the performance of the Work.
1. When necessary to temporarily disconnect any existing feeder or branch circuit, domestic water, and chilled/hot water and steam service supplying occupied facilities, confer with the City of New York and schedule a mutually agreeable period of interruption.
 2. Where replacement, relocation or modification of existing equipment is indicated, provide and maintain all temporary feeders, connections, and any other materials and appurtenances required to maintain services to occupied areas.
- B. No work shall be left incomplete, nor any hazardous situation created, which will affect the life or safety of the public and/or building occupants. At no time shall the work interfere with or cut off any of the existing services without the City of New York's prior written permission.
- C. The City of New York reserves the right to operate all existing electrical and mechanical equipment not included in this work, and to perform all required servicing and repairs to same, at all times.
- D. It is required that the work indicated and/or specified shall be carried out with a minimum of interference to the established operations of the Building.

1.4 PROJECT SITE CONDITIONS

- A. Site Visit: Examine the site and existing buildings in order to determine the existing conditions, character of equipment and facilities needed for the performance of demolition work.
 - 1. Investigate adjoining construction and underlying conditions including field verification of electrical and mechanical system locations.
 - 2. Investigate the conditions of public thoroughfares and roads as to availability, clearances, load limits, and other restrictions or limitations affecting transportation to and from site.
- B. Building Conditions: Accept the condition of the site and building structures as found. The Commissioner and City of New York assume no responsibility for condition of site nor structures nor the continuation of the condition existing at time of bidding.

1.5 GENERAL

- A. Products and materials furnished for the work of this section shall comply with other Sections of Contract #3.

1.6 PREPARATION

- A. Contract #3 Contractor's Verifications
 - 1. Check existing conditions of Project, including adjacent elements subject to damage or to movement during demolition, cutting, and removal operations.
- B. Utility Disconnections: Disconnect and cap existing utility, electrical, and other service lines.
 - 1. Do not interrupt existing utility service or adjacent occupied or used facilities except when authorized. Provide temporary services during accidental or unavoidable interruptions to existing utilities.
 - 2. Remove, seal, cap, disconnect and make safe utilities serving the structure to be demolished. Remove wires and cap conduits of electrical systems and any steam or water services. Disconnects or capping shall be to the point of service origin or otherwise clear of new work for the Project. Verify terminations prior to start of demolition work.

1.7 DEMOLITION

- A. Codes: All demolition work shall be completed in compliance with all governing codes, standards and regulations. The use of explosives in demolition operations is prohibited.
- B. Dust, Dirt and Noise Control:
 - 1. Use water sprinkling, temporary enclosures, and other suitable methods as necessary to limit the amount of dust and dirt rising and scattering in the air to the lowest level of air pollution and to prevent dust from being a nuisance to the public or causing damage.

2. Maintain noise abatement program to keep noise level at lowest possible level. Work shall be carried out during daylight hours on weekdays only in accordance with regulations.

1.8 CUTTING

- A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surface to receive installation of work by others and patching of finish surfaces.

1.9 REMOVAL, CLEAN-UP AND DISPOSAL

- A. General: Remove from the site all debris, rubbish and other materials resulting from demolition operations as work progresses. Storage or sale of demolished materials will not be permitted on the Project site.
- B. Removal:
 1. Transport all materials removed from demolished building structure and dispose of all from the Project site. Do not accumulate debris on site during progress of work.
 2. Remove debris and litter of man-made materials, equipment or machinery which is not otherwise scheduled to be salvaged for City of New York.
- C. Disposal and Transport:
 1. Disposal shall be at legal off-site disposal areas.
 2. Transport materials over legal haul routes and obtain necessary permits for transporting and disposal as required by local regulations.

1.10 EXISTING MECHANICAL WORK AND REMOVALS

- A. Remove, reroute or relocate any piping, ductwork, controls and other mechanical items which are rendered inactive in the course of, or interfere with, the alterations. Remove all newly and previously exposed and or inactive piping, ductwork, etc. which interfere with the alterations.
- B. It is the intention of these specifications to provide for the continuance of all mechanical services presently installed in areas not being altered under this scope of work. Provide all interconnecting piping, ducts, controls and equipment necessary to maintain services to these areas.
- C. Compare the plans with the existing conditions to determine the amount of work affected. Remove all unused mechanical equipment, piping, ductwork, controls and the like not required by the alterations.
- D. All equipment, piping, and materials required to be removed and not reinstalled under this Contract #3, unless otherwise indicated, shall become the property of the Contract #3 Contractor and shall be removed from the site and properly disposed of.

- E. Where piping and branch lines are indicated to be removed, they shall be completely removed back to their source. Accessible piping shall be removed completely; piping embedded in concrete or masonry shall be cut off flush and the surface patched with concrete smooth and level.
- F. Where ductwork and branch lines are indicated to be removed, they shall be completely removed back to their source. Exposed or accessible ductwork shall be removed completely; ductwork passing through concrete or masonry shall be removed in its entirety and the surface patched with concrete smooth and level.
- G. No removed existing piping or materials shall be reused.

1.11 EXISTING PLUMBING WORK AND REMOVALS

- A. Remove, abandon, reroute or relocate any piping and other plumbing items which are rendered inactive in the course of, or interfere with, the alterations. Remove all newly and previously exposed piping and plumbing equipment which interfere with the alterations.
- B. It is the intention of these specifications to provide for the continuance of all plumbing services presently installed in areas not being altered under this scope of work. Provide all interconnecting piping and devices necessary to maintain services to these areas.
- C. Compare the plans with the existing conditions to determine the amount of work affected. Remove all unused plumbing equipment, fixtures, piping and the like not required by the alterations.
- D. All equipment, fixtures, piping, and materials required to be removed and not reinstalled under this Contract #3, unless otherwise indicated, shall become the property of the Contract #3 Contractor and shall be removed from the site and properly disposed of.
- E. All connections to piping to be removed shall be properly plugged or capped.
- F. Where piping and branch lines are indicated to be removed, they shall be completely removed back to their source. Accessible piping shall be removed completely; piping embedded in concrete or masonry shall be cut off flush and the surface patched with concrete smooth and level.
- G. No dead ends shall be left on any piping upon completion of work.
- H. All lengths of piping no longer required due to system modification shall be removed completely. No piping shall be abandoned in place, unless embedded in concrete or otherwise specifically noted.
- I. All systems shall be left in perfect working order upon completion of all new work.
- J. No removed existing piping or materials shall be reused.

1.12 EXISTING FIRE PROTECTION WORK AND REMOVALS

- A. Remove, reroute or relocate any existing piping, valves, and other items which are rendered inactive in the course of, or interfere with, the alterations.
- B. Compare the plans with the existing conditions to determine the amount of work affected. Remove all unused mechanical equipment, piping, ductwork, controls and the like not required by the alterations.

- C. All equipment, piping, and materials required to be removed and not reinstalled under this Contract #3, unless otherwise indicated, shall become the property of the Contract #3 Contractor and shall be removed from the site and properly disposed of.
- D. Where piping and branch lines are indicated to be removed, they shall be completely removed back to their source. Accessible piping shall be removed completely; piping embedded in concrete or masonry shall be cut off flush and the surface patched with concrete smooth and level.
- E. No removed existing piping or materials shall be reused.

1.13 HAZARDOUS MATERIAL REMEDIATION

- A. Refer to description of work under separate cover and Sections 024119 and 028013.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 23 05 13

MOTORS AND STARTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 230000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #3 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 230000, General Provisions, and with the provisions of all applicable codes and laws.
- B. The installation and equipment is to conform to applicable building code articles and applicable reference standards cited therein.

1.3 SUBMITTALS

- A. Procedure
- B. Prepare and make the submissions listed below and in Section 230000 in accordance with the procedure specified in Section 230000.
- C. Shop Drawings
 - 1. Submit motors with individual items of driven equipment.
 - 2. Starters - Technical specs and application data.
 - 3. Schedule of starters including starter model, equipment served, starter enclosure, and accessories.
 - 4. Submit starter and drive unit wiring diagrams with the automatic control shop drawing submission required under Section 230000.
 - 5. Variable speed drive units - Technical specs and application data.

1.4 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 230000

1.5 GENERAL REQUIREMENTS

- A. Provide all necessary contacts, relays and switches for motor operation in accordance with the control system sequences and safety device operation.
- B. All motors, starters, push buttons, signal devices and motor controller equipment shall be NEMA standard and UL listed.
- C. All motors shall be covered by the warranty provided by the original equipment manufacturer which shall extend the full extent of the project warrantee. No motor shall be installed which has been manufactured more than two years prior to delivery.

- D. Each unit shall be fully warranted by the manufacturer for a period of 36 months from date of shipment, including the cost of all parts, labor, and travel expenses.

PART 2 - PRODUCTS

2.1 MOTORS

- A. All motors shall be general purpose squirrel-cage induction type, NEMA Design B, Class B insulation, continuous duty, 40 °C ambient, single or multiple speed as scheduled.
- B. All three phase motors shall be NEMA Premium Efficiency design. Motor efficiency shall be indicated on the motor nameplate by the manufacturer per IEEE Standard 112 Method B in accordance with following tables:

Open Drip Proof (ODP)

Horsepower	1200 RPM	1800 RPM	3600 RPM
1	82.5%	85.5%	77.0%
1.5	86.5%	86.5%	84.0%
2	87.5%	86.5%	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%
30	93.6%	94.1%	91.7%

Totally Enclosed Fan-Cooled (TEFC)

Horsepower	1200 RPM	1800 RPM	3600 RPM
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%	85.5%
5	89.5%	89.5%	86.5%
7.5	91.0%	91.7%	98.5%
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%
30	93.0%	93.6%	91.7%

- C. Unless otherwise indicated, motors 1/2 horsepower and larger shall be three-phase; motors less than 1/2 horsepower shall be single phase. Motor voltage shall be as indicated; verify with Contract #4 Contractor.
- D. All motors shall have a 1.15 minimum service factor.
- E. Two speed motors shall be two winding type, RPM as noted on plans.
- F. Single speed motors shall operate at 1750 RPM unless otherwise indicated.
- G. Motors controlled by Variable Frequency Drive (VFD) units shall be rated for inverter duty (NEMA MG1, Part 31).

- H. All motors shall have a terminal box, appropriate mounting base, and a ground post for connection of a ground conductor.
- I. Motor enclosures shall be open drip-proof unless otherwise indicated or required.
- J. Motor manufacturers:
 - 1. General Electric Co.
 - 2. Baldor
 - 3. Westinghouse
 - 4. Marathon

2.2 MANUAL STARTERS

- A. Provide manual starters for single-phase motors that are not interlocked with other equipment.
- B. Starter shall include quick make-quick break toggle mechanism in a suitable enclosure. The overload relay shall be field adjustable to +/-10% of nominal rating.
- C.

<u>Manufacturer</u>	<u>Series</u>
Cutler Hammer	9101
General Electric	CR101
Siemens	SMF
Square D	Class 2510 Type F
Westinghouse	MS

2.3 MAGNETIC STARTERS

- A. Provide electrically-held magnetic starter for three-phase motors 1/2 horsepower and larger. Magnetic starters shall be combination type, with adjustable motor circuit protector, across-the-line contactor, and thermal overload relay in a common enclosure.
- B. The motor circuit protector shall trip instantaneously when the motor current level is in excess of the trip setting. Trip settings of all poles shall be adjusted simultaneously by a single trip point adjustment.
- C. The starter shall be suitable for connection to a power system having available fault current of 100,000RMS symmetrical amperes.
- D. Furnish contactors with one N.O. auxiliary interlock contact for the holding circuit, and a minimum of two additional auxiliary contacts. Coordinate auxiliary contacts with Section 230923.
- E.

<u>Manufacturer</u>	<u>Series</u>
General Electric	CR387
Square D	Class 8539
Westinghouse	Class A206

2.4 REDUCED VOLTAGE STARTER

- A. Provide autotransformer type starters of the closed transition type, in an enclosure, with integral motor circuit protector, for all starters of NEMA Size 4 and larger (i.e. > 25 hp at 208 volts or > 50 hp at 480 volts).
- B. Transformers shall have three starting taps, 50%, 65% and 80%. Unit shall be set at 65% at factory.

- C. Furnish contactors with one N.O. auxiliary interlock contact for the holding circuit, and a minimum of two additional auxiliary contacts. Coordinate auxiliary contacts with Section 230923.

<u>Manufacturer</u>	<u>Series</u>
General Electric	CR331
Square D	Class 8606
Westinghouse	A606

2.5 STARTER ACCESSORIES

- A. Enclosure shall be NEMA 1 for dry location, NEMA 4 for wet or outdoor locations.
- B. The disconnect handle shall be capable of being padlocked in the open position.
- C. Provide all starters unless otherwise specified with manual reset thermal type overload relays having inverse time delay characteristics and interchangeable heater elements.
- D. Provide each starter with a red running light, neon type, mounted through cover.
- E. Provide each starter with a three position, maintained contact, H-O-A selector switch, mounted through the cover.
- F. Provide two speed starters for all motors listed with multiple speeds in the equipment schedules. Multiple speed starters shall be provided with a time delay relay when switching to a lower speed.
- G. Furnish contactors with one N.O. auxiliary interlock contact for the holding circuit, and a minimum of two additional auxiliary contacts for each motor speed. Coordinate auxiliary contacts with Section 230923.
- H. Current-Sensing, Phase-Failure Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection; arranged to operate on phase failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage. Provide adjustable response delay.

2.6 VARIABLE FREQUENCY DRIVES

- A. General
- Where variable speed control is indicated in drawings, schedules, or specifications, provide complete factory-assembled and -tested adjustable frequency AC drives as herein specified.
 - Variable frequency drives (VFD's) shall provide stepless speed control of standard NEMA Design B squirrel cage induction motors, without motor derating.
 - VFD's shall be variable torque design, suitable for HVAC pump, fan, and blower applications.
 - VFD's shall be tested and listed to the following standards:
 - UL Standard 508C
 - IEEE Standard 519-1992
 - NEMA - ICS 7.0, AC Adjustable Speed Drives
 - IEC 281000 Parts 1 and 2.

5. Each VFD shall be appropriately sized and rated to suit the driven load and input power characteristics.
6. VFD logic and control circuitry shall be microprocessor-based.

B. Design and Construction Features

1. Where located indoors in non-damp and non-wet environment, VFD enclosures shall be steel, ventilated NEMA 1, with hinged lockable door, suitable for wall mounting in sizes through 75 HP (at 460 VAC). Larger units shall have floor mounted, freestanding enclosures. Where located outdoors, or where VFD is mounted in damp or wet environment, provide NEMA 3R enclosures with strip heater.
2. The input section shall include a full-wave diode bridge rectifier, padlockable door-interlocked disconnect switch, input power fuses, input line reactor, and output reactor / filter for circuits longer than 75 feet.
3. The inverter section shall be sine-coded pulse-width-modulated (PWM), utilizing Insulated Gate Bipolar Transistors (IGBT's).

C. Performance Features

1. Produce rated output under the following service conditions:
 - a. Rated input voltage +/- 10%.
 - b. Ambient temperature 0°C. to 40°C.
 - c. Relative humidity 0-95% non-condensing.
 - d. Elevation up to 3300 feet above sea level.
 - e. Input frequency 60 hertz, +/- 2 hertz.
2. Input displacement power factor - minimum 0.95 at any speed.
3. Output - 6 to 60 hertz, 0 to input volts, with adjustable volts/hertz.
4. Adjustable output current limit - to 115%.
5. Adjustable acceleration and deceleration rates.
6. Adjustable minimum and maximum speed limits.
7. Automatic restart after an input power loss, with adjustable time delay, if RUN command is still activated.
8. Input current THD - 5% maximum.
9. Efficiency - minimum 96% at full load, full speed.
10. Capable of a smooth start into a rotating motor (either direction).
11. Minimum 2 second power loss ride-through for logic and control power.
12. Motor noise attributable to the VFD shall be less than 3 dB above that with across-the-line operation, measured at 3 feet from the motor centerline.

13. 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).
14. 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.
15. 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 NEC Table 430.250 for 3-phase alternating-current motors.
16. 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.
17. The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices and source transformers to be oversized per NEC 430.
18. 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.
19. 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 under-load condition.
20. 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.
21. 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.

D. Protective Features

1. Integral I^2t electronic motor overload protection, adjustable.
2. Integral trip circuits for input power undervoltage, overvoltage, phase loss, and overcurrent.
3. Integral trip circuits for internal overtemperature, DC bus overvoltage, and internal or output circuit ground fault.
4. The VFD's shall be suitable for connection to a power system having available fault current of 100,000RMS symmetrical amperes.
5. The VFD's shall be self-protecting against an open output circuit.

6. Provide input power line surge protection.
7. Provide user-selectable manual or automatic restart after a fault.

E. Controls and Indications

1. LED or LCD digital information display, including:
 - a. Output frequency, voltage, and current.
 - b. Input voltage, current, and KW.
 - c. % speed.
 - d. % load.
2. LED lamp or alphanumeric display indication of individual fault conditions.
3. Status indicators for POWER ON, READY, and RUN.
4. 3-position, maintained contact, Hand-Off-Auto selector switch.
5. Remote-Local speed reference selector.
6. Integral keypad for manual (local) speed control, adjustment, and programming functions.
7. Interfaces for remote safety contacts, start-stop contacts, and speed control (4-20 mA, 0-5 VDC, or 0-10 VDC, user selectable).
8. Form C (SPDT) dry contacts, wired to terminal blocks, for remote indication of RUN or FAULT.
9. Minimum of 3 programmable resonant frequency lockout bands.

F. 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 or approved equal. 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. All protocols shall be "certified" by the governing authority. Use of non-certified protocols is not allowed.
2. The BACnet connection shall be an RS485, MSTP interface operating at 9.6, 19.2, 38.4, or 76.8 Kbps. The connection shall be tested by the BACnet Testing Labs (BTL) and be BTL Listed. The BACnet interface shall conform to the BACnet standard device type of an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:
 - a. Data Sharing – Read Property – B.
 - b. Data Sharing – Write Property – B.
 - c. Device Management – Dynamic Device Binding (Who-Is; I-AM).
 - d. Device Management – Dynamic Object Binding (Who-Has; I-Have).
 - e. Device Management – Communication Control – B.

If additional hardware is required to obtain the BACnet interface, the VFD manufacturer shall supply one BACnet gateway per drive. Multiple VFDs sharing one gateway shall not be acceptable.

3. 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.
4. 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.
5. The VFD shall include an independent PID loop for customer use. The independent PID loop may be used for cooling tower bypass valve control, chilled water valve 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.

G. EMI / RFI Filtering

1. 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.

H. Special Features

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. Door interlocked, pad-lockable, circuit breaker that will disconnect all input power from the drive and all internally mounted options.
3. Fused VFD only disconnect (service switch). Fast acting fuses exclusive to the VFD – fast acting fuses allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection, maintaining bypass capability. Bypass designs, which have no such fuses, or that incorporate fuses common to both the VFD and the bypass will not be accepted.
4. The drive / bypass shall provide single-phase motor protection in both the VFD and bypass modes.

5. The following operators shall be provided:
 - a. Bypass Hand-Off-Auto
 - b. Drive mode selector
 - c. Bypass mode selector
 - d. Bypass fault reset

6. 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

7. The following relay (form C) outputs from the bypass shall be provided:
 - a. System started
 - b. System running
 - c. Bypass override enabled
 - d. Drive fault
 - e. Bypass fault (motor overload or underload (broken belt))
 - f. Bypass H-O-A position

8. 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.

9. 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.

10. 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).

11. 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.
 12. Class 20 or 30 (selectable) electronic motor overload protection shall be included.
 13. There shall be an internal switch to select manual or automatic bypass.
 14. There shall be an adjustable current sensing circuit for the bypass to provide loss of load indication (broken belt) when in the bypass mode.
 15. Output Reactor - A reactor (dv/dt filter) is to be installed between the drive and the motor if the total electric feeder distance between the two exceeds 75 feet.
- I. Factory Testing
1. Each unit shall be fully tested prior to shipment, including operation at full load for 8 hours in a 40°C ambient.
- J. Acceptable Manufacturers
1. Subject to compliance with requirements, provide variable frequency drives manufactured by one of the following:
 - a. Allen-Bradley
 - b. Yaskawa E7 Series
 - c. Asea Brown Boveri (ABB)
 - d. Graham / Danfoss
 - e. Square D

PART 3 - EXECUTION

3.1 GENERAL

- A. Motors shall be supplied as part of factory assembled equipment specified in other sections.
- B. All starters and variable speed drives shall be turned over to the Contract #4 Contractor for mounting, installation, and wiring in conformance with all applicable codes and ordinances. Starters and drives shall be located within line-of-site of the associated equipment being controlled.
- C. Install overload heaters, adjust overload relays, and set motor circuit protectors in accordance with motor nameplate ratings and NEC Article 430.
- D. Unless noted otherwise, starters for outdoor equipment shall be mounted attached to or adjacent to the equipment served and shall be provided with NEMA 3R enclosures with strip heaters.

3.2 MOTOR NOISE LEVEL

- A. Motor drives for pumps and refrigeration machines, or other mechanical equipment

having a motor installed within a mechanical room, shall operate with noise levels not exceeding 85 dBA.

- B. Noise levels shall be determined in accordance with IEEE Standard #85 "Test Procedure for Air-Borne Noise Measurements on Rotating Electric Equipment".
- C. Motor drives for fans, regardless of where located, or other mechanical equipment located outside mechanical equipment spaces, shall not contribute to increase the manufacturer's sound power ratings by 2 dB in any octave band.

3.3 VARIABLE FREQUENCY DRIVE START-UP

- A. A factory authorized field service technician shall perform inspection of the drive installation and wiring, initial energizing and start-up, and the adjustments and programming necessary to achieve specified operation and performance.
- B. The factory-authorized field service technician shall program the 3 available resonant frequency lockout bands during motor/drive start-up based on actual motor/equipment performance for each drive. Provide the necessary frequency and vibration testing instruments.
- C. After successful start-up, a factory authorized representative shall provide a minimum of four (4) hours training and demonstration to City of New York's personnel.

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SECTION 23 05 23

PIPING, VALVES AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 230000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #3 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of section 230000, General Provisions, and with the provisions of all applicable codes and laws.

1.3 SUBMITTALS

- A. Procedure
 - 1. Prepare and make the submissions listed below and in Section 230000 in accordance with the procedure specified in Section 230000.
- B. Shop drawings
 - 1. Piping Materials, Joints and Fittings.
 - 2. Piping Specialties.
 - 3. Valve Tags and Name Plates with Schedule and Location.
 - 4. Valves.
 - 5. Strainers.
 - 6. Hot water accessories
 - 7. Anchors and guides
 - 8. Thermometers, gauges, complete listing with scale range and normal operating point.
 - 9. Water balance, contractors qualification, procedures, and report format
 - 10. Water Balance Report.

1.4 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 230000. Produce and maintain required effect under operating criteria determined in advance by agreement with the Commissioner.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. All pipe shall be new, free from scale or rust, and of the material and weight specified under the various services. Each length of pipe shall be properly marked at the mill for proper identification with name of symbol or manufacturer.

- B. All steel piping shall be standard or extra strong weight, in conformance with the ASTM designation A-53 as manufactured by National Tube Division, Republic Steel Corp., or approved equal. Piping shall be seamless except as specified herein.
- C. All brass piping shall be standard or extra heavy weight 85% red brass semi-annealed seamless-drawn, in conformance with the ASTM designation B-43, as manufactured by Anaconda, American Brass Co., Chase Brass and Copper Co., or Revere Copper and Brass, Inc.
- D. All copper tubing shall be of weight as required for service specified in conformance with ASTM designation B-88-47 for types "L" and "K" tubing, as manufactured by Chase, Anaconda, Revere, or approved equal. Copper tubing shall be used as specified in the schedule. Tubing and fittings shall be thoroughly cleaned with sand cloth and treated with an approved flux before solder is applied.
- E. All galvanized steel piping shall be standard or extra strong weight, as specified, in conformance with the ASTM designation A-53. Pipe shall be hot-dipped zinc-coated with prime western spelter and not wipes.
- F. Generally, unless otherwise specified, joints in steel and wrought-iron piping of sizes 2 inches and under shall be screwed, and all sizes 2-1/2" inches and over shall be welded or flanged. All drain piping shall be screwed. Brass pipe shall be screwed 2 inches and smaller and flanged 2-1/2 inches and over. Copper tubing shall be silver-soldered or 95-5 solder as herein specified.

2.2 FITTINGS

- A. Fittings shall be as specified under "Fittings" for each pipe service listed in the "Pipe Schedule".
- B. 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 clearances necessitate the use of standard radius pattern. Welding fittings shall be Tubeturn or Ladish.

Steel Welding Fittings	ASTM A-106
Wrought Iron Welding Fittings	ASTM A- 72
Malleable Iron Fittings	ASTM A-197
Cast-Iron Fittings	ASTM A-126
Brass Fittings	ASTM B- 62
Solder Fittings	ASTM B- 88
- C. All fittings used at expansion loops or bends shall be extra heavy.
- D. Cast-iron, malleable-iron and bronze fittings shall be of Crane Manufacture or approved equal.
- E. Flanges shall be of the same weight as the fittings in each service category. All flanges shall be drilled and spot faced in conformance with fittings. Screwed and loose flanges shall be of cast iron. Welding flanges shall be of steel welding neck type, flanges on brass to be Crane No. 2104 or approved equal.
- F. Flanges shall be faced and true and made up perfectly square and tight with gaskets. Bolts, nuts and gaskets shall be dipped in a mixture of graphite and oil just before installation.
- G. Unions - Unions 2 inches and smaller shall be screwed. Unions 2-1/2" and larger shall be flanged. Screwed unions on steel pipe, unless otherwise specified, shall be of malleable

iron with bronze ground seats suitable for 300 pounds, W.S.P. Screwed unions on brass pipe shall be brass, ground joint suitable for 300 pounds W.SP. Flanged unions shall be malleable iron, gasket type suitable for 150 pounds W.S.P. Unions shall be as manufactured by Crane, Dart or approved equal.

- H. Brass pipe threads shall be cut with special brass threading dies, and the joints shall be made with lubricant. Strap wrenches, or equivalent, shall be used in making up brass pipe. Wrenches that gouge or scar the pipe will not be used.
- I. Solder for each solder-type fitting shall be of 95% tin and 5% antimony or silver solder, as specified herein.
- J. Fittings shall be of the eccentric reducing type unless otherwise noted, where changes of size occur in horizontal piping to provide for proper drainage or venting. Steel pipe bends shall be made of the very best grade open hearth, low carbon steel, leaving a smooth uniform exterior and interior finish. Pipe bends shall be made with seamless steel pipe, leaving a minimum radius of not less than five (5) pipe diameters.

2.3 PIPE SCHEDULE

- A. All piping materials installed under this Section shall be new and shall consist of the following materials and construction:

Service	2" and Smaller	2-1/2" and Larger
Chilled Water		
Hot Water		
Vents and Drains		
Construction:	Solder joint construction with threaded adapters as required. 95-5 Tin/Antimony solder.	Welded construction with flanged connections to valves and equipment
Piping:	Copper, Type L, hard drawn, ANSI H23.1, ASTM B88.	Black steel, schedule 40, seamless, ASTM A53, Grade A or B.
Unions:	Bronze solder ends, ground joints, ANSI B16.19 or ANSI B16.22.	Steel, Class 150, weld type, ANSI B16.5, ASTM A181, Grade 1.
Flanges:	Cast bronze, Class 150, solder type, ANSI B16.24	Steel, Class 150, weld type, ANSI B16.5, ASTM A234, Grade WPA

Service	2" and Smaller	2-1/2" and Larger
Cooling Coil Drains		
Cold Water Make-Up		
Construction:	Solder joint construction with threaded adapters as required. 95-5 Tin/Antimony solder.	Solder joint construction with threaded adapters as required. 95-5 Tin/Antimony solder.
Piping:	Copper, Type L, hard drawn, ANSI H23.1, ASTM B88.	Copper, Type L, hard drawn, ANSI H23.1, ASTM B88.
Fittings:	Cast bronze or wrought copper, solder ends, ANSI B16.189 or ANSI B16.22	Cast bronze or wrought copper with solder ends, ANSI B16.19 or ANSI B16.22.

	Construction:	Threaded construction with threaded or flanged connections to equipment as required.	Welded construction with flanged connections to valves and equipment as required.
Emergency Generator Exhaust			
	Construction:	Threaded construction with threaded or flanged connections to equipment as required.	Welded construction with flanged connections to valves and equipment
	Piping:	Black steel, schedule 40, seamless, ASTM A106, Grade A.	Black steel, schedule 40, seamless, ASTM A53, Grade A or B.
	Fittings:	Cast iron ASTM A126B, Class 125, threaded ends.	Steel, Class 150, weld type, ANSI B16.5, ASTM A234, Grade WPA.
	Flanges:	Steel, Class 150, threaded type, ANSI B16.5, ASTM A181, Grade 1.	Steel, Class 150, threaded type, ANSI B16.5, ASTM A234, Grade WPA.
Fuel Oil Supply and Return		2" and Smaller	2-1/2" and Larger
	Construction:	Threaded construction with threaded or flanged connections to equipment as required.	Welded construction with flanged connections to valves and equipment as required.
	Piping:	Black steel, Schedule 40, seamless, ASTM 106, Grade A or B., inside same secondary containment pipe.	Black steel, Schedule 40, seamless, ASTM A106, Grade A or B., inside same secondary containment pipe.
	Fittings:	Cast iron ASTM A126B, Class 125, threaded ends.	Steel, Class 150, butt weld ends, ANSI B16.9, ASTM A234
	Unions:	Malleable iron, Class 150, threaded ends, ground joints, ANSI B16.49, ASTM A181, Grade 1.	Use flanges.
	Flanges:	Steel, Class 150, threaded type, ANSI B16.5, ASTM A181, Grade 1.	Steel, Class 150, weld type, ANSI B16.5, ASTM A234, Grade WPA.
Fuel Oil Vents and Steam Vents			
	Construction:	Threaded construction with threaded or flanged connections to equipment as required.	Welded construction with flanged connections to valves and equipment as required.
	Service	2" and Smaller	2-1/2" and Larger

Piping:	Galvanized steel, Schedule 40, seamless, ASTM A106, Grade A or B., inside same secondary containment pipe.	Galvanized steel, Schedule 40, seamless, ASTM A106, Grade A or B., inside same secondary containment pipe.
Fittings:	Cast iron ASTM A126B, Class 125, threaded ends.	Cast iron ASTM A126B, Class 125, threaded ends.
Unions:	Malleable iron, Class 150, threaded ends, ground joints, ANSI B16.49, ASTM A181, Grade 1.	Use flanges.
Flanges:	Galvanized Steel, Class 150, threaded type, ANSI B16.5, ASTM A181, Grade 1.	Galvanized Steel, Class 150, threaded type, ANSI B16.5, ASTM A181, Grade 1.

B. Flange Bolts and Nuts:

Bolts: ANSI B181, ASTM A307, Grade B, square head, course-thread series, Class 2B fit.

Nuts: ANSI B18.2.2, ASTM A307, Grade B, hexagonal, heavy series, semi-finished, course-thread series, Class 2B fit.

C. Gaskets: Flat ring 1/16-inch thick, compressed synthetic fiber with SBR binder. Garlock Style 3200, or an approved equal.

D. Welded Joints: Branch lines and changes in direction shall be made with factory weld fittings such as tees, 90 ells, 45 ells, weld-o-lets, thread-o-lets, and welding saddles. Job fabrication of fittings and stab-ins is not permitted.

2.4 JOINTS

A. Brass pipe threads shall be cut with special brass threading dies, and the joints shall be made up with lubricant. Strap wrenches or equivalent, shall be used in making up brass pipe. Wrenches which gouge or scar the pipe shall not be used.

B. Flange joints shall be faced true, packed and made up perfectly square and tight. Each flange joint shall be provided with best grades steel bolts and with hexagon nuts. Flanges shall be raised face, suitable for pressure of system in which they are installed.

2.5 PIPE HANGERS AND SUPPORTS

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, do not 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 that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted both in the vertical and horizontal direction, as required. Hangers in contact with copper or brass pipe shall be copper plated steel or provided with felt sleeve.

- B. Pipe hangers shall be of the band type for piping 2" and smaller, clevis for pipe 2 1/2" and larger except where otherwise noted. Hangers for generator exhaust and steam pipe 2" and smaller shall be of the clevis roller type and two rod roller type for pipe 2 1/2" and larger except where otherwise noted.
- C. All vertical piping shall be supported by means of heavy wrought iron or steel clamps securely bolted or welded to the piping, and with end extension bearing on the building. Riser clamps shall be constructed of two flat wrought steel bar yokes formed to fit the pipe and bolted together.
- D. Beam clamps - hangers supported from steel shall be center loading beam clamps for hangers supporting piping 2 inches. For piping 2-1/2 inches and larger, I beam clamps shall be forged steel. "C" clamps are not to be used.
- E. Where piping is run near the floor and not hung from the ceiling construction, but is supported from the floor or in a trench, such supports shall be of pipe stanchion with base flange and adjustable top yoke with u-bolt retainer.
- F. Where piping is run above the floor, and is not hung from the ceiling construction or not supported from the floor, such piping shall be supported from the wall with bracket hangers, expansion bolted or fish plated to the wall. Provide details for review by Commissioner.
- G. For water piping (fluid less than 100F), provide insulated saddle with vapor barrier or pipe insulation plus protection shield with vapor barrier jacket. For steam, condensate, and hot-water heating piping 2 inches and smaller same as above. For hot-water heating piping 2-1/2 inches and larger, provide steel pipe covering protection saddles spot welded to pipe with insulation insert.
- H. Piping in trenches shall rest or hang from angle iron cross supports provided by Contract #3 Contractor.
- I. Hanger rods shall be of galvanized steel not exceeding six (6) feet in length of the following diameters. Trim excess rod to within 1" of the support. Supplementary steel shall be provided as necessary

PIPE SIZE	ROD DIAMETER
2 inches and below	3/8 in.
2-1/2 & 3 in.	1/2 in.
4 & 5 in.	5/8 in.
6 in.	3/4 in.
8 in. and above	7/8 in.

J. Support Schedule

All hanger components of hanger assembly shall be hot dip galvanized or cadmium plated.

TYPE	GRINNELL	NATIONAL	SUPER TOLCO	CARPENTER & PATTERSON	M-CO
Band	70	110/115	2	1A	105
Clevis	260	215	1	100	401
Clevis roller	181	250	324	140	610
Two rod roller hanger	171/177	255/260	322	109	605
Riser Clamp	261	420	6	126	510
Stanchion w/U- bolt	259	X	102	125	721
Wall Bracket	199	710	30H	139	353
Insulation Shield	167	307	220	265	125
Insulation Saddle	160-165	310-340	260-265	351-357	X
Beam Clamp	133/228	680/695	62	82/287	360/361
Insert	281/282	600	309/310	108/650	355
Insert	X	555/560 561	107F/109F 109	104M/104F 143	320
Guide	255/256	120	420/421	S794	650 651
Insulated Shield	X	Pro-Shield	X	265CVB 465CVB	123 124

2.6 VALVES - GENERAL

- A. All valves shall be of a design which the manufacturer lists for the service and shall be of materials allowed by the latest edition of the ASME Code for Pressure Piping for the pressure and temperature contemplated, unless a higher grade or quality is herein specified. All valves shall be of the same manufacturer, except for special applications.
- B. The system shall be supplied with gate or butterfly type isolation valves as specified herein, at all branches mains and risers.
- C. All valves shall be installed with the best workmanship and are to have neat appearance and be arranged so that they are easily accessible.
- D. Each valve shall have the maker's name or brand, the figure or list number and the guaranteed working pressure cast on the body and cast or stamped on the bonnet, or shall be provided with other means of easy identification.
- E. Check valves installed in the horizontal position shall be swing checks; valves installed in the vertical position shall be silent checks, except that all check valves in pump discharges shall be silent checks.

- F. Provide blow-off valves at all strainers, and where shown on the drawings.
- G. Provide valve operating chain on all gate and globe valves in Mechanical Equipment Rooms - 3" and larger, which are more than 6'-6" above the operating floor. Unit shall be complete with adjustable sprocket, chain and guide (Crane "Babbit" type or approved equal). Provide hook to keep chain out of the way.
- H. Generally, all valves are to be of the gate type, except that globe valves shall be used for throttling services and on traps, and pressure reducing and control valve by-passes. Globe valves used on by-passes shall have monel metal mountings.
- I. All valves 2 inches in diameter and smaller shall be all bronze with bronze bodies. Valves 2-1/2 inches in diameter and larger shall have iron bodies with bronze mountings unless otherwise specified.
- J. All flanged-end valves shall have renewable metal seat rings and discs. On gate valves these parts shall be of bronze, on all globe valves they shall be of bronze and suitable for throttling service.
- K. All screwed-end globe valves shall be of the union bonnet type, non-rising stem with renewable metal seats and discs.
- L. All valves shall have their bonnets back-seated to provide for packing under pressure.
- M. All gate valves shall be of the solid tapered wedge type, union bonnet, rising stem.
- N. All valves 5 inches in diameter and larger shall be furnished with an integral by-pass and a by-pass suitable for the operating pressure.
- O. Drain valves shall be provided on tanks, receivers, risers and where they may be required or necessary, or directed for draining the lines and equipment. Drain valves or plug cocks shall be provided at the low points for proper drainage, and where required or directed cocks and valves shall be provided with threaded ends for hose connections.
- P. All valves up to 2 inches in diameter shall have screw ends, 2-1/2" in diameter and over shall have flanged ends.
- Q. Isolation valves shall be provided at all pumps, tanks, reducing and automatic or mechanical flow control devices, radiation, coils and heat exchangers, and at all other apparatus requiring partial drainage of the system for periodic maintenance or inspection. The isolation valves shall be so located as to permit removal and/or service of the isolated equipment without draining complete or substantial portions of the system.
 - 1. Provide flanges or union(s) to permit removal of all equipment isolated as indicated above.
 - 2. The flow and control diagrams do not indicate the complete requirement for isolation valves in the system. Manual valves are depicted in flow diagrams to show relative positions of division 230923 control devices.

2.7 VALVE SCHEDULE

- A. All valves shall conform to the requirements of this Section for the services indicated and shall be provided as indicated on the Drawings.
- B. Valves for hot water, chilled water, condenser water, cold water (make-up), and pumped condensate piping systems shall comply with the following:

<u>Valve Type</u>	<u>Manufacturer</u>	<u>Construction</u>
Gate Valves 2" & smaller Class 150	Stockham B-124 Milwaukee 1169 NIBCO S-134	Bronze body, solid wedge disc, rising stem, union bonnet, threaded ends, 150 psi SWP, 300 psi WOG.
Gate Valves 2-1/2" & larger Class 125	Crane 465-1/2 Stockham G-623 Milwaukee F-2885 NIBCO F-617-0	Iron body, solid wedge disc, OS&Y, bolted bonnet, flanged ends, 125 psi SWP, 200 psi WOG.
Globe Valves 2" & smaller Class 150	Crane 7TF Stockham B-22T Milwaukee 590T NIBCO T-235-Y	Bronze body, composition steam disc, union bonnet, threaded ends, 150 psi SWP, 300 psi WOG.
Plug Valves 2-1/2" & larger Class 125	DeZurik 118F	Cast iron body, eccentric acting, resilient plug facing, stainless steel bearings, nickel seat flanged ends, ANSI 125, 150 psi CWP
Swing Check Valves 2" & smaller Class 150	Crane T/S-433 Stockham B-309/319 Milwaukee 07 NIBCO 563Y	Bronze body, horizontal swing, bronze re-grinding disc, Y-pattern, threaded ends, 150 psi SWP, 300 psi WOG.
Swing Check Valves 2-1/2" & larger Class 125	Crane 373 Stockham F-931 Milwaukee F-2974 NIBCO F-918	Iron body, horizontal swing, bolted cap, flanged ends, 125 psi SWP, 200 psi WOG.
Spring Check Valves 2" & smaller Class 150	Mueller 109M-BP	Bronze body, globe type, stainless steel spring, bronze seat and disc, flanged ends.
Spring Check Valves 2-1/2" & larger Class 125	Mueller 105M-AP	Iron body, globe type, stainless steel spring, bronze seat and disc, flanged ends.
Ball Valves 2" & smaller Class 150	Watts B-6001 Apollo 70-200 Crane 9322 Stockham S-216 BRRS Milwaukee ML-123E NIBCO LD2000	Bronze body, two-piece, full port, reinforced Teflon seats, lever operated. 150 psi SWP 600 psi WOG. Stem extensions with sleeves shall be provided to suit insulation thickness, so handle is located clear of insulation.
Butterfly Valves 2-1/2" & larger Class 125	Crane 44-FXZ Stockham LD-712 Milwaukee ML-123E NIBCO LD2000	Ductile iron body, lug type, stainless steel stem aluminum-bronze disc, bronze or Nylatron GS bushings, EPDM liner, with lever lock handle for 6 inches and smaller and weatherproof gear operators for 8 inches and larger, and memory stop on return piping valves.
Triple Duty Valves Class 125	Bell & Gossett 3DS Mueller 721	Combination balancing, shut off and check valve. Cast iron body, bronze seat and disc, rising stem, 175 psi WOG, ANSI Class 125

C. Combination Balancing/Flow Measuring Valve

1. Valves 1/2-inch to 3-inch size shall be of bronze/brass ball construction with glass and carbon filled TFE seat rings. Valves shall have differential pressure

read-out ports across valve seat area. Read-out ports shall be fitted with internal EPT inserts and check valves. Valve bodies to have 1/4" NPT tapped drain/purge port. Valves shall have memory stop feature allowing valve to be closed for service and then opened to setpoint without disturbing balance position. All valves to have calibrated nameplates to assure specific valve settings. Valves shall be designed for positive shut-off.

2. Valves shall be manufactured by Bell & Gossett, Armstrong or Griswold.

2.8 AUTOMATIC AIR VENTS

- A. Furnish where shown on drawings and wherever else required, for water systems, of float type to expel air from system and prevent air binding. Provide each valve with 1/2" shut-off valve and overflow of soft copper tubing extended to spill over nearest open drain. Similar to Sarco type 13W or approved equal.

2.9 STRAINERS

- A. There shall be approved strainers in the inlet connections to each valve feeder and makeup connection, each water regulating valve, and each diaphragm valve, and where else indicated on the drawings. The intention is to protect by strainers, all apparatus of an automatic character, whose proper functioning would be interfered with by dirt on the seat, or by scoring of the seat.
- B. All strainers shall have cast iron, semi-steel or bronze bodies of ample strength for the pressure to which they shall be subjected, removable cylindrical or conical screens of monel or stainless steel and suitable flanges or tapings to connect with the piping they serve. They shall be of such a design as to allow blowing out of accumulated dirt, and to facilitate removal and replacement of a strainer screen, without disconnections of the main piping.
- C. All strainers shall be Y-type with removable screen. Two-inch and smaller or where installed in non-ferrous piping system, screwed or flanged, bronze Sarco type BT or approved equal.
 1. 2-1/2" and larger in ferrous piping systems, flanged cast iron Sarco type AF-125 or approved equal. Brass screens for water 1/16" for 3" inclusive; 1/8" for 4" and above.

2.10 FINTUBE RADIATION:

- A. Type L, seamless copper tubing with aluminum fins permanently bonded to the tube and guaranteed for a pressure of 200 PSIG with temperatures up to 250°F.
- B. 16 gauge steel enclosure with spring clip fastening.
- C. Prime coat and factory finished with baked enamel. Color to be selected by the Commissioner from manufacturer's samples.
- D. Accessories: Full 20 gauge backplate with urethane gasket, combination hanger/bracket with cradle and damper.
- E. Refer to plans for capacity and cover style.
- F. Manufacturer:
Standard
Sterling
Trane
Vulcan

2.11 PRESSURE GAUGES

- A. Phosphorous bronze Bourdon tube type, cast aluminum 4-1/2" diameter case with blowout disc, stainless steel movement with bronze bushing brass socket and black numerals on a white face.
- B. Accuracy: 1/2 or 1% of scale range.
- C. Scale to be selected so that normal operating point is between 35% and 65% of full scale.
- D. Each gauge to include brass petcock. Gauges on steam piping to include syphon.
- E. Gauges to be installed:
 - 1. Across water coils.
 - 2. Across tube bundles (e.g. chiller evaporator, chiller condenser, convertors).
 - 3. Suction and discharge of pumps.
(Compound gauge on fuel oil pump suction)
 - 4. Inlet and outlet of pressure reducing valves.
 - 5. Inlet and outlet of steam control valves.
 - 6. Additional locations as shown on plans.
- F.

<u>Manufacturer</u>	<u>Series</u>
H.O. Trerice	500X
Albert A. Weiss	UG-1
Weksler Instruments	AA1
Or Approved Equal	

2.12 THERMOMETER

- A. Mercury filled red reading column type, 9" long, with one piece aluminum case and sealed replaceable glass element. Brass stem with union connection and adjustable angle to permit reading from any angle. Black numerals on white background.
- B. Accuracy: 1% of scale range.
- C. Scale to be selected so that normal operating point is between 35% and 65% of full scale.
- D. Each thermometer to be installed in an extension neck brass separable socket. Extension neck length to be coordinated with insulation thickness. Socket and thermometer insertion length to be minimum of 75% pipe diameter.
- E. Thermometers to be installed:
 - 1. Supply and return of water coils (single return on multiple coil bank)
 - 2. Supply and return of tube bundles (e.g. chiller evaporator, chiller condenser, convertors)
 - 3. Circulating pump discharge
 - 4. Supply and return of water boilers.
 - 5. Additional locations as shown on plans.
- F.

<u>Manufacturer</u>	<u>Series</u>
1. Taylor	E
2. H.O. Trerice	BX
3. Weksler Instrument	AA5

2.13 REMOTE READING THERMOMETER

- A. Mercury actuated bronze Bourdon tube type, cast aluminum 4-1/2" diameter flanged ease, stainless steel movement with bronze bushing, brass socket, and black numerals on a white face.
- B. Braided capillary tube and sensing bulb shall be stainless steel and fully ambient compensated for its entire length. Sensing bulb to be installed in a extension neck brass separable socket. Extension neck length to be coordinated with insulation thickness.
- C. Accuracy 1% of scale range.
- D. Scale to be selected so that normal operating point is between 35% and 65% of full scale.
- E. Thermometers to be installed as shown on plans.
- F.

<u>Manufacturer</u>	<u>Series</u>
1. H.O. Trerice	M80300
2. U.S. Gauge Supertherm	9100.
3. Weksler Instruments	415A.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION - GENERAL

- A. Provide and erect in a workmanlike manner, according to the best practices of the trade, all piping shown on the drawings or required to complete the installation intended by these specifications.
- B. The drawings indicate schematically the size and location of piping. Piping shall be set up and down and offset to meet field conditions.
- C. Contract #3 Contractor shall inform himself from the general construction specifications and plans, of the exact dimensions of finished work and of the height of finished ceilings in all rooms where radiation, units, equipment or pipes are to be placed and arrange his work in accordance with the schedule of interior finishes, as indicated on the architectural drawings.
- D. All piping shall be run perpendicular and/or parallel to floors, interior walls, etc. Piping and valves shall be grouped neatly and shall be run so as to avoid reducing headroom or passage clearance. All valves, controls and accessories concealed in furred spaces and requiring access for operation and maintenance shall be arranged to assure the use of a minimum number of access doors.
- E. All pipe lines made with screwed fittings must be provided with as sufficient number of flanges or unions to make possible any taking down of the pipes without breakage of fittings.
- F. All piping shall be erected so as to insure a perfect and noiseless circulation throughout the system. No bull head tees will be permitted.
- G. All valves and specialties shall be so placed as to permit easy operation and access and all valves shall be packed at the completion of the work before final inspection.

- H. Provide proper provisions for expansion and contraction in all portions of pipe work, and to prevent undue strains on piping or apparatus connected therewith. Provide double swings at riser transfers and other offsets wherever possible, to take up expansion. Arrange riser branches to take up motion of riser.
- I. Approved bolted, gasketed, welded flanges shall be installed at all apparatus and appurtenances, and wherever else required to permit easy connection and disconnection. Screwed unions shall be used on piping 2" or less.
- J. All piping connections to coils and equipment shall be made with offsets provided with screwed or welded bolted flanges so arranged that the equipment can be serviced or removed without dismantling the piping.
- K. If after plant is in operation, any coils or other apparatus are stratified or air bound (by vacuum or pressure) they shall be repiped with new approved and necessary fittings, air vents, or vacuum breakers at no extra cost. If connections are concealed in furring, floors, or ceilings, this trade shall bear all expenses of tearing up and refinishing construction and finish, leaving same in as good condition as before it was disturbed.
- L. Make all changes in size and direction of piping with fittings. Do not use miter fittings, face, or flush bushing, close nipples or street elbows. Provide clean outs at all changes in direction and at other locations shown in drainage piping.
- M. Make all branch connections with tees, except that on steel piping forged steel "Weldolets" as manufactured by Bonney Forge may be used where the branch pipe is not larger than one half the size of the main pipe.
- N. Tubing shall be erected neatly in a workmanlike manner. Bends in soft copper tubing shall be made with approved tubing benders to prevent deformation of the tubing in the bends. Approved seat-to-pipe threaded adapters shall be provided for junctions with valves and other equipment having threaded connections.
- O. Vertical sections of main risers shall be constructed of pipe lengths welded together. No couplings shall be used.
- P. The ends of all pipe and nipples shall be thoroughly reamed to the full inside diameter of the pipe and all burrs formed in the cutting of the pipes shall be removed.
- Q. Piping shall be installed in accordance with the latest edition of the ASME Code for pressure piping, and all other applicable codes.
- R. All piping shall be concealed above furred ceilings in rooms where such ceilings are provided (except where specifically indicated otherwise on the drawings), or walls or partitions, except as otherwise indicated.
- S. Dissimilar piping shall be connected with dielectric connector as made by Ebco Company.
- T. Piping at all equipment and control valves shall be supported to prevent strains or distortions in the connected equipment and control valves. Piping shall be supported to allow for removal of equipment, valves and accessories with a minimum of dismantling and without requiring additional supports after these items are removed.
- U. Pipe nipples - any piece of pipe 3" in length and less shall be considered a nipple. All nipples with unthreaded portion 1-1/2" and less shall be extra heavy. Only shoulder nipples shall be used. No close nipples will be provided.

- V. Screw threads shall be cut clean and true; screw joints made tight without caulking. No caulking will be permitted. A non-hardening lubricant will be permitted. No bushings shall be used. Reductions, otherwise causing objectionable water or air pockets, to be made with eccentric reducers or eccentric fittings. All pipe shall be reamed out after cutting to remove all burrs.
- W. Pitch water piping upward one inch per 100 feet in direction of flow to ensure adequate flow without air binding, and to prevent noise and water hammer.
- X. Pitch drain piping 1/8 inch per foot in the direction of flow.
- Y. Branch connections to mains are to be made in such a manner as to prevent air trapping and permit free passage of air. To meet job conditions mains shall be set up to maintain headroom, and clear other trades.
- Z. Provide air vents at all high points in water piping. Provide oversized float operated automatic air vent at high points of equipment connections and in mechanical rooms or as shown on piping details. Provide manual vents at all other locations. When installed above inaccessible ceilings, valves shall be installed remote and identified on valve tag chart.
- AA. Avoid 90 degrees lift set-ups in supply lines by using 45 degree ells. Where 90 degree lifts exceed 12" install automatic air vent in supply lines. All lifts in return lines shall be installed with automatic air vents.
- BB. Pipe outlet of all air vents to an open sight drain if the vent is concealed or to within two feet of the floor within Machine Rooms.
- CC. All water piping shall pitch back to low points for drainage. Low points shall be provided with 3/4 inch hose cocks.
- DD. Provide drain valves at the heel of all interior main water risers. Provide drain valves at the heel of all perimeter water risers if shown on drawings. Pipe all drain valves to an indirect waste.
- EE. Miscellaneous drains, vents, reliefs, and overflows from tanks, equipment, piping, relief valves, pumps, etc., shall be run to the nearest open sight drain or roof drain. Provide drain valves whenever required for complete drainage of piping including the system side of all pumps.
- FF. Where pipe penetrates walls, partitions or slabs provide Schedule 40 steel sleeves with an internal diameter at least 2" larger than the outside diameter of the pipe. Set sleeves before pouring concrete or securely fasten and grout with cement. Floor sleeves shall project 1" above the finished floor. Pack void between pipe and sleeve with an approved firestop material. See Section 230000.
- GG. Provide escutcheons fastened to pipe and covering sleeve on all penetrations visible within occupied spaces, corridors, and mechanical equipment rooms. Escutcheons are to be chrome plated brass, Ritter No. 36A for vertical lines, Ritter No. 3A for all other piping.
- HH. Cross connection of any devices, or construction which will permit backflow connections between a water distribution system and any part of the drainage system shall not be installed.
- II. Provide domestic water connections from valved outlets to any equipment requiring same.

- JJ. Keep piping 2'-0" outside the vertical line of unprotected electrical equipment, or provide painted, watertight gutters or pans with pipe drains.

3.2 PIPING SUPPORT

- A. Piping shall not be hung from other piping or from equipment of other trades.
- B. Piping installed shall be hung from supplemental steel attached to and spanning the steel structure or with chemical adhesive anchors. Use of vertical expansion shields shall not be permitted. Where vertical support into masonry or concrete structure cannot be avoided, use supplemental steel as noted above, or use chemical adhesive anchors.
1. When attaching to concrete structure, provide two chemical adhesive anchors at each support point. The chemical anchors shall be separated by a minimum of 8". A 2.5x2.5x3/8 angle iron shall span the two chemical anchors. Drilling for chemical adhesive anchors must not interrupt or displace any existing rebar. Concrete insert shall be either external or internal threaded element by the chemical adhesive manufacturer.
 2. When attaching to concrete rib construction, the chemical anchors shall be attached to the upper third of the rib. Do not attach to the bottom of concrete ribs.
 3. Minimum chemical anchor embedment shall be 3". The two chemical adhesive anchors shall be the same diameter as the attachment rod.
 4. Chemical adhesive product for solid concrete applications shall be Hilti HIT RE 500 or approved equal with either internally threaded inserts or threaded rod supplied by the chemical adhesive manufacturer. Inserts to be similar to Hilti HIS or approved equal. Threaded rod to be similar to Hilti HAS product or approved equal.
- C. Hanger rods shall not pierce ducts.
- D. All piping connected to pumps and compressors within 50 feet of such equipment, and where required or directed to eliminate vibration or isolate pipe from building structure, Contract #3 Contractor shall supply and install spring type antivibration isolators as called for in Section 230548 of these specifications.
- E. Where additional steel is required for the support of hangers, the Contract #3 Contractor shall furnish and install same subject to the approval of the Commissioner.
- F. All piping running on walls shall be supported by means of hangers suspended from heavy galvanized steel angle wall brackets. No wall hooks will be permitted.
- G. Lateral bracing of horizontal pipe shall be provided where required to prevent side sway or vibration. The lateral bracing shall be of a type approved by the Commissioner and shall be installed where directed by the Commissioner.
- H. All horizontal copper tubing shall be supported by hangers not over 6' apart for piping 1-1/4" and smaller. Space hangers no more than 10' apart for piping 1-1/2" and larger. All branches shall have separate hangers. Hangers shall be Clevis type (with copper bottom support for uninsulated brass pipe or copper tubing). If channel or angle iron trapeze hangers are used, the space on the hangers for uninsulated brass pipe or copper tubing shall be wrapped with lead shields to isolate tubing.

- I. Hanger rods attached to concrete inserts or piping racks shall not be used to support piping in Mechanical Rooms or for the support of individual pipes weighing in excess of 20 lbs. per linear foot.

3.3 PIPING JOINTS

A. Welding

1. Joints between sections of pipe and between pipe and fittings shall be fusion welded in accordance with the recommendations of the American Welding Society. Mitering of pipe to form elbows, matching straight runs to form tees or any similar construction shall not be done.
2. All welding shall be done as outlined in the latest edition of the ASME Code for pressure piping.
3. Welding process - all welding shall be done by the oxyacetylene or electric arc welding process in accordance with the requirements set forth in welding of pipe joints of the codes for pressure piping.
4. Beveling and welding - all pipe 2-1/2 inches 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 provided all paint, rust, scale and oxide are carefully removed with hammer, chisel or file and bevel left smooth and clean. Joints shall be prepared and welded to assure thorough fusion of alignment and the production of a joint that shall develop the full strength of the pipe and that shall be leakproof in service.
5. Welding tees - welding tees shall be used when specified hereinafter. Where necessary, branch connections shall be reinforced in an approved manner. For the smaller branches, where welding tees are unavailable, nozzles shall be welded to pipe. Where such nozzles are welded to the pipe, all cutting oxide which may drop inside the pipe shall be removed before welding the branch or section in place. Where branch size is one half the size of main or larger, use welding tees. Where branch size is two (2) sizes smaller than the size of main "Weldolets" or "Sockolets" may be used.
6. Welding rods - the welding rod used for welding steel and wrought iron shall be approved welding rod in accordance with ASTM SPEC. A233.
7. Welder shall be fully certified by New York City to certify welders for pressure piping.

B. Flanged Joints

1. Use matched flange faces and 1/16" thick compressed gaskets.
2. When connection to equipment with flat face flange, grind flange raised face flat and use full faced gaskets.

C. Screwed Joints

1. Do not damage fitting surface, remove burrs, apply red lead and ground graphite in linseed oil to male threads only. Do not use wicking, cord or similar materials. Clean joint thoroughly of excess jointing material.

D. Soldered Joints

1. 95-5 wire solder. Completely clean all surfaces and coat with a thin layer of flux.

E. Brazed Joints

1. Conform to ASA-B31.1 and ASTM B-260-56T in accordance with the requirements of the manufacturers of the fittings and the brazing material.

3.4 CLEANING OF PIPING

- A. Plug all open ends of piping, valves and equipment except when work is being performed. Protect connections to equipment and control valves with temporary screens and flush piping with water. Remove dirt and debris collected.
- B. Thoroughly clean the piping to remove all organics, rust, and all foreign matters and to prepare the system for permanent treatment.
- C. Perform chemical cleaning after completing all pressure and leakage tests and thoroughly flushing the systems.
- D. Use cleansing agent which will not interact with any of the materials in the systems in any way to produce corrosions, form deposits, weaken, reduce the life or in any way have a detrimental effect on any system components.
- E. Fill the system with clean water and add sufficient cleaning preparation to provide a concentration adequate to perform complete cleaning. Add the cleaning preparation at a point which will assure good mixing.
- F. Provide temporary containers to accommodate the foam that may form and temporary pumps to circulate the chemical solution.
- G. Circulate the mixture of cleanser and water for a sufficient length of time to complete the cleaning.
- H. Drain the system, flush with clean water, clean all strainers and screens and refill the system.
- I. Cleaner for the new piping shall be Nalprep 330 as manufactured by the Nalco Chemical Co., or the approved equal.
- J. Entire cleaning operation shall be performed by a competent water treatment service in strict accordance with the manufacturer's recommendations. Provide written certifications after the cleaning operation is complete.

3.5 TESTS

- A. Tests all piping except drainage connections, including valves, fittings and joints hydrostatically at a pressure equal to at least 1-1/2 times the rated pressure, but no less than 200 psig for a minimum of four hours. Blank-off or remove all elements or equipment which may be damaged by the pressure. Open but do not back-seat valves. Inspect all joints and connections.
- B. Test drainage piping hydrostatically and with smoke in accordance with the local authorities.
- C. Repair all leaks, defects or damage revealed by resulting from the test and re-test the system.

- D. Do not insulate or conceal piping until the system has been tested and the results approved.
- E. Perform tests in the presence of the Commissioner.

3.6 AIR ELIMINATION

- A. The Contract #3 Contractor's attention is specifically directed to the problem of proper air elimination. In installing water piping systems and all equipment, the Contract #3 Contractor shall carefully plan the actual installation in such a manner that high points and air pockets be kept to a minimum and that they are properly vented where they are unavoidable. All air elimination devices called for on the drawings and in these specifications shall be provided and properly installed. In addition, Contract #3 Contractor shall furnish and install all other air elimination devices which may be required due to job conditions. The liability of the Contract #3 Contractor under the guarantee provisions of the contract is intended to cover his responsibility for a proper, continuous and automatic air elimination to assure even and balanced distribution of water to all equipment.

3.7 ANCHORS

- A. All anchors shall be separate and independent of all hangers and supports. Anchors shall be of heavy blacksmith construction suitable in every way for the work of this contract. Anchors shall be welded to the pipe and fastened to the structure with bolts.
- B. Anchors shall be fabricated and assembled in such a form as to secure the piping in a fixed position. They shall permit the line to take up its expansion and contraction freely in opposite directions away from the anchored points; and shall be so arranged to be structurally suitable for particular location, and line loading. Submit details for approval.

3.8 WATER BALANCE

- A. Balance all new water systems and those designated existing water system to the quantities shown with the following tolerances:
 - 1. Pumps: Design Flow plus 5%
 - 2. Coils: Design Flow plus 5%
- B. Balance in accordance with ASHRAE, AABC, or NEBB procedures and submit all readings.
- C. Water system balancing is to be performed by a professional organization, qualified by experience and practice to perform this service. Submit evidence of qualifications, balancing procedures, and report forms for approval prior to start of work.
- D. Submit three bound copies of the water balance report to the Commissioner. Balance Report to include the following data for each water system:

Pump Designation, location, system type.
Manufacturer, model number, size.
Suction and discharge pressure readings.
Balancing valve position.
Motor manufacturer, frame, horsepower, volts, phase, hertz, and RPM.
Motor amps - Design versus Actual.
Water coil GPM, entering water temperature, leaving water temperature and pressure drop (Design versus Actual) - Balancing valve position.
Tube bundle GPM, entering water temperature, Leaving water temperature, and pressure drop (Design versus Actual) - Balancing valve position.
Steam coil entering pressure, flow rate, air quantity, entering and leaving air temperature.

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SECTION 23 05 48

EQUIPMENT BASES AND VIBRATION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 230000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #3 Contractor.
- C. Refer to ASHRAE Guidelines on Vibration Isolation in the 2007 ASHRAE Handbook – HVAC Applications, Chapter 49, for additional information not covered in this section.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 230000, General Provisions, and with the provisions of all applicable codes and laws.

1.3 QUALITY ASSURANCE

- A. Manufacturer shall:
 - 1. Determine vibration isolation sizes for all locations.
 - 2. Provide piping and equipment isolation systems as scheduled or specified.
 - 3. Guarantee specified isolation system deflection.
 - 4. Provide installation instructions and drawings.
 - 5. Substitution of "Internally Isolated" mechanical equipment in lieu of the specified isolation of this section must be approved for individual equipment units by the Commissioner. This type of substitution will only be considered with a letter of guarantee form the equipment manufacturer that states that the "Internal Isolated" mechanical equipment is equivalent to the specified isolation outlined in this section.

1.4 SUBMITTALS

- A. Submit the following data in a comprehensive vibration isolation submittal for approval, clearly identifying each item of equipment supported and the isolation to be installed at each point of support.
 - 1. Summary sheet of equipment supported and the isolation to be installed at each point of support. The following items shall be provided on the summary sheet.
 - a. Location
 - b. Estimated load
 - c. Type by model number

- d. Rated capacity (lbs.)
- e. Rated deflection (in.)
- f. Estimated deflection under estimated load (in.)

- 2. Dimension detail for each isolation device.
- 3. Piping and duct layout drawings showing each point of support and isolator type selected by model number and spring color reference to summary sheet.
- 4. Horsepower of each motor, and rpm of both driven and driver, in each supported unit.
- 5. Deflection as indicated in the Vibration Isolation Schedule herein, in inches.
- 6. Scheduled deflection of each isolator. Identification of each isolator selected by model number and spring color.
- 7. Deflection of each isolator under the calculated load, actual loaded and unloaded measurable spring height.
- 8. The loading at which each isolator would be fully compressed to solid.
- 9. The load at which each isolator would operate at the deflection recommended in the Vibration Isolation Schedule herein.

B. Shop Drawings

- 1. Vibration isolation equipment.
- 2. Submittal data shall include complete mounting details of each isolated piece of equipment, including static deflection, operating and free heights, and outside spring diameter, and isolation efficiencies.
- 3. Steel bases and concrete inertia bases shall be completely detailed.
- 4. Include clearly outlined procedures for installing and adjusting the isolators.
- 5. Performance report and calculations for vibration isolation equipment.
- 6. Manufacturers' certified reports on motorized equipment alignment and installation.
- 7. Piping and duct layout drawings showing each point of support and the isolator type selected by model number and spring color reference to the summary sheet.
- 8. The loading at which each isolator would be fully compressed to solid.
- 9. Anchor bolt locations.
- 10. Reinforcing and template steels.
- 11. Quality Assurance Provisions

C. Samples

1. Provide one sample of each type of vibration isolator in use on the project.

D. Final Inspection Report

1.5 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 230000.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements specified herein, provide vibration isolation materials, bases and systems by one of the following or approved equal:

1. Kinetics Noise Control, Inc.
6300 Irelan Place
P.O. Box 655
Dublin, OH 43017
877.457.2695
www.kineticsnoise.com
2. Mason Industries, Incorporated
350 Rabro Drive
Hauppauge, New York 11788
631-348-0282
www.mason-ind.com
3. Vibration Mountings & Controls, Inc.
113 Main Street
Bloomingdale, NJ 07403
973-838-1780
www.vmc-kdc.com

- B. All products specified under this section shall be provided by one manufacturer.

- C. Where listed Mason Industries, Inc. (M.I.I) provided as a basis of design.

- D. Where exposed to corrosive elements: corrosion protected.

2.2 VIBRATION ISOLATIONS, GENERAL

- A. All mechanical equipment shall be mounted in accordance with the specifications below and with the specific requirements shown in the equipment schedules. The vibration isolation manufacturer shall provide supervision to ensure proper application, installation and adjustment of the isolators. Upon completion of the installation and after the system is put into operation, the manufacturer shall make a final inspection and report. The Contract #3 Contractor shall submit this report to the Commissioner, in writing, certifying

the proper performance of the installation.

- B. The isolation manufacturer shall supply all unit isolators, complete rails, fan and motor bases and structural steel forms for concrete inertia blocks, where called for, and shall be responsible for the selection of all vibration eliminators and shall guarantee to meet the requirements of this specification.
- C. Wherever rotational speed is mentioned as the disturbing frequency the lowest such speed in the system shall be used. All isolation devices shall be selected for uniform static deflections according to distribution of weight.
- D. Vibration isolators shall be designed or treated for resistance to corrosion. Steel components shall be PVC coated, or phosphated and painted with rust-resistant enamel. Nuts, bolts and washers shall be zinc-electroplated. Structural steel bases shall be thoroughly cleaned of welding slag and primed with metal etching primer and painted with rust-resistant enamel. Isolators exposed to the weather shall have all steel parts hot-dipped galvanized. Nuts, bolts and washers may be cadmium plated. Spring components shall be cadmium plated and neoprene coated.
- E. All fan units and air handling units (except fans mounted on slab on grade) shall be isolated as follows:

1.	Up to 450 RPM	75% efficiency (3-1/2" max. defl.)
2.	450 RPM to 850 RPM	90%
3.	850 RPM and Over	95%
- F. Submittals shall show disturbing frequency, required efficiency, designed deflection and outside diameter of springs, when pertinent.
- G. Horizontal pipe runs - all horizontal pipe runs within Mechanical Equipment Rooms and within 50 feet of final connections to all equipment having motors of 1/2 horsepower or larger, shall be isolated from building structure by means of spring hanger units designed for insertion in rods.
- H. All vibration isolators shall have either known undeflected heights or calibration markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.
- I. All isolators shall operate in the linear portion of their load versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer, and must be linear over a deflection range of not less than 50% above the design deflection.
- J. The ratio of lateral to vertical stiffness shall be not less than 1.0 nor greater than 1.5.
- K. The theoretical vertical natural frequency for each support point based upon load per isolator and isolator stiffness shall not differ from the design objectives for the equipment as a whole by more than + 10%.
- L. All neoprene mountings shall have a shore hardness of 40 to 65, after minimum aging of 20 days or corresponding oven-aging.

2.3 MOUNTINGS

- A. Spring Type:
 - 1. Spring isolators shall incorporate the following:
 - a. Minimum diameter of 0.8 of the loaded operating height

- b. Corrosion resistance where exposed to corrosive environment with:
 - i. Springs cadmium plated and neoprene coated.
 - ii. Hardware cadmium plated.
 - iii. All other metal parts hot dip galvanized.
- c. Reserve deflection (from loaded to solid height) of 50% of rated deflection
- d. Leveling device
- e. 1/4" thick neoprene acoustical base pad.
- f. Designed and installed so that ends of springs remain parallel.
- g. Adequate operating clearance.
- h. Non-resonant with equipment forcing frequencies or support structure natural frequencies.
- i. Springs should not be welded to top and bottom plates.

2. Type "A": Spring isolators to be one of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	FDS
Mason Industries, Inc.	SLF
Vibration Mountings	Spring-Flex Series "A"

3. Type "A-S": Spring isolators shall incorporate seismic restraint and be one of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	SSLFH
Vibration Mountings	

4. Type "B": Spring isolators shall be the same as Type "A" except:

- a. Where operating weight differs from installed weight, provide built-in adjustable limit stops to prevent equipment rising when weight is removed. Stops not in contact during normal operation.
- b. Two layers of 1/4" neoprene base pad separated by 1/16" sheet steel.
- c. Tapped holes in top plate for bolting to equipment.
- d. Capable of supporting equipment at a fixed elevation during equipment erection.
- e. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	SLR
Vibration Mountings	AWR

5. Type "B-S": Spring isolators incorporating seismic restraint shall be one of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	SSL
Vibration Mountings	

6. Type "C": Spring hanger rod isolators shall incorporate the following:

- a. Spring element seated on a steel washer within a neoprene cup.
- b. Steel retainer box encasing the spring and neoprene cup.
- c. Neoprene bushing for lower rod hole to prevent steel-to-steel contact.
- d. Spring diameters and hanger box lower hole size large enough to permit hanger rod to swing through a 30° arc before contacting the hole and short-circuiting the spring.
- e. Requires Seismic Restraint.
- f. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	Type 30
Vibration Mountings	

B. Elastomer Mounting Types

- 1. All elastomer isolators shall incorporate the following:

- a. Bolt holes for bolting to equipment base.
- b. Bottom steel plates for bolting to sub-base as required.
- c. Unit type design molded in black oil-resistant neoprene.
- d. All metal surfaces shall be neoprene covered.
- e. Neoprene to be compounded to meet the following:
 - i. Not greater than 50 durometer.
 - ii. Maximum tensile strength 2000 psi.
 - iii. Minimum elongation 300%.
 - iv. Maximum compression set at 25% of the original deflection.

- 2. Type "D": Double deflection neoprene mount.

- a. Rated deflection minimum 0.35 inches.
- b. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	ND
Vibration Mountings	RD

- 3. Type "D-S": Double deflection neoprene mount.

- a. Rated deflection minimum 0.35 inches.
- b. Shall incorporate seismic restraint.
- c. One of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	RBA
Vibration Mountings	

- 4. Type "D-SA": All directional captive neoprene mount.

- a. Rated deflection minimum 0.25 inches.
- b. Shall incorporate seismic restraint.
- c. One of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries, Inc.	BR
Vibration Mountings	

- 5. Type "E": Double deflection elastomer hanger rod isolators incorporating the following:

- a. Molded unit type neoprene element.
- b. Steel retainer box encasing neoprene mounting.
- c. Clearance between mounting hanger rod and steel retainer box.
- d. One of the following.

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	FLS
Mason Industries	HD
Vibration Mountings	RHD

- 6. Type "F": Pad type neoprene mountings.

- a. 3/4-inch minimum thickness.
- b. 50 psi maximum loading.
- c. Ribbed or waffled design.
- d. 15% Deflection
- e. 16 Gauge galvanized steel plate between multiple layers of pad thickness.
- f. Suitable bearing plate to distribute load.
- g. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	NPD
Mason Industries	Super W
Vibration Mountings	SHEAR-FLEX

- C. Combination spring and elastomer types:

- 1. Type "G": Combination spring/elastomer hanger rod isolators.

- a. Spring and neoprene isolator elements in a steel box retainer.
- b. Characteristics of spring and neoprene as described in Type "C" and Type "E" isolators.
- c. Factory pre-loading to 75% of rated load (for pre-compressed springs).
- d. Requires Seismic Restraint.
- e. One of the following:

MANUFACTURER TYPE

Kinetics
Mason Industries 30N
Vibration Mountings

2. Type "G-S": Combination spring/elastomer hanger rod isolators incorporating seismic upstop.

- a. Spring and neoprene isolator elements in a steel box retainer.
- b. Characteristics of spring and neoprene as described in Type "C" and Type "E" isolators.
- c. Factory pre-loading to 75% of rated load (for pre-compressed springs).
- d. Requires Seismic Restraint.
- e. One of the following:

MANUFACTURER TYPE

Kinetics
Mason Industries RW30N
Vibration Mountings

3. Type "H": Thrust Restraints

- a. Use on all fan heads and axial or centrifugal fans where the air thrust exceeds 10% of the equipment weight.
- b. The thrust restraint consists of a TYPE "G" isolator with the same deflection as specified in the schedule for the mountings or hangers.
- c. Spring element contained within a steel frame designed so it can be preset for thrust at the factory and adjusted in the field to allow for a maximum of 1/4" movement at start and stop.
- d. Assembly furnished with one rod and angle brackets for attachment to both equipment and ductwork or the equipment and the structure.
- e. Restraints attached at the centerline of thrust and symmetrically on either side of the unit.
- f. One of the following:

MANUFACTURER TYPE

Kinetics
Mason Industries Type WB
Vibration Mountings

2.4 Materials – Rooftop spring curbs

A. Type RSC-1: Curb mounted isolation base (low deflection).

- 1. Integral spring and weather seal curb arrangement that fits under the equipment to be isolated and over the curb.

2. Top and bottom members constructed of extruded aluminum and connected by a flexible, water-proof neoprene membrane. The aluminum members seal against the curb with continuous closed cell neoprene sponge.
3. Cadmium plated springs with a 1" deflection and 50% additional travel to solid. Spring diameters no less than 0.8 of the spring height at rated load.
4. Wind resistance and seismic restraint shall be provided by resilient snubbers in the corners with a minimum clearance of 1/4" so as not to interfere with the spring action except in high winds or seismic activity.
5. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics Mason Industries Vibration Mountings	Type CMAB

B. Type RSC-2: Curb mounted isolation base (high deflection).

1. Integral spring and weather seal curb arrangement that fits under the equipment to be isolated and directly on top of the roof, spanning the joists.
2. Bottom member constructed of rectangular, tubular structural steel. Top member, supporting the equipment, constructed of an inverted steel AU" channel with cross member bracing.
3. Water-proofing by a flexible formed aluminum weather seal on all four sides of the base. Corner joints constructed of molded rubber.
4. Springs cadmium plated with deflections as called out in the schedule and 50% additional travel to solid. Spring diameters of no less than 0.8 of the spring height at rated load.
5. Wind resistance and seismic restraint shall be provided by means of resilient snubbers in the corners with a minimum clearance of 1/4" so as not to interfere with the spring action except in high winds or seismic activity.
6. The system should incorporate (for improved air-borne acoustical isolation), two layers of staggered joint 5/8" drywall directly attached to the top of the roof structure within the curb surrounding the ducts. All interfaces should be caulked. In addition, 4" thick, 1.5 pound density glass or mineral fiber shall cover the drywall surface under the unit and all sides of the plenum.
7. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics Mason Industries Vibration Mountings	Type RSC

2.5 Materials – Equipment Bases

A. Equipment Bases:

1. Type "B-1A": Integral structural steel bases.

- a. Reinforced as required to prevent base flexure at startup and misalignment of drive and driven units.
- b. Fan bases complete with motor slide rails.
- c. Drilled for drive and driven unit mounting plate.
- d. Depth equal to 1/10 of the longest dimension of the base, not exceeding 14 inches.
- e. Height saving brackets shall be employed in all mounting locations. Isolators shall be Type "A". When seismic restraint is required, isolators shall be Type "A-S."
- f. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries	Type WSFL
Vibration Mountings	

2. Type "B-2A": Concrete inertia base

- a. Formed in structural steel frame.
- b. Structural base reinforced as required to prevent flexure, misalignment of drive and driven unit or stress transfer into equipment
- c. Minimum base depth must equal to 1/12th or 8% of the longest base dimension.
- d. Fan bases complete with motor slide rails.
- e. Pump bases to provide base elbow supports. Bases complete with height saving brackets, reinforcing, equipment bolting provisions and Type "A" isolators (Type "A-S" isolators for seismic requirements) provided by vibration control supplier.
- f. Base ready for concrete pour; concrete weighing not less than 140 lbs per cubic foot by others.
- g. One of the following:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries	Type KSL
Vibration Mountings	

2.6 Materials – Flexible Connections

A. Flexible Connectors:

1. Type "FC-1": Neoprene connector for general piping.

- a. Rubber expansion joints shall be peroxide cured EPDM throughout with Kevlar tire cord reinforcement.
- b. The raised face rubber flanges must encase solid steel rings to prevent pull out. Flexible cable wire is not acceptable.
- c. Sizes 1-1/2" through 14"(40mm through 350mm) shall have a ductile iron external ring between the two spheres. Sizes 16" through 24" (400mm to 600mm) may be single sphere. Sizes 3/4" through 2"(20mm through 50mm) may have one sphere, bolted threaded flange assemblies and cable retention.
- d. Control rods passing through 1/2"(12mm) thick Neoprene washer bushings large enough to take the thrust at 1000psi (0.7 kg/mm²) of surface area may be used on unanchored piping where the manufacturer determines the condition exceeds the expansion joint rating without them.
- e. Minimum ratings through 14"(350mm) shall be 250psi at 170°F and 215psi at 250°F. (1.72MPa at 77°C and 1.48MPa at 121°C), 16"(400mm) through 24"(600mm) 180psi at 170°F and 150psi at 250°F. (1.24MPa at 77°C and 1.03 MPa at 121°C). Higher published rated connectors may be used where required.
- f. Safety factors shall be a minimum of 3/1. All expansion joints must be factory tested to 150% of maximum pressure for 12 minutes before shipment.
- g. Submittals shall include two test reports by independent consultants showing minimum reductions of 20 DB in vibration accelerations and 10 DB in sound pressure levels at typical blade passage frequencies on this or a similar product by the same manufacturer.
- h. The piping gap shall be equal to the length of the expansion joint under pressure.
- i. All expansion joints shall be installed on the equipment side of the shut off valves.
- j. Connector to be one of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics	
Mason Industries	Type SAFEFLEX
Vibration Mountings	

- 2. Type "FC-2": Flexible stainless hose for use in inaccessible areas.
 - a. Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings.
 - b. 3-inch and larger shall be flanged.
 - c. 3-inch pipe size and smaller with male nipple fittings.
 - d. At equipment, hoses shall be installed on the equipment side of the shut-off valves horizontal and parallel to the equipment shafts wherever possible.
 - e. Suitable for operating pressure with 4:1 minimum safety factor.

- f. Length as shown on manufacturer's certified drawings and shall be as tabulated:

Flanged

3" x 12" (75 x 300mm)	6" x 18" (150 x 450mm)	12" x 24" (300 x 600mm)
4" x 12" (100 x 300mm)	8" x 18" (200 x 450mm)	14" x 30" (350 x 750mm)
5" x 18" (125 x 450mm)	10" x 18" (250 x 450mm)	16" x 32" (400 x 800mm)

Male Nipples

1/2" x 12" (12 x 300mm)	1-1/4" x 12" (32 x 300mm)	2" x 12" (50 x 300mm)
3/4" x 12" (19 x 300mm)	1-1/2" x 12" (38 x 300mm)	2-1/2" x 18" (64 x 450mm)
1" x 12" (25 x 300mm)		

- g. Connectors to be one of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Kinetics Mason Industries Vibration Mountings	Type BFFL

3. Type "FC-3": Flexible duct connections to fans.

- a. 30 ounce wovenglass fiber coated with neoprene, sewn together at the edges and joints.
- b. 6" long and held in place with 1". wide bands of 12 ga. galvanized steel bolted to duct and to outlets and inlets of the units and fans with 1/8" stove bolts, 5" o.c. Metal connections 3" wide on either side of the flexible material, as provided by the manufacturer, may also be used.
- c. One of the following or equal:

<u>MANUFACTURER</u>	<u>TYPE</u>
Ventfabrics DuroDyne	Ventglas Insulflex

2.7 ISOLATION SCHEDULE

<u>EQUIPMENT TYPE</u>	<u>SERVING</u>	<u>ISOLATOR TYPE</u>	<u>MINIMUM STATIC DEFLECTION (INCHES)</u>
FLOOR MOUNTED AIR HANDLING	AHU-1, 2, 3, 4	Units externally isolated A-S,FC-3	1.0
UNIT HEATERS	ALL	F	Max. 50 Durometer

ROOF TOP FANS	SEF-1, 2	RSC-1, FC-3	1.0
CURB MOUNT	EF-4, EF-6		
EXHAUST FANS	RFL-1, EF-R1	G-S, FC-1	1.0
	EF-R2, EF-R3		
	EF-R4A, EF-R4B		
VAV BOXES	ALL	E, FC-3	1.0
FAN COIL UNITS	FCU-1, 2, 3, 4	G-S, FC-3	1.0
	FCU-5, 7, 8		
PIPING	FLOOR MOUNTED	B-S	
	SUSPENDED	G, G-S	SEE SPEC
	RISERS	B-S, P-2	
DUCTWORK	FLOOR MOUNTED	B-S	SEE SPEC
	SUSPENDED	G, G-S	

PART 3 - EXECUTION

3.1 Inspection

- A. Examine all work prepared by others to receive work of this Section and report problems or defects affecting installation to the General Contractor for correction.
- B. Inspect all components of the Work to insure no damage has occurred during shipment or storage.
- C. Accompany Commissioner and Contractor on a joint inspection, ideally within 2 weeks of the point in time when equipment systems are certified operable and adjusted.

3.2 Installation

- A. Install vibration isolation devices and systems in accordance with the manufacturer's instructions and certified submittal data.
- B. Installation of vibration isolators must not cause any change of position of equipment, piping or duct resulting in stresses or misalignment.
- C. No rigid connections between equipment and the building structure shall be made that degrades the performance of the vibration isolation systems herein specified.
- D. The contractor shall not install any equipment, piping, duct or conduit, which makes rigid connections with the building unless isolation is not specified. "Building" includes, but is not limited to, slabs, beams, columns, studs and walls.
- E. Coordinate work with other trades to avoid rigid contact with the building.
- F. Any conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.
- G. Correct, at no additional cost, all installations which are deemed defective in workmanship and materials at the contractor's expense.
- H. Floor Mounted Equipment:
 - 1. 4-inch thick concrete housekeeping pads:
 - a. Over entire floor area of supported equipment.
 - b. Supporting all vibration isolation devices and bases.
 - c. Keyed with hairpins as required to be integral with the structural slab.
 - d. Incorporating approved seismic restraint anchor plates flush with the top of the housekeeping pad.

2. Concrete per specification describing requirements.

1 General Equipment Isolation:

1. Provide 2-inch operating clearance between concrete inertia bases and housekeeping pad and 1-inch clearance between equipment or structural bases and housekeeping pad.
2. Isolation mounting deflection (minimum) as specified or scheduled on manufacturer's certified drawings.
3. Position equipment, structural base and concrete bases on blocks or wedges at proper operating height.
4. Provide operating load conditions prior to transferring base isolator loads to springs and removing wedges.
5. Electrical conduit connections to isolated equipment shall be looped or installed with flexible conduit to allow free motion of isolated equipment.
6. Install equipment directly on isolation system. Support rails between the equipment and isolators should not be used.
7. Verify all installed isolators and mounting systems permit equipment motion in all directions.
8. Adjust or provide additional resilient restraints to limit startup equipment lateral motion to 1/4-inch.
9. Prior to startup, clean out all foreign matter between bases and equipment. Verify that there are no isolation short circuits in the base or isolators.
10. No rigid connections between rotating or vibrating equipment and building structure shall be made that degrades the vibration isolation system herein specified.
11. Coordinate work with other trades to avoid rigid contact with the "building". Inform other trades following, such as plastering, drywall, electrical or sheet metal, to avoid any contact which would reduce the vibration isolation.
12. Bring to the Architect's attention immediately, prior to installation, any conflicts with other trades which will result in unavoidable rigid contact with equipment or piping as described herein, due to inadequate space or other unforeseen conditions. Corrective work necessitated by conflicts after installation shall be at the contractor's expense.
13. Correct, at no additional cost, all installations which are deemed defective in workmanship or material as a result of project completion inspection or subsequent inspections due to owner complaints within a period of one year following acceptance.

J. Piping Isolation:

1. All piping shall be resiliently mounted, either floor supported or ceiling hung, such that piping will be isolated from the building structure (ie - no direct metal to metal contact of the piping with the building structure) in the following locations:
 - a. Inside Mechanical Equipment Rooms
 - b. Within 50-feet of vibrating equipment
 - c. Within 10-feet of noise critical (see Noise Control Section 230549 1.1.C.3) spaces (this includes piping under, over or adjacent to these spaces)
 - d. Inside noise critical (see Noise Control Section 230549 1.1.C.3) spaces itself (ie - piping run in ceiling of noise critical space)
 - e. All exposed piping in any occupied space
 - f. Pipe greater than 2-inches in diameter
 - g. First three hangers on both sides of an Acoustical Isolation Joint (AIJ) or when crossing into or out from box-in-box constructions
2. Horizontal pipe isolation: Use factory preloading for the first four isolators from the rotating equipment and for all piping greater than 6 inches in diameter. The first four isolators from the equipment shall have the same static deflection of the isolator used for the equipment itself. Subsequent isolators shall have a static deflection of 1/2 that of connected equipment with a minimum of 1". Use "G-S" isolators for subsequent hangers. Floor supported piping shall rest on type "B" isolators.
3. Riser isolation: Isolate the entire rise of all pipes in the locations described in 3.2.J.1. Risers shall be suspended from type "G-S" hangers or supported by type "A" mountings. Guide and anchor piping in shafts as required with approved resilient mounting designs as described below to prevent direct contact of piping with building structure. Steel springs shall be a minimum of 1" except in those expansion locations where additional deflection is required to limit load changes to $\pm 25\%$ of the initial load. Submittals must include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on the building structure, spring deflection changes and seismic loads. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist in the proposed design.
4. Provide flexible connections "FC-1" at all connections of pipe to rotating or vibrating equipment and as directed in the vibration isolation schedule.
5. Position isolators:
 - a. Close to building structure.
 - b. Between building structure and supplementary steel if required.
 - c. Not to contact acoustic rated walls.
6. Suspend isolators from rigid and massive support points.

7. Adjust as required all isolators to eliminate all contact of the isolated rod with the hanger rod box retainer or short circuiting of the spring.
8. Supplementary steel to be sized for a maximum deflection of 0.08 inches at the center span.
9. Resilient Piping Guides:
 - a. Weld steel guides to the pipe at a maximum spacing of 60°. The outside diameter of the opposing guide bars shall be smaller than the inside diameter of the pipe riser clamp in accordance with the standard field construction practice. Rigidly attach each end of the pipe anchor to an all-directional pipe anchor isolation mounting which, in turn, is rigidly fastened to the steel framing within the shaft.
 - b. The all-directional pipe anchor isolation mountings consists 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 shall not exceed 500 psi.
 - c. Construct low temperature piping guides with a 360°, 10-gauge metal sleeve around the piping. Provide thermal insulation between the piping and the sleeve. Space the metal sleeve away from the piping with heavy duty neoprene and canvas duck isolation pad of thickness equal to thermal insulation. Provide urethane or other suitable thermal insulation in the voids between the pipe sleeve and isolation pad material. The metal sleeve outside diameter shall be smaller than the pipe riser clamp inside diameter in accordance with standard field construction practice. Rigidly attach the pipe riser clamp to the steel framing within the shaft.
 - d. Mountings shall be Type VSG - M.I.I. or approved equal.
10. Resilient Piping Anchors:
 - a. Weld the pipe riser clamp at anchor points to the pipe and to pairs of vertical resilient pipe anchor mountings, which, in turn, are rigidly fastened to the steel framing in the pipe shaft.
 - b. The resilient pipe anchor mountings consist of a bolted assembly of steel plates with laminations of 1/2" thick, heavy duty neoprene and canvas duck isolation material. The mounting shall be capable of safely accepting loads developed by the installed piping. A heat shield shall be provided as required. The isolation material loading shall not exceed 500 psi.
 - c. Resilient pipe anchor shall be Type ADA - M.I.I., or approved equal.

K. Ductwork Isolation:

1. Isolate all ductwork in mechanical rooms and outside of equipment rooms within 25 feet of vibrating equipment with Type "B-S" isolators (floor supported) or Type "G-S" hanger rod isolators with 1-inch static deflection (ceiling hung).

2. Provide flexible connections "FC-3" at all connections of ductwork to rotating or vibrating equipment and as directed in the vibration isolation schedule.
3. Position isolators:
 - a. Close to building structure.
 - b. Between building structure and supplementary steel if required.
 - c. Avoid contact to acoustic rated walls.
4. Suspend isolators from rigid and massive support points.
5. Adjust as required all isolators to eliminate all contact of the isolated rod with the hanger rod box retainer or short-circuiting of the spring.
6. Supplementary steel shall be sized for a maximum deflection of 0.08 inches at the center span.

3.3 Adjust and Clean

- A. Check and adjust all isolators to insure there is no short circuiting such as:
 1. Hanger rods touching boxes
 2. Hold-down bolts not released
 3. Bolts touching springs
 4. Springs and/or neoprene overloaded
 5. Bottom neoprene pads short-circuited by welding bottom plate to structure
 6. Isolation device touching adjacent structures

3.4 Final Inspection

- A. On completion of installation of all vibration isolation devices herein specified, the local representative of the isolation materials manufacturer shall inspect the completed systems and report, in writing, any installation error, improperly selected isolation devices or other faults in the system that could affect the performance of the system. Contractor shall submit a report to the Architect, including the manufacturer's representative's final report, indicating all isolation reported as properly installed or requiring correction and include a report by the Contractor on steps taken to properly complete the isolation work.
- B. The Commissioner will subsequently inspect the systems for conformance to specifications and for proper installation methods. Contractor shall replace or repair, at his expense, any isolation devices that deviate from the specifications, approved shop drawings, and manufacturer's recommendations as a result of this inspection.

END OF SECTION

SECTION 23 05 49

NOISE CONTROL

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Complete noise control systems for equipment, piping and ductwork including:
 - 1. Acoustical Performance of equipment systems and air distribution devices.
 - 2. Sound attenuating units.
 - 3. Duct lining.
 - 4. Noise Control Enclosures and Plenum.
 - 5. Noise Control Louvers.
 - 6. Duct and Pipe Lagging.
 - 7. Soundproofing of construction.
 - 8. Ductwork Enclosure for soundproofing.
- B. Noise evaluation of equipment specified elsewhere.
- C. Acoustical Performance
 - 1. It is the intent of this specification that noise levels from HVAC equipment (air-conditioning and/or ventilating equipment, ducts, grills, diffusers, mixing boxes, fan coil units, pumps, cooling towers, etc.) will not exceed the Preferred Noise Criteria Curves (PNC) described in Paragraph 3 of this Section. Noise Criteria Curves establish a one number rating for evaluating the acceptability of a sound pressure spectrum according to the average person's hearing. Noise Criteria Curves and their related sound pressure equivalents for each frequency are described in the 1987 ASHRAE Handbook Systems Volume.
 - 2. These NC levels should be used as a guide in the event of product substitutions and shop drawing modifications. The NC levels shall also serve as a gauge by which the results of workmanship and care of installation will be judged from an acoustical standpoint, since a poor installation can lead to the generation of noise.

3. Noise Criteria for occupied spaces for this project shall be set as follows:

Table 2 – Background Noise Criteria

Space	Rating
Theater 1 and Theater 2	PNC-20
Rehearsal Studios	PNC-25
Lobbies and Public Circulation Areas	PNC-35 to 40
Offices, Dressing Rooms	PNC-30 to 40

- D. This section is supplementary to other sections of Division 23, except where conflict exists between Section 230549 and other sections of Division 23, this Section 230549 shall govern.

1.2 QUALITY ASSURANCE

- A. Manufacturers to have been in the production and installation of noise control products for a period of no less than three years.
- B. Manufacturer to supervise installation of noise control systems where specified later in this section.
- C. In addition to complying with all pertinent codes and regulations, all work of this Section shall conform to the following Standard Specification requirements:
1. ADC 1062GRD-84 Test Code for Grilles, Registers and Diffusers.
 2. ADC 1062R4 Equipment Test Code for Air Terminal Boxes (VAV).
 3. AMCA Standard 300-1996 Reverberant Room Method for Sound Testing of Fans.
 4. AMCA Standard 301-1990 Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
 5. ANSI S12.2-1995 Criteria for Evaluating Room Noise.
 6. ANSI S12.34-1988 Engineering Method for the Determination of Sound Power Levels of Noise Sources for Essentially Free-Field Conditions over a Reflecting Plane.
 7. ANSI/ARI 880-89P Air Terminals.
 8. ARI Standard 260P Sound Rating of Ducted Air Moving and Conditioning Equipment.
 9. ARI Standard 270 Sound Rating of Outdoor Unitary Equipment.

10. ARI Standard 370-86 Sound Rating of Large Outdoor Refrigeration and Air Conditioning Equipment
11. ARI 890/ASHRAE 70-91 Rating of Air Diffusers and Air Diffuser Assemblies
12. ARI Standard 885-90 Method for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets
13. ARI Standard 575-94 Method of Measuring Machinery Sound Levels within Equipment Rooms.
14. ARI Standard 350-86 Sound Rating of Non-Ducted Indoor Air-Conditioning Equipment.
15. ASHRAE Standard 68-86 / AMCA Standard 330-86 Method of Testing In-Duct Sound Power Measurement Procedure for Fans.
16. ASTM C423-90 a Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
17. ASTM C1071-91 Thermal and Acoustical Insulation (Mineral Fiber, Duct Lining Material)
18. ASTM E90-90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
19. ASTM E413-87 Classification for Determination of Sound Transmission Class (STC).
20. ASTM E477-96 Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials.
21. ASTM E795-92 Practices for Mounting Test Specimens During Sound Absorption Tests.
22. ASTM E1222-90 Test Method for Laboratory Measurement of Insertion Loss of Pipe Lagging Systems.
23. CTI Code ATC-128 Code for Measurement of Sound from Water-Cooling Towers
24. ISO 7235-199 Acoustics – Measurement procedures for Ducted Silencers – Insertion Loss, Flow Noise, and Total Pressure Loss

D. Addresses

1. ADC: Air Diffusion Council, Chicago, IL 312-372-9800
2. AMCA: Air Movement and Control Assoc., Arlington Heights, IL 847-394-0150.

3. ANSI: American National Standards Institute, New York, NY
212-354-3300.
4. ARI: Air-Conditioning and Refrigeration Institute, Arlington, VA
703-524-8800
5. ASHRAE: American Society of Heating, Refrigeration and Air-Conditioning Engineers,
Atlanta, GA 404-636-8400
6. ASTM: American Society for Testing of Materials, West Conshohocken, PA 610-832-
9500

1.3 SUBMITTALS

A. Shop drawings, supplemental to Division 1 requirements:

1. Noise Control Enclosures and Plenum
2. Ductwall External Sound Proofing
3. Noise Control Louvers

B. Product data and schedules:

1. Sound Attenuators
2. Duct Lining
3. Noise Control Enclosures and Plenum
4. Pipe or Duct Lagging
5. Air Distribution Devices (Grilles, Registers and Diffusers)
6. VAV Units, Fan Terminal Units
7. Fans, Blowers, Chillers, Cooling Towers, Air-Conditioning Equipment, Pumps

C. Test Reports

Submit certified, independent acoustical test reports, not prior to 1975, from an accredited laboratory, member of NVLAP (National Volunteer Laboratory Accreditation Program) for the following:

1. Sound Attenuators
 - a. Acoustical performance shall be established by ASTM E-477-96 procedures. Dynamic insertion loss, air generated noise and aerodynamic performance test results, both in positive and negative flow, with pressure drop ratings shall be supplied that meets or exceeds requirements established later in this Specification.
2. Duct Lining
 - a. Acoustical performance shall be established by ASTM C423-90 procedures. Sound Absorption Coefficients with Type "A" mounting per ASTM E795 shall be supplied that meets or exceeds requirements established later in this Specification.
3. Noise Control Enclosures, Plenum and Louvers
 - a. Acoustical performance shall be established by ASTM E90, E413, E795 and C423 procedures. Sound Transmission Loss data, STC value, Sound Absorption Coefficients and NRC value shall be supplied that meets or exceeds requirements established later in this Specification.
4. Duct Lagging
 - a. Acoustical performance shall be established by ASTM E413 and E90 procedures. Insertion loss, Transmission loss and STC data shall be supplied that meets or exceeds requirements established later in this Specification.
5. Grilles, Registers and Diffusers
 - a. Acoustical performance shall be established by ADC 1062GRD and ADC/ARI standard 885 procedures. Sound power data and NC value with correction factors used shall be supplied that meets or exceeds requirements established later in this Specification. (NC data only is not acceptable).
6. VAV and Fan Terminal Boxes
 - a. Acoustical performance shall be established by ANSI/ARI 880-89 procedures. Sound power data and NC value with correction factors used shall be supplied that meets or exceeds requirements established later in this Specification. (Sone data only is not acceptable).
7. Fan Coil Units
 - a. Acoustical performance shall be established by AMCA Standard 350 procedures. Sound data shall be supplied that meets or exceeds requirements established later in this Specification. (Data in Sones or Bels is not acceptable).
8. AHUs and Air Conditioning Equipment

- a. Acoustical performance shall be established by AMCA Standard 330/ASHRAE Standard 68, or ARI 260P procedures. Sound data shall be supplied that meets or exceeds requirements established later in this Specification. (Data presented in Sones or Bels is not acceptable).

9. Fans (Exhaust Fans, Return Fans, Transfer Fans, Ventilation Sets)

- a. Acoustical performance shall be established by AMCA Standard 300 or 301 procedures. Sound data shall be supplied that meets or exceeds requirements of this Specification. (Data presented in Sones or Bels is unacceptable).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sound Attenuators

Vibro-Acoustics, Scarborough, ON (800) 565-8401
Industrial Acoustics Company, Inc., Bronx, NY (718) 931-8000
The AeroSonics Corporation, California, MO (573) 796-4151
United McGill Corporation, Griffin, GA (614) 882-5455
Commercial Acoustics, Division of Metal Form Manufacturing, Phoenix, AZ
(602) 233-1211

B. Duct Lining

Duct Liner Board, Owens-Corning Fiberglass, Toledo, OH (419) 248-8000
Mat Faced Linacoustic Standard Fiberglass Liner Board, Johns Manville, Denver, CO (303)
978-4900
Model PA Fiber Glass Absorber, Kinetics Noise Control Inc., Dublin, OH
(614) 889-0480

C. Duct and Pipe Lagging

KNM-100ALQ-2, Kinetics Noise Control, Inc., Dublin, Ohio (614) 889-0480
Noisemaster, The Proudfoot Company, Inc., Monroe, CT (800) 445-0034
Sound Seal Lag Series, Sound Seal, division of United Process, Inc., Agawam, MA
(413) 789-1770
Soundfab, The Soundcoat Company, Inc., Deer Park, NY (631) 242-2200

D. Noise Control Louvers

Industrial Acoustics Company, Inc., Bronx, NY (718) 931-8000
Titus Products, Division of Phillips Industries Inc., Richardson, TX 75081
(214) 699-1030

E. Noise Control Plenums and Enclosures

Industrial Acoustics Company, Inc., Bronx, NY (718) 931-8000
Commercial Acoustics, Division of Metal Form Manufacturing, Phoenix, AZ
(602) 233-1211

2.2 SOUND ATTENUATORS

- A. Duct silencers/sound traps/attenuators shall be installed according to the plans, specifications and enclosed schedule.
- B. Outer shells of the silencer shall be of 22 gauge minimum galvanized steel, with inner faces of 24 gauge minimum perforated galvanized steel. All internal components shall be spot-welded in place with welds on centers not exceeding 4". Seams shall be lock formed, mastic filled and be airtight when subjected to a differential air pressure of 8" H₂O. Leading and trailing edges of modules, when in multiple configuration shall be filled with a bead of caulking and shall be provided with continuously taped nosing or continuous metallic nosing that is crimped or button punched. Filler material shall be of inorganic mineral or glass fiber under a minimum 5% compression, inert, vermin and moisture proof.
- C. Combustion rating for the filler material shall equal or exceed the following when tested in conformance with ASTM E84, NFPA Standard 255 or UL No. 723:
- | | |
|-----------------------------|---------|
| Flame Spread Classification | 10 - 25 |
| Fuel Contributed | 0 - 15 |
| Smoke Development | 0 - 20 |
- D. Acoustical performance shall be established by ASTM E-477 tests in an accredited laboratory. Dynamic insertion loss, air generated noise and aerodynamic performance test results, both in positive and negative flow, shall be supplied by the manufacturer with submittal drawings. All tests are to have been conducted in the same facility. The silencers provided and installed shall have interior configurations, namely splitter and air passage widths, that are identical to the approved test units.
- E. Dynamic insertion loss and air generated noise performance under design air flow velocities shall be as scheduled herein.
- F. DUCT SILENCER SCHEDULE

Tag Number	Type*	System/ Area Served	W"	H"	L"	Airflow (cfm)	Static Pressure Drop (in.)
SA-3S	5LFM	AHU-3 Supply	30	26	60	4300	0.13
SA-3R	3LFM	AHU-3 Return	36	22	36	4300	0.12
SA-F8S	3LFM	FCU-8 Supply	24	12	36	696	0.05
SA-F8R	3LFM	FCU-8 Return	24	12	36	696	0.05

SA-F4S	3LFM	FCU-4 Supply	24	18	36	1250	0.05
SA-F4R	3LFM	FCU-4 Return	24	18	36	1250	0.05

* Type numbers are based, for identification purposes, on the Industrial Acoustics Company models.

G. DUCT SILENCER PERFORMANCE SCHEDULE

- The following minimum Dynamic Insertion Loss performance in decibels (+ 4 dB) shall be provided by each silencer when measured at a face velocity (forward (+) and reverse (-) flow) of 2000 ft/min, (values for type S and LFM are for 1000 ft/min.)

Silencer Type	Airflow Direction	Octave Band Center Frequency (Hz)						
		63	125	250	500	1000	2000	4000
3LFM	+	5	7	16	19	17	12	10
3LFM	-	7	8	17	20	18	13	11
5LFM	+	10	13	24	29	28	17	13
5LFM	-	12	15	27	31	30	17	14

- The **Self or Regenerated Noise** sound power levels in decibels re 10^{-12} watt shall not exceed the following values (± 4 dB) when measured at a face velocity (forward (+) and reverse (-) flow) of 1000 ft/min on a unit with a face area of 4 ft² for rectangular and conical cross sections.

Silencer Type	Airflow Direction	Octave Band Center Frequency (Hz)						
		63	125	250	500	1000	2000	4000
LFM	+	47	34	36	35	40	37	27
LFM	-	45	40	43	45	47	46	37

- Silencer dimensions are listed as catalog standard sizes. For ducts not falling into a standard silencer cross-section, units were chosen based on the most economical treatment with a combination of standard sizes and the required transitions versus custom fabrication to exact duct size.
- When silencers are installed downstream of elbows, splitters shall be parallel to the plane of the elbow turn.
- Silencers installed within 2 duct diameters of elbows or branch takeoffs shall be avoided, as this will increase the static pressure drop of the silencer by 1.2 to 3 times the catalog performance (as shown in the last column of the schedule) and could increase the silencer's regenerated noise and affect the final background room NC level.

2.3 SOUND-LININGS:

- A. Duct lining shall be roll form, 1" or 2" as called out in the drawings or specifications. It shall be installed on all interior surfaces of sheet metal ductwork where shown on the drawings or specifications.
- B. Duct lining shall be adhered by 100% covering of a fire retardant adhesive. The black acrylic face shall face the air stream. When width of duct exceeds 12" and also on sides when height exceeds 24", use non-ferrous mechanical fasteners in addition to 100% adhesive coverage. All transverse and longitudinal abutting edges of duct lining shall be sealed and lapped 3" with a heavy coat of adhesive, in accordance with the manufacturer's recommendations.
- C. Duct lining shall be fiberglass insulation with a surface acrylic EPA registered anti-microbial coating that will not support biological growth, and meets ASTM G21 and G22 specifications. This coating shall also guard against incursion of dust and dirt into the insulation. This coating shall be damage resistant which does not tear or abrade easily. Duct lining shall be capable of being cleaned per NAIMA Duct Cleaning Standards. Duct lining shall be black, 1.5 lb/ ft³ density meeting the requirements of NFPA 90A and 90B, FHC 25/50, and limited combustibility. Duct lining shall be suitable up to 5000 fpm. Duct lining and adhesives shall comply with ASTM E-84 and shall have a maximum flame spread rating of 25 and smoke rating of 50. Duct lining adhesive shall conform to ASTM C916 "Specifications for Adhesives for Duct Thermal Insulation". Fasteners shall comply with SMACNA HVAC Duct Construction Standards Article S2.11
- D. Metal Nosings shall be securely installed over transversely-oriented liner edges facing the air stream at forward discharge and at any point where lined duct is preceded by unlined duct. When velocities exceed 4000 FPM, use metal nosings on every leading edge. Nosing may be formed on duct or be channel or zee attached by screws, rivets or welds.
- E. Duct lining shall conform to ASTM C1071 standard "Thermal and Acoustical Insulation" and have the following minimum sound absorption coefficients when tested in accordance with ASTM C423 and E795 procedures mounting type "A":

	Octave Band Center Frequency, Hz.						
	125	250	500	1000	2000	4000	NRC
1" thick	0.04	0.19	0.35	0.55	0.69	0.72	0.45
2" thick	0.12	0.42	0.76	0.85	0.85	0.83	0.72

1. Mechanical Fasteners:

Comply with SMACNA HVAC Duct Construction Standards, Article S2.11.

2. Adhesives:

15-141 from King Co., St. Louis, MO (314) 772-9953

Tuffbond from Goodloe E. Moore, Inc., Danville, IL (800) 331-1164

INC C-700 from Industrial Noise Control Inc., Addison, IL (312) 620-1998

2.4 NOISE CONTROL ENCLOSURES AND PLENUM

- A. Plenum shall be furnished and installed as shown on the drawings and/or as hereinafter specified.
- B. 4" thick (nominal) noise control panels shall comprise 16-18 gauge solid sheet metal outer faces with 20-22 gauge perforated (providing 23% minimum open area) inner faces. The space between faces shall be filled with a mineral or glass fiber blanket, 3" to 4" thick of minimum density 3 lb/ ft³, packed under compression and two layers of 1/2" thick drywall, adhered to the solid steel side with mastic, for high STC panel. Panel framing and stiffeners shall be 16-18 gauge sheet metal. Perforated face of panel shall provide minimum Noise Reduction Coefficient (NRC) of 0.95 and entire panel shall provide a minimum Sound Transmission Class (STC) of 40, and minimum sound transmission loss values in the 1/1 octave bands as follows when tested in accordance with ASTM E90-75 or later:

Transmission Loss in dB	Octave Band Frequency, Hz.								STC
	63	125	250	500	1000	2000	4000	8000	
Regular	20	21	27	38	48	58	67	66	40
High STC	27	30	32	41	50	59	67	71	45

- C. Plenum shall be mounted on Mason Type ND mounts with a 0.35" deflection, or approved equal.
- D. Door panels shall be constructed of solid #18 gauge galvanized metal sides. Doors shall be supplied 24" wide x 60" high or 36" wide x 72" high as shown on the drawings. The doors shall be 4" thick of the overlapping seal type. Each door shall be supplied with single continuous acoustic seals around the sill, jamb and head. Doors shall have 2 hinges and 2 latches with an inside release handle. Each door shall be assembled with hinge hardware attached and adjusted and latches to be installed in the field. Door latches are to be the wedge lever type with inside handle. Hinges shall be heavy duty and designed for door size and weight. Door shall be designed to open against the air pressure.
- E. Windows shall be furnished for doors where shown on the drawings and shall consist of two layers of 1/4" safety glass separated by an air space and sealed acoustically and air tight with rubber seals. Air space shall contain a desiccant material to prevent misting.

- F. Roof channels, aprons and corner joiners shall be made of #16 gauge galvanized steel formed to prevent a direct path for sound and/or air leakage. Floor channels shall be made of #18 gauge galvanized steel. Panel joiners shall be made of #20 gauge galvanized steel and shall be roll formed to be greater in strength than standard #16 gauge joiners. Where roll joiners are not utilized, #16 gauge shall be provided. All panel accessories shall be furnished in standard lengths to be field cut to required dimensions. When Ramset can not be used, floor channels shall be pre-punched with 9/32" holes spaced 24" on center for attachment by 1/4" round head screws with expansion type inserts. All panel joiners and connectors requiring neoprene seals shall have the neoprene field applied.
- G. Openings for acoustical louvers, fan and duct connections where required, shall be provided by the plenum manufacturer. Pipe and conduit penetrations shall be located and cut in the field and sealed in accordance with the Manufacturer's instructions.
- H. The plenum shall be normally self-supporting. Where roof spans and wall loadings require additional strength, it shall be furnished either by heavier roof and wall joiners or additional structural steel members and/or pipe columns.
- I. Metal surfaces shall be galvanized except for 5" wide flange beams when used which shall be HR steel prime painted. Plenum shall be designed for outdoor use where required with normal weather-proofing and wind and snow loads accounted for.
- J. Panels shall have a maximum Heat Transfer Factor of 0.07 BTU/hour/sq. ft./degree Fahrenheit temperature difference of standard air.
- K. Plenum installation shall be capable of withstanding a positive internal static air pressure of 5.5 inches.
- L. Plenum installation shall be capable of withstanding a negative internal static air pressure of 4.5 inches.
- M. Plenum manufacturer shall warrant that when the plenum is installed in a workman like manner in strict accordance with these specifications and manufacturer's instructions, plenum shall meet the acoustical, thermal and air pressure performance specified.
- N. Plenum components shall be furnished clean, well made and free of any defects which may adversely affect the appearance, serviceability or performance. Manufacturer shall furnish proof of having manufactured similar plenums for at least three years prior to this installation.

2.5 DUCT AND PIPE LAGGING

- A. Where indicated on the drawings, duct/pipe shall be wrapped with a minimum 2" thick glass or mineral fiber blanket with a minimum 3.0 lb/ ft³ density, and a mass loaded vinyl sheet covered with an aluminum foil jacket. Vinyl sheet shall have a nominal density of 1.0 lb/ ft³ and shall be 0.10" thick. Jacket edges shall overlap by minimum of 6" and be supplied with velcro or peel off tape to secure jacket around duct/pipe. Complete system shall provide a minimum STC-23 as measured in an independent accredited acoustical laboratory in accordance with ASTM E90 and E413. Insertion Loss data indicating an IL (Insertion Loss) value of 25 at 500 Hz shall also be submitted.

2.6 GRILLES, REGISTERS AND DIFFUSERS

- A. Grilles, registers and diffusers shall be as specified elsewhere. Sound power and NC data shall be submitted as described in Section 1.4 of this Specification. Submittal may be rejected if sound power data is more than 5 dB higher in the 63 Hz octave band or 3 dB higher in any other octave band and NC is more than 1 NC higher when compared against the sound data of the specified product as indicated on the schedule.

2.7 AIR HANDLING UNITS AND AIR-CONDITIONING EQUIPMENT

- A. Air handling units and air-conditioning equipment shall be as specified elsewhere. Sound power data shall be submitted as described in Section 2.1 of this Specification.
- B. Provide units with the maximum sound power levels in dB, re 10⁻¹² as described in the following table. Units shall meet the specified power levels for radiated, discharge and ducted inlet noise.

Unit	Element	Octave Band Center Frequency (Hz)						
		63	125	250	500	1000	2000	4000
AHU-1	D	67	65	69	54	49	46	44
	I	64	66	77	65	49	55	53
	R	68	64	64	65	61	48	37
AHU-2	D	70	68	75	60	52	52	49
	I	68	66	82	69	57	63	58
	R	71	67	70	71	63	55	43
AHU-3	D	68	67	70	56	50	47	45
	I	64	67	79	68	50	56	52
	R	70	66	66	68	50	56	52
AHU-4	D	74	64	78	69	61	55	53
	I	67	56	76	63	59	63	57
	R	74	63	68	75	67	51	40
AHU-5A	D	84	85	79	79	78	73	73
	I	86	86	77	80	70	66	67

	R	72	68	56	56	57	60	49
AHU-5B	D	84	85	79	78	78	73	72
	I	86	85	77	81	72	67	68
	R	71	68	55	55	57	60	48

D: Discharge

I: Ducted Inlet

R: Casing Radiated

- C. Submittal may be rejected if sound power level data is more than 5 dB higher in the 63 Hz octave band or 3 dB higher in any other octave band when compared against the specified unit.
- D. Air-conditioning equipment shall be as specified elsewhere. Sound power data shall be submitted as described in Section 2.1 of this Specification for all units listed in the mechanical schedules on the drawings.
- E. Prior to air handling unit shipment to the site, ducted discharge and inlet sound power levels shall be measured for units AHU-1. Testing shall be witnessed by Commissioner at the manufacturer's expense. Notice shall be given by the air handling unit manufacturer of the proposed test date a minimum of four weeks in advance. Prior to testing, the manufacturer shall submit a detailed test plan as well as laboratory accreditation, personnel, and test equipment qualifications for approval by the Commissioner.

All measurements shall be taken in 1/3 and 1/1-octave bands. All tests shall be performed in conjunction with an AMCA 210 air flow test to ensure that sound measurements are taken when the unit is at the design operating point.

- F. In the event that the specified sound levels are not achieved by the tested unit(s), it is the manufacturer's responsibility to do whatever is necessary to achieve the specified sound levels at no additional cost to the owner.
- G. A detailed report, including all certifications, sound power level data, and test methods, shall be presented to Commissioner for approval prior to equipment shipment.

2.8 FANS (Exhaust Fans, Return Fans, Transfer Fans, Vent Sets)

- A. Fans shall be as specified elsewhere. Sound power data shall be submitted as described in Section 2.1 of this Specification.
- B. Provide units with the maximum sound power levels in dB, re 10^{-12} as described in table below. Units shall meet the specified power levels for radiated, discharge and ducted inlet noise if and as specified below.

Unit	Element	Octave Band Center Frequency (Hz)						
		63	125	250	500	1000	2000	4000

RFL-1	I	81	83	81	73	69	66	60
	R	84	84	77	67	61	51	42
EF-R1	I	79	77	64	61	53	51	45
	R	80	79	58	55	48	45	39
EF-R2	I	70	67	71	60	52	51	53
	R	73	68	67	54	44	36	35
EF-R3	I	79	78	65	62	53	52	46
	R	80	80	59	56	48	46	40
EF-R4A	I	81	81	76	73	65	61	56
	R	84	82	72	67	57	46	38
EF-R4B	I	73	76	69	65	58	55	48
	R	76	77	65	59	50	40	30

D: Discharge

I: Ducted Inlet

R: Casing Radiated

- C. Submittal may be rejected if sound power level data is more than **5 dB** higher in the 63 Hz octave band or **3 dB** higher in any other octave band when compared against the specified unit.

2.9 FAN COIL UNITS

- A. Fan Coil Units shall be as specified elsewhere. Sound power data shall be submitted as described in Section 2.1 of this Specification.
- B. Provide units with the maximum sound power levels in dB, re 10^{-12} as described in table below. Units shall meet the specified power levels for radiated, discharge and ducted inlet noise if and as specified below.

Unit	Speed	Element	Octave Band Center Frequency (Hz)					
			125	250	500	1000	2000	4000
FCU-1	Medium	D	64	59	51	47	42	33
		R	66	62	54	48	42	33
FCU-2	Medium	D	64	59	51	47	42	33
		R	66	62	54	48	42	33
FCU-3	Medium	D	63	56	52	49	45	39
		R	65	59	55	50	45	39
FCU-4	Medium	D	64	57	52	49	44	39
		R	66	60	55	50	44	39
FCU-8	Low	D	58	54	47	42	37	28
		R	60	57	50	43	37	28

D: Discharge

I: Ducted Inlet

R: Casing Radiated

PART 3 - EXECUTION

3.1 SOUNDPROOFING OF CONSTRUCTION

- A. Required for penetrations of ductwork, pipes, and conduits through walls, floors and ceilings of mechanical rooms and Sound-Critical Spaces as called out in Acoustical Performance Section 1.01 of this Specification, 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 a 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":

- 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 = 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 the neoprene insulation.
- 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 < 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/pipe shall be separated by minimum 4" in all directions.
 2. Multiple duct/pipe/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.

3.2 DUCTWORK ENCLOSURE FOR SOUNDPROOFING

- A. Where indicated on drawings, duct shall be enclosed on all four sides (or air-tight to the slab above) with a separate 2-1/2" steel stud filled with 2" thick, 3 pound density fiberglass and covered with 2 thicknesses of 5/8" thick gypsum wallboard. Wherever possible, joints between the base and face layers shall be staggered by a minimum of 6 inches. All gypsum board joints on both the base and face layers shall be taped. Use acoustical caulking to seal all interfaces with structure. Treatment shall be applied to elbows, transitions, branch-takeoffs, etc. that are included in the applicable duct section.
- B. Where access is required, approved gypsum board covered metal access panels shall be installed with perimeter gaskets.
- C. Where enclosure intersects a metal deck, insure that the gypsum wallboard is cut to the shape of the flutes and caulked air-tight.

3.3 NOISE CONTROL ENCLOSURE AND PLENUM

- A. Noise control enclosures and plenums shall be installed by factory trained personnel or manufacturer and/or his representative. Installer shall conform to all local trade agreements. Installation shall be performed according to approved shop drawings and manufacturer's instructions.
- B. Manufacturer shall inspect site and/or coordinate with machinery manufacturer in preparing shop drawings. Shop drawings shall be approved by machinery manufacturer as well as Commissioner and other parties in accordance with Section 1.3.
- C. Installer shall inspect finished installed product after machine is operational and adjust any sound seals and caulk any leaks and/or adjust seals to maintain noise control properties of enclosure.

3.4 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 partition penetrations. Background sound levels due to equipment noise may be measured 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, as described in Section 1.01.C of this specification, 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

SECTION 23 07 00

INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 230700, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #3 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 230000, General Provisions, and with the provisions of all applicable codes and laws.
- B. Conform to applicable performance standards, listings or approvals of the following organizations.
 - 1. National Fire Protection Association (NFPA)
 - 2. Underwriters Laboratories (UL)
 - 3. New York City Office of Technical Certification and Research (OTCR)
- C. All insulating materials shall comply with the following ratings:
 - 1. Flamespread -25
 - 2. Smoke Developed -50
 - 3. Fuel Contributed -50

1.3 SUBMITTALS

- A. Procedure: Prepare and make the submissions listed below and in Section 230000 in accordance with the procedure specified in Section 230000.
- B. Shop Drawings
 - 1. Insulating materials and jackets.
 - 2. Insulating cements, mastics and adhesives.
 - 3. Methods of installation.
 - 4. Pump enclosure details.
 - 5. Pipe shields.
 - 6. Schedule of insulation (system, material, thickness, cover, method of installation).

1.4 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 230000.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Type A - Fiberglass Insulation

1. The insulation should be sectional pipe jacketed with an embossed barrier laminate. 3.5 pound density insulation with a maximum thermal conductivity(k) of 0.29 Btu-in/hr-ft²-°F and rated to 850°F, composed of glass fibers bonded with a thermosetting resin. Insulation to be faced with vapor barrier of white flame resistant UL rated Kraft paper bonded to reinforced aluminum foil. Vapor barrier to have a maximum permeance of 0.02 perms.

2. Indoor Piping	Pipe Size:		
	1-1/2" & smaller	Over 1-1/2"	Fitting Type
	<hr/>		
Service:	Thickness (in.):		
Hot Water (<200°F)	1"	2"	F
Chilled Water	1"	1-1/2"	G
Condensate Drains	1/2"	1/2"	G

3. Manufacturers:

Owens-Corning, SSL II
Johns Manville - Micro-Lok HP
Knauf 1000° Pipe Insulation

B. Type B – NOT USED

C. Type C – NOT USED

D. Type D – Calcium silicate

1. Asbestos free, rigid hydrous calcium silicate, rated to 1200°F operating temperature.

Minimum density = 12 PCF.

Maximum conductivity = .4 at 200°F mean.6 at 600°F, mean

2. Service:	Thickness:
Generator Exhaust	2"
Generator Muffler	2"

3. Manufacturers:

Owens-Corning, Kaylo 10
Industrial Insulation Group, Thermo-12 Gold

E. Type E - Aluminum Jacketing

1. .016" aluminum jacket lock-on or slip-on type jacketing to be covered with acrylic coating on one outer surface and the baked epoxy moisture barrier on the inner surface.
2. Service:
Outdoor Piping on Type D Insulation
3. Manufacturer: Childers Products Co. - Lock-on or slip-on type or approved equal.

F. Type F - Fiberglass insulation for valves/fittings/flanges (other than vapor seal insulation).

1. Molded factory-formed fibrous glass with 3.5 PCF minimum density, max. K = .3 at 200OF, mean, rated to 450OF.
2. Finish with white 0.020", 25/50 rated PVC jacket, as manufactured by Proto LoSMOKE, Zeston (for use with Hamfab inserts) or approved equal. Fitting covers and jacketing to be precured.
3. Service: Thickness:
Hot Water Same as Piping
4. Manufacturers:
Fibrous Glass Products, Inc.
Insulcoustic Corp.
Hamfab

G. Type G - Fiberglass insulation for valves, fittings, flanges (vapor seal insulation).

1. Molded, factory-formed fibrous glass with 3.5 PCF minimum density, max. barrier adhesive and wrapped with glass mesh tape. Each fitting to be finished with two coats of Benjamin Foster 30-36 vapor seal.
2. Finish with white 0.020", 25/50 rated PVC jacket, as manufactured by Proto LoSMOKE, Zeston (for use with Hamfab inserts) or approved equal. All joints between PVC jacket and pipe covering shall be sealed with vapor barrier tape. Fitting covers and jacketing to be precured.
3. Service: Thickness:
Chilled Water Same as piping
4. Manufacturers:
Fibrous Glass Products, Inc.
Insulcoustic Corp.
Hamfab

H. Type H - Blanket/wrap

1. One(1) pound density insulation with a maximum thermal conductivity(k) of 0.27Btu-in/hr-ft²-°F at 75° F, composed of glass fibers bonded with a thermosetting resin. Insulation to be faced with vapor barrier of reinforced aluminum foil bonded to flame resistant UL rated Kraft paper. Vapor barrier to have a maximum permeance of 0.02 perms.

2. Service: Thickness:

Concealed Ductwork	
Supply Air	2"
Return Air	2"
Outside Air	2"
Exhaust Air downstream & 5' upstream of motorized damper.	2"

3. Manufacturers:

CertainTeed Soft Touch duct wrap with FSK facing.
Johns Manville Microlite XG duct wrap with FSK facing.
Knauf - Duct Wrap with FSK jacket.
Owens-Corning Fiberglass - Type 100 all service duct wrap.

I. Type I - Duct Board

1. Six(6) pound density insulation with a maximum thermal conductivity(k) of 0.23Btu-in/hr-ft²-°F at 75° F, composed of glass fibers bonded with a thermosetting resin. Insulation to be faced with vapor barrier of reinforced aluminum foil bonded to flame resistant UL rated Kraft paper. Vapor barrier to have a maximum permeance of 0.02 perms.

2. Service: Thickness:

Exposed ductwork	
Supply Air	1-1/2"
Return Air	1-1/2"
Outside Air	1-1/2"
Exhaust Air downstream & 5' upstream of motorized damper.	1-1/2"

3. Manufacturers:

Certainteed - CertaPro Commercial Board.
Johns Manville - Spin-Glas Board
Knauf - Insulation Board

J. Type J - Fiberglass for tanks and accessories.

1. Three pounds density, 450° F max. operating temperature, K Max = .3 at 200° F, mean semi-rigid board fibrous glass insulation, unfaced.

2. Service: Thickness:
Irregularly shaped pipe accessories 1"
Condensate Pump Receivers 1"

3. Manufacturers:
Owens-Corning, Type 703
Certaineed, Type IB
Knauf, Type elevated temperature board.
Manville, Type 814 Spin Glass

K. Type K – NOT USED

L. Type L - Fire Resistive Duct Wrap

1. Non-asbestos lightweight, high temperature, inorganic material consisting of ceramic fiber blanket with continuous foil-scrim jacket.

2. Service temperature of 2300°F. Suitable for zero clearance to combustible material.

3. Service: Thickness:
Supply and Return ductwork 1-1/2" in multiple layers
necessary for a two hour rating.

4. Manufacturer:
Minnesota Mining and Manufacturing, FireMaster Duct Wrap or the approved equal having received approval from the Commissioner and New York City Office of Technical Certification and Research (OTCR) Division for use on supply / return ductwork.

PART 3 - EXECUTION

3.1 INSULATION - GENERAL

- A. All insulating materials shall be applied only by experienced workmen, in accordance with the best covering practice. All piping, duct or equipment shall be blown out, cleaned, tested and painted prior to the application of any covering.
- B. At all openings insulation, insulate edges neatly and protect with sheet metal frames.
- C. All items below described in general indicate the type of covering required, however, all piping, ductwork or equipment that transmits heat or will form condensation shall be insulated.
- D. Insulate all piping, valves, fittings, and accessories that are part of the piping systems specified to be insulated in specification section 230700. Insulate valves and strainers to permit removal of bonnets or baskets without damage to insulation on valve or strainer bodies.
- E. Where existing insulation is damaged by requirements of the work, replace all damaged insulation to match existing insulation's thermal value.
- F. All insulation at duct access doors shall be set in sheet metal double-pan construction.

- G. No piping, ductwork, or equipment shall be insulated until tested and approved for tightness. All piping and ducts shall be dry when covered.

3.2 APPLICATION - PIPE INSULATION (TYPE A)

- A. Vapor barrier jacket: Seal longitudinal joints with vapor barrier adhesive, transverse joints sealed with vapor barrier strips and adhesive. Ends of pipe insulation sealed off with vapor barrier adhesive at all flanges, valves and fittings, and at not more than 20 feet on continuous runs of pipe.
- B. Finish for concealed pipe insulation: Secure all concealed pipe insulation with staples and vapor seal adhesive at longitudinal; standard all service jacket pasted on lap.
- C. Finish for exposed pipe insulation: Multiple layers (minimum 2) of glass weave jacket lap sealed with Childers CP-30. Alternatively, finish with white 0.020", 25/50 rated PVC pre-curved and pre-cut jacket, as manufactured by Proto LoSMOKE or Zeston, covering over all service jacket. For exposed vapor seal insulation, same finish over vapor sealed all service jacket.

3.3 APPLICATION - INSULATION AT PIPE HANGERS

- A. Provide pipe hangers insulation protection saddles and shields.
- B. Fill each pipe covering protection saddle with same insulation as specified for respective pipe or with suitable insulating cement.
- C. Where shields are specified at hangers on piping with fibrous glass covering, provide for load bearing calcium silicate between shields and piping as follows:
 - 1. For pipe covering without vapor barrier jacket, furnish at each shield 18" long calcium silicate section with canvas jacket continuous between shield and insulation.
 - 2. For pipe covering with vapor barrier jacket, remove bottom half section of fibrous glass and replace with half section of calcium silicate. Make vapor barrier jacket continuous between shield and insulation.

3.4 APPLICATION - DUCT INSULATION (TYPE H)

- A. Install duct wrap over clean, dry sheet metal ducts. All duct joints and seams must be sealed to prevent air leakage from the duct.
- B. Duct wrap shall be cut to stretch-out dimensions. 2" piece of insulation is removed from the facing at the longitudinal and circumferential ends of the piece to form an overlap. Wrap the insulation around the perimeter of the duct with the facing out. Duct wrap shall be compressed a maximum of 25% in order to maintain thermal efficiency. Adjacent sections of insulation shall be tightly butted with the 2" overlapping. Staple seams on 6" centers.
- C. Minimize compression of the insulation to assure maximum thermal performance. Longitudinal seam of the vapor barrier must be overlapped a minimum of 2".
- D. All seams should be finished with appropriate pressure sensitive tape or glass fabric and mastic.
- E. Pressure sensitive tapes should be a minimum 3" wide and be applied with moving pressure using an appropriate sealing tool.

- F. Closure systems should have a 25/50 F.H.C. per UL 723.
- G. For rectangular ducts over 18" wide, the duct wrap should be secured to the duct with mechanical fasteners spaced on 18" centers to reduce sag. Care should be taken to avoid overcompressing the insulation with the retaining washer.
- H. Unfaced duct wrap should be overlapped a minimum of 2" and fastened with 4" to 6" nails or skewers spaced 4" apart, or secured with a wire or banding system.
- I. Where vapor barrier performance is necessary, all seams, joints, penetrations, washers and damage to the facing should be repaired with a minimum 2" overlap of tape prior to system startup.

3.5 APPLICATION - DUCT INSULATION (TYPE I)

- A. Fasten insulation in place with wed pins and washers or equivalent mechanical fastening method, as approved.
- B. Seal all joints with vapor barrier adhesive to provide continuous vapor barrier.
- C. All edges, corners, penetrations, and joints shall be reinforced and sealed with with vapor barrier adhesive tape to provide continuous vapor barrier. Tape shall be 4" wide, of type, and applied in strict conformance with manufacturer's recommendations. Tape shall be applied over insulation support washers.

3.6 APPLICATION - TANK INSULATION (TYPE J)

- A. Point joints with lagging cement prior to application of finish. Finish with two layers of 8 oz. glass mesh weave. Coat each layer of weave with vapor barrier adhesive.
- B. Insulation shall be fastened with welded pins or stick clips on flat surfaces and with stainless steel bands on irregular surfaces.

3.7 APPLICATION - FIRE RESISTIVE DUCT WRAP (TYPE L)

- A. Install in accordance with manufacturer's recommendations and approved OTCR installation procedures.
- B. Encircle the duct with continuous layers of insulation material. The material shall overlap by a minimum of three inches in the perpendicular direction. Subsequent layers of material shall be applied with a minimum three inch overlap in the longitudinal direction. Apply multiple layers as necessary to achieve a two hour zero clearance fire resistance rating.
- C. Secure insulation with 304 carbon steel banding (two hour rating) not less than 1/2 inches wide and 0.015 inches thick.
- D. Seal edges of insulation with high performance aluminum tape, 3 inches wide.
- E. Access doors shall be covered by three layers of insulation secured by 10 gauge pins, 4" to 5" long or copper coated steel, secured by 1-1/2" x 1-1/2" galvanized clips. Insulation shall be applied in three layers, each successive layer shall be 2" larger than the previously applied layer. Seal edges of exposed insulation with three inch wide aluminum tape. Access door shall be secured by 1/4" diameter threaded rods with 1/4" wing nuts, 12 inches on center around the perimeter of the access door.
- F. Seal floor penetrations with 3M FB-2000+ silicone sealant or approved equal over packing material of 3M FireMaster duct wrap or 3 pcf mineral wool or approved equal.

- G. Insulate all hanger rods directly in contact with the duct, with 8" of ductwrap closest to the point of contact.

3.8 APPLICATION - GENERATOR EXHAUST/MUFFLER (TYPE D)

- A. Apply insulation in two layers with staggered joints between layers. Each layer shall be secured with No. 14 gauge stainless steel wire. Apply a high rib lath and two coats of vermiculite plaster over the insulation.
- B. Finish the surfaces with .016" thick aluminum jacketing with lock on joints. Provide 12" long, 16 gauge aluminized steel shields at support points.

3.9 APPLICATION - PIPE INSULATION (TYPE E)

- A. Install aluminum jacketing with a minimum 2" overlap lapped downward to shed water. Seal all joints with joint sealer mastic. Finish circumferential joints with 3/8" aluminum strapping and seals. Secure with aluminum bands on 8" centers.

END OF SECTION

SECTION 23 08 00
COMMISSIONING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, General Commissioning Requirement and other Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.
- B. Related Sections:
 - 1. Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.
 - 2. Division 23 Heating Ventilation & Air Conditioning

1.3 DESCRIPTION

- A. Commissioning: Commissioning is a systematic process of ensuring that all building systems, including the mechanical and electrical systems, have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The Commissioning Agent (CxA) shall provide the Owner with an unbiased, objective view of the system's installation, operation and performance. This process does not eliminate or reduce the responsibility of each system designer to provide a complete design or installing subcontractors to provide a finished product. Commissioning is intended to enhance the quality of each system installation, startup and transfer to beneficial use by the Owner.
- B. Commissioning during the construction phase is intended to achieve the following specific objectives, according to the Contract Documents:
 - 1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 - 2. Verify and document proper performance of equipment and systems as per the written procedures.
 - 3. Verify that Operation & Maintenance documentation is complete and transferred to Owner.
 - 4. Verify that the Owner's operating personnel are adequately trained.
 - 5. Verify a contract is in place for a post occupancy review with O&M staff within 10 months after Substantial Completion.
- C. The Commissioning process shall be a team effort and encompass, as well as coordinate, the traditionally separate functions of system documentation, system installation, equipment startup, control system calibration, testing, balancing and verification and performance checkouts.

- D. The CxA will work closely with the construction team, cooperating on and coordinating all Cx activities with the Commissioner, Owner's representative, Trade Contractors, subcontractors, manufacturers and equipment suppliers.

The Cx process shall not reduce the responsibility of the CM to comply with the Contract Documents.

1.4 DEFINITIONS

- A. Refer to Division 01 Section "General Commissioning Requirements" for definitions.

1.5 SUBMITTALS

- A. Refer to Division 01 Section "General Commissioning Requirements" for CxA's role.
- B. Refer to Division 01 Section "Submittals" for specific requirements.
- C. In addition, provide the following:
 - 1. Certificates of readiness
 - 2. Certificates of completion of installation, pre-start, and startup activities.
 - 3. O&M manuals
 - 4. Test reports
- D. Control Drawings Submittal
 - 1. The control drawings shall have a key to all abbreviations.
 - 2. The control drawings shall contain graphic schematic depictions of the systems and each component.
 - 3. The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
 - 4. Provide a full points list with at least the following included for each point:
 - a. Controlled system
 - b. Point abbreviation
 - c. Point description
 - d. Display unit
 - e. Control point or set point (Yes / No)
 - f. Monitoring point (Yes / No)
 - g. Intermediate point (Yes / No)
 - h. Calculated point (Yes / No)

1.6 QUALITY ASSURANCE

- A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.7 COORDINATION

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to coordination during the commissioning process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the mechanical contractor of Division 23 shall ultimately be responsible for all standard testing equipment for the HVAC&R system and controls system in Division 23, except for equipment specific to and used by TAB in their commissioning responsibilities. A sufficient quantity of two-way radios shall be provided by each subcontractor.
- B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.
- C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.
- D. Data logging equipment and software required to test equipment will be provided by the CxA, but shall not become the property of the Owner.
- E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 - EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS

- A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems
- B. Red-lined Drawings:
 - 1. The contractor will verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings.
 - 2. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.
 - 3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
 - 4. The contracted party, as defined in the Contract Documents will create the as-built drawings.

C. Operation and Maintenance Data:

1. Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
2. The CxA will review the O&M literature once for conformance to project requirements.
3. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.

D. Demonstration and Instruction:

1. Contractor will provide demonstration and instruction as required by the contract document.
2. A complete instruction plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any instruction.
3. A instruction agenda for each training session shall be submitted to the CxA at least one (1) week prior the training session.
4. The CxA shall be notified at least 72 hours in advance of scheduled tests so that testing may be observed by the CxA and Owner's representative. A copy of the test record shall be provided to the CxA, Owner, and Architect.
5. Engage a Factory-authorized service representative to instruct Owner's maintenance personnel to adjust, operate, and maintain specific equipment.
6. Instruct Owner's maintenance personnel on procedures and schedules for starting and stopping, trouble shooting, servicing, and maintaining equipment.
7. Review data in O&M Manuals.

3.2 CONTRACTOR'S RESPONSIBILITIES

- A. Mechanical, Controls and TAB Contractors. The commissioning responsibilities applicable to each of the mechanical, controls and TAB contractors of Division 23 are as follows (all references apply to commissioned equipment only):
- B. Perform commissioning tests at the direction of the CxA.
- C. Attend construction phase controls coordination meetings.
- D. Attend testing, adjusting, and balancing review and coordination meetings.
- E. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
- F. Provide information requested by the CxA for final commissioning documentation.
- G. Prepare preliminary schedule for Mechanical system orientations and inspections, operation and maintenance manual submissions, training sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, testing and balancing and task completion for owner. Distribute preliminary schedule to commissioning team members.
- H. Update schedule as required throughout the construction period.
- I. During the startup and initial checkout process, execute the related portions of the prefunctional checklists for all commissioned equipment.
- J. Assist the CxA in all verification and functional performance tests.
- K. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

- L. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA (45) days after submittal acceptance.
- M. Coordinate with the CxA to provide (72) hour advance notice so that the witnessing of equipment and system start-up and testing can begin.
- N. Notify the CxA a minimum of (2) weeks in advance of the time for start of the testing and balancing work. Attend the initial testing and balancing meeting for review of the official testing and balancing procedures.
- O. Participate in, and schedule vendors and contractors to participate in the instruction sessions.
- P. Provide written notification to the CM/GC and CxA Authority that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.
 - 1. HVAC&R equipment including all fans, air handling units, piping, ductwork, dampers, terminals, and all other equipment furnished under this Division.
 - 2. Controls system used for equipment monitoring and manipulation
 - 3. Fire stopping in the fire rated construction, including fire and smoke damper installation, caulking, gasketing and sealing of smoke barriers.
 - 4. Fire detection and smoke detection devices furnished under other divisions of the specification.
- Q. The equipment supplier shall document the performance of his equipment.
- R. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.
- S. Test, Adjust and Balance Contractor
 - 1. Attend initial commissioning coordination meeting scheduled by the Commissioning Authority.
 - 2. Submit the site specific testing and balancing plan to the CxA and AE for review and acceptance.
 - 3. Attend the testing and balancing review meeting scheduled by the CxA. Be prepared to discuss the procedures that shall be followed in testing, adjusting, and balancing the HVAC&R system.
 - 4. At the completion of the testing and balancing work, and the submittal of the final testing and balancing report, notify the HVAC&R contractor and the CM/GC.
 - 5. Participate in verification of the testing and balancing report, which will consist of repeating measurements contained in the testing and balancing reports. Assist in diagnostic purposes when directed.
- T. Provide instruction of the Owner's operating staff using expert qualified personnel, as specified.
- U. Equipment Suppliers
 - 1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner, to keep warranties in force.
 - 2. Assist in equipment testing per agreements with contractors.
 - 3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
- V. Refer to Division 01 Section "General Commissioning Requirements" for additional contractor responsibilities.

3.3 OWNER'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for Owner's Responsibilities.

3.4 CxA RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for CxA's Responsibilities.

3.5 TESTING PREPARATION

- A. Certify in writing to the CxA that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
- B. Certify in writing to the CxA that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- C. Certify in writing that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
- D. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- E. Inspect and verify the position of each device and interlock identified on checklists.
- F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.6 TESTING, ADJUSTING AND BALANCING VERIFICATION

- A. Air and water testing, balancing and equipment performance verification shall be accomplished by an independent test and balance firm. The CxA shall spot check this work to verify accuracy of results
- B. Prior to performance of Testing, Adjusting and Balancing work, provide copies of reports, sample forms, checklists, and certificates to the CxA.
- C. Notify the CxA at least ten (10) days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.
- D. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.
 - 1. The CxA will notify testing and balancing subcontractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.
 - 2. The testing and balancing subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
 - 3. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.7 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
- B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- D. The CxA along with the HVAC&R contractor, testing and balancing Subcontractor, and HVAC&R Instrumentation and Control Subcontractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.
- E. Tests will be performed using design conditions whenever possible.
- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. The CxA may direct to alter set points when simulating conditions is not practical.
- H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.8 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 23 sections. Provide submittals, test data, inspector record, and certifications to the CxA.
- B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 23 Sections. Assist the CxA with preparation of testing plans.
- C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment: Test requirements are specified in Division 23 piping Sections. HVAC&R Contractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include but not limited to the following:
 - 1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
 - 2. Description of equipment for flushing operations.
 - 3. Minimum flushing water velocity.
 - 4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.
- D. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.
- E. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

- F. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.
- G. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The following equipment and systems shall be evaluated:
 - 1. HVAC systems
 - 2. Building Automation System
 - 3. Ductwork and accessories
 - 4. Heating Hot Water System
 - 5. Testing, Adjusting and Balancing

3.9 APPROVAL

- A. Refer to other specification and "General Commissioning Requirements" for approval procedures.

3.10 DEFERRED TESTING

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to deferred testing.

3.11 OPERATION AND MAINTENANCE MANUALS

- A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.
- B. Refer to Division 01 Section "General Commissioning Requirements" for the CxA roles in the Operation and Maintenance Manual contribution, review and approval process.
- C. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.

3.12 INSTRUCTION OF OWNER PERSONNEL

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to instruction.
- B. Mechanical Contractor. The mechanical contractor shall have the following instruction responsibilities:
 - 1. Provide the CxA with an instruction plan two weeks before the planned training.
 - 2. Provide designated Owner's personnel with comprehensive orientation and instruction in the understanding of the systems and the operation and maintenance of each piece of HVAC equipment including, but not limited to, all HVAC equipment (ex. pumps, heat exchangers, chillers, heat rejection equipment, air conditioning units, air handling units, fans, terminal units, controls and water treatment systems, etc.)
 - 3. Instruction shall normally start with classroom sessions followed by hands-on instruction on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
 - 4. 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 will be repaired or adjusted as necessary and the demonstration repeated.
 - 5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building

operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the training.

6. The controls contractor shall attend sessions other than the controls instruction, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
 7. The instruction sessions shall 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.
 8. Instruction shall include:
 - a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
 - b. Discussion of relevant health and safety issues and concerns.
 - c. Discussion of warranties and guarantees.
 - d. Common troubleshooting problems and solutions.
 - e. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
 - f. Discussion of any peculiarities of equipment installation or operation.
 - g. The format and training agenda in The HVAC Commissioning Process, ASHRAE Guideline 1-2007, is recommended.
 9. Hands-on instruction 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.
 10. The mechanical contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
 11. Instruction shall occur after functional testing is complete, unless approved otherwise by the Owner.
- C. Controls Contractor. The controls contractor shall have the following training responsibilities:
1. Provide the CxA and AE with a training plan four weeks before the planned training.
 2. The controls contractor shall provide designated Owner personnel training on the control system in this facility. The intent is to clearly and completely instruct the Owner on all the capabilities of the control system.
 3. Training manuals. The standard operating manual for the system and any special training manuals will be provided for each trainee, with three extra copies left for the O&M manuals. In addition, copies of the system technical manual will be demonstrated during training and three copies submitted with the O&M manuals. Manuals shall include detailed description of the subject matter for each session. The manuals will 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 CxA and A/E. Copies of audiovisuals shall be delivered to the Owner.
 4. The trainings will be tailored to the needs and skill-level of the trainees.
 5. The trainers will be knowledgeable on the system and its use in buildings. For the on-site sessions, the most qualified trainer(s) will be used. The Owner shall approve the instructor prior to scheduling the training.

6. 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 will be repaired or adjusted as necessary and the demonstration repeated.
7. The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
8. Three (3) training sessions are suggested: (to be confirmed by the owner and should be included in general specification for training, as applicable)
 - a. Training I. Control System. The first training shall consist of 8 hours of actual training. This training may be held on-site or in the supplier's facility. If held off-site, the training may occur prior to final completion of the system installation. Upon completion, each student, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.
 - b. Training II. Building Systems. The second session shall be held on-site for a period of 8 hours of actual hands-on training after the completion of system commissioning. The session shall include instruction on:
 - 1) 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.
 - 2) Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing set points and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, 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.
 - 3) All trending and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends. Trainees will actually set-up trends in the presence of the trainer.
 - 4) Every screen shall be completely discussed, allowing time for questions.
 - 5) Use of keypad or plug-in laptop computer at the zone level.
 - 6) Use of remote access to the system via phone lines or networks.
 - 7) Setting up and changing an air terminal unit controller.
 - 8) Graphics generation
 - 9) Point database entry and modifications
 - 10) Understanding DDC field panel operating programming (when applicable)
 - c. Training III. The third training will be conducted on-site six months after occupancy and consist of 8 hours of training. The session will be structured to address specific topics that trainees need to discuss and to answer questions concerning operation of the system.

D. TAB: The TAB contractor shall have the following training responsibilities:

1. TAB shall meet with facility staff after completion of TAB and instruct them on the following:
 - a. Go over the 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 for any areas that are not finished.
- e. Other salient information that may be useful for facility operations, relative to TAB.

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SECTION 23 09 23

CONTROLS AND INSTRUMENTATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 230000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #3 Contractor.
- C. Provide all labor, materials, tools, equipment, and services for a complete direct digital control (DDC) system as indicated, in accordance with provisions of contract documents.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 230000, General Provisions, and with the provisions of all applicable codes and laws.
- B. The installation and equipment is to conform to applicable building code articles and applicable reference standards cited therein.
- C. It is the responsibility of the Contract #3 Contractor to be familiar with all codes, rules, ordinances, and regulations of the New York City Building Code and their interpretations which are in effect at the site of the work.
- D. The latest issue of applicable standards and recommended practices of the following agencies in effect shall form a part of the specification to the extent each agency's relative standards or recommended practices apply to the Systems and its components as specified herein.
 - 1. Federal Communications Commission (FCC)
 - 2. American National Standards Institute (ANSI)
 - 3. American Society of Mechanical Engineers (ASME)
 - 4. Electronic Industries Association (EIA)
 - 5. Institute of Electrical and Electronics Engineers (IEEE)
 - 6. National Electrical Manufacturers Association (NEMA)
 - 7. National Fire Protection Association (NFPA)
 - 8. Underwriters Laboratories (UL)
 - 9. Occupational Safety and Health Administration (OSHA)
 - 10. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- E. The Contract #3 Contractor shall be solely responsible for compliance with all health and safety regulations, performing the work in a safe and competent manner, and use industry accepted installation procedures required for the work as outlined in these documents.

- F. All systems equipment, components, accessories, and installation hardware shall be new and free from defects and shall be UL listed where applicable. All components shall be in current production and shall be a standard product of the system or device manufacturer. Refurbished or reconditioned components are unacceptable. Each component shall bear the make, model number, device tag number (if any), and the UL label as applicable. All Systems components of a given type shall be the product of the same manufacturer.

1.3 SUBMITTALS

- A. Procedure: Prepare and make the submissions listed below and in Section 230000 in accordance with the procedure specified in Section 230000.
- B. Shop Drawings
 - Automatic control components
 - Sequences of operation
 - Starter wiring of all automatically controlled motors
 - Control diagrams
 - Color coded wiring diagrams
 - Control valves
 - Variable speed drive unit
 - Sample of panel graphics
 - Direct digital control panels
 - Computer program
 - Accessories and auxiliaries
 - Library of custom computer graphics to be installed under this contract.
 - Outline of system test and commissioning procedure and anticipated schedule for testing and commissioning using project milestones.

1.4 SYSTEM TESTING AND COMMISSIONING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 230000.
- B. Control system shall be set up and checked out by factory trained competent technicians skilled in the setting and adjustment of BMS equipment used in this project. This technician shall be experienced in the type of systems associated with this BMS.
- C. At the time of final observation, demonstrate the sequence of operation for each system to the Commissioner.

1.5 IDENTIFICATION TAGS AND DRAWINGS

- A. Provide two copies of the as-installed control system, mounted on masonite and covered with heat bonded clear plastic laminate.
- B. Provide identifying tags on all controls to conform to the designation of the control diagrams.
- C. Provide nameplate on each starter equal to equipment identification (Section 230000) indicating equipment controlled, source of control voltage, and equipment interlocked through starter. Size of identification nameplate to be a function of information contained (minimum 1-1/2" x 3-1/2").

1.6 MANUFACTURER'S WARRANTY

- A. In addition the warranty specified in 230000, the BMS vendor shall warrant all system components for a period of two years from the date of final acceptance by the City of New York and Commissioner. The warranty shall include parts, labor, and debugging of system software.

1.7 INSTRUCTION OF CITY OF NEW YORK'S OPERATING PERSONNEL

- A. In addition to the on site training specified elsewhere, the Contract #3 Contractor shall instruct two facilities personnel at the manufacturer's regional training facility.
- B. The course shall be the same course used in the instruction of the manufacturer's own service personnel. The course shall have a minimum of 40 classroom hours, and shall cover the following curriculum.
 - 1. Programming
 - 2. Maintenance of hardware
 - 3. Trouble shooting
 - 4. Repairing and rebuilding system components

PART 2 - PRODUCTS

2.1 ELECTRIC CONTROLS

- A. General
 - 1. Electrical controls of the low voltage type, shall be minimum #18AWG THHN/THWN, plenum-rated, with copper conductors. 120 volt control wiring shall be minimum #12AWG, THHN/THWN, terminated in appropriate lugs.
 - 2. Safety controls shall be 120 volts or less, with one leg grounded.

2.2 INDIVIDUAL INDICATING PANELS

- A. Provide separate indicating panels in each mechanical room, to house all miscellaneous pneumatic and electric control devices, relays, etc. serving systems located in the room. Mount controls, control setting indicator, all control pressure gauges and all remote mounted system temperature and pressure gauges on the panel.
- B. Locate the panels near the central equipment for each system. The panel mounted controls for air systems may be mounted in a common panel.
- C. Construct the panels of a minimum of 16 gauge steel or formica properly braced and stiffened and supported on an angle iron frame.
- D. Provide a diagram of each device and its position in the panel, with nomenclature matching the final control diagrams.

2.3 MOTORIZED DAMPERS

- A. Constructed multiple opposed blades of extruded aluminum 16 gauge steel crimped at the ends or of doubled 22 gauge steel, formed and spot welded for stiffness or of airfoil shaped aluminum. Limit blade width to 10". Provide steel linkage and shaft and nylon or oil impregnated bronze bearings. Set damper blades in a welded steel channel frame.
- B. Galvanize or zinc plate all steel parts. Finish with aluminum paint.
- C. Damper blades and frame shall have butyl or neoprene mechanically fastened to insure airtight seal when closed. Provide seals on all four sides. Seals shall be rated for operation between -40°F and 200°F. Maximum leakage shall not exceed 4 SCFM/FT² at 3.0 inch pressure differential.
- D. Damper linkage arrangement shall be equal percentage and shall match the damper operator.

Application: Fresh Air
 Relief
 Return
 Smoke Damper

2.4 DIRECT DIGITAL CONTROL SYSTEM

- A. Approved manufacturers for the automatic control systems are as follows:

<u>Manufacturers</u>	<u>SERIES</u>
Automated Logic	
Honeywell	EXCEL 5000 w/ Symmetre software
Johnson Controls	Metasys
Siemens	Apogee

- B. System Architecture
 - 1. The system shall employ distributed processing architecture. Interruption of the main network bus or any of the local LAN buses shall not interrupt the operation of the system in any way. DDCP shall be so organized such that all necessary inputs and output points necessary to accomplish specified sequences of operation shall be connected to the same DDC panel.
 - 2. It shall be possible to access data from any point on the system from any other point on the system including space sensors, DDCP's, LAN controller's, etc.
 - 3. Workstation/DDC Panel Support: Operator workstations and DDC panels shall directly reside on a single shared high speed local area network such that communications may be executed directly between controllers, directly between workstations, and between controllers and workstations on a peer-to-peer basis.
 - 4. Dynamic Data Access: All operator devices, either network resident or connected via dial-up modems, shall have the ability to access all point status and application report data, or execute control functions for any and all other devices via the local area network. Access to data shall be based upon logical identification of building equipment.

- a. Access to system data shall not be restricted by the hardware configuration of the facility management system. The hardware configuration of the DDC system network shall be transparent to the user when accessing data or developing control programs.
5. General Network Design: Network design shall include the following provisions:
- a. High speed data transfer rates for alarm reporting, quick report generation from multiple controllers, and upload/download efficiency between network devices. The minimum baud rate shall be 1 Megabaud.
 - b. Support of any combination of controllers and Operator Workstations directly connected to the local area network.
 - c. Detection and accommodation of single or multiple failures of either workstations, DDC panels or the network media. The network shall include provisions for automatically re-configuring itself to allow all operational equipment to perform their designated functions as effectively as possible in the event of single or multiple failures.
 - d. Message and alarm buffering to prevent information from being lost.
 - e. Error detection, correction, and re-transmission to guarantee data integrity.
 - f. Default device definition to prevent loss of alarms or data, and ensure alarms are reported as quickly as possible in the event an operator device does not respond.
 - g. Commonly available, multiple sourced, networking components shall be used to allow the DDC system to coexist with other networking applications. The following are acceptable technologies: ARCNET and/or ETHERNET and/or SERVICE TELEPHONE PAIRS and/or BROADBAND.
 - h. Communications must be of a deterministic nature to assure calculable performance under worst-case network loading. When a collision-based network is proposed, the Contract #3 Contractor shall provide detailed calculations showing worst-case network response times.
 - i. Automatic synchronization of the real-time clocks in all DDC panels shall be provided.
- C. Direct Digital Control Panels (DDCP)
1. Stand-alone Controllers shall be micro-processor based with a minimum word size of 16 bits. They shall also be multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules. Controller size shall be sufficient to fully meet the requirements of this specification and the attached point list.

2. Each DDC Controller shall have sufficient memory, a minimum of 1 megabyte, to support its own operating system and databases, including:
 - a. Control processes
 - b. Energy management applications
 - c. Alarm management applications including custom alarm messages for each level alarm for each point in the system.
 - d. Historical/trend data for points specified
 - e. Maintenance support applications
 - f. Custom processes
 - g. Operator I/O
 - h. Dial-up communications
 - i. Manual override monitoring

3. Each DDC Controller shall support:

Monitoring of the following types of inputs, without the addition of equipment outside the DDC Controller cabinet:

- a. Analog inputs
 - 4-20 mA
 - 0-10 Vdc
 - Thermistors
 - 1000 ohm RTDs
- b. Digital inputs
 - Dry contact closure
 - Pulse Accumulator
 - Voltage Sensing

Direct control of pneumatic and electronic actuators and control devices. Each DDC Controller shall be capable of providing the following control outputs without the addition of equipment outside the DDC Controller cabinet:

- c. Digital outputs (contact closure)
- d. Contact closure (motor starters, sizes 1-4).
- e. Analog outputs
 - 0-20 psi
 - 4-20 mA
 - 0-10 Vdc

4. Each DDC Controller shall have a minimum of 10 per cent spare capacity for future point connection. The type of spares shall be in the same proportion as the implemented I/O functions of the panel, but in no case shall there be less than two spares of each implemented I/O type. Provide all processors, power supplies and communication controllers complete so that the implementation of a point only requires the addition of the appropriate point input/output termination module and wiring.
 - a. Provide sufficient internal memory for the specified control sequences and have at least 25% of the memory available for future use.

5. DDC Controllers shall provide at least two RS-232C serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals. DDC Controllers shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, printers or terminals.
6. The operator shall have the ability to manually override automatic or centrally executed commands at the DDC Controller via local, point discrete, on-board hand/off/auto operator override switches for digital control type points and gradual switches for analog control type points. These override switches shall be operable whether the panel processor is operational or not.
 - a. Switches shall be mounted either within the DDC Controllers key-accessed enclosure, or externally mounted with each switch keyed to prevent unauthorized overrides.
 - b. DDC Controllers shall monitor the status of all overrides and inform the operator that automatic control has been inhibited. DDC Controllers shall also collect override activity information for reports.
7. DDC Controllers shall provide local LED status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device. Graduated intensity LEDs or analog indication of value shall also be provided for each analog output. Status indication shall be visible without opening the panel door.
8. Each DDC Controller shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all panel components. The DDC Controller shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.
9. Isolation shall be provided at all peer-to-peer network terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standards 587-1980.
10. In the event of the loss of normal power, there shall be an orderly shutdown of all DDC Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours.
 - a. Upon restoration of normal power, the DDC Controller shall automatically resume full operation without manual intervention.
 - b. Should DDC Controller memory be lost for any reason, the user shall have the capability of reloading the DDC Controller via the local RS-232C port, via telephone line dial-in or from a network workstation PC.
11. Provide a separate DDC Controller for each HVAC system as indicated by separate articles in the Part III - Execution section of this specification section. It is intended that each unique system be provided with its own point resident DDC Controller.

12. Telecommunication Capability:

- a. Auto-dial/auto-answer communications shall be provided to allow DDC Controllers to communicate with remote operator stations and/or remote terminals on an intermittent basis via telephone lines, as indicated in the sequence of operations.
- b. Auto-dial DDC Controllers shall automatically place calls to workstations to report alarms or other significant events using recorded voice messages for each alarm category and system prepared by the DDC vendor in coordination with the City of New York.
 - i. DDC Controllers shall be able to store a minimum of 10 phone numbers of at least 20 digits. Retry a single primary number at a fixed interval until successful.
 - ii. The auto-dial program shall include provisions for handling busy signals, "no answers" and incomplete data transfers. Provide as a minimum 3 secondary numbers when communications cannot be established with the primary device.
- c. Operators at dial-up workstations shall be able to perform all control functions, all report functions and all database generation and modification functions as described for workstations connected via the network. Routines shall be provided to automatically answer calls from remote DDC Controllers. The fact that communications are taking place with remote DDC Controllers over telephone lines shall be completely transparent to an operator.
 - i. An operator shall be able to access remote buildings by selection of any facility by its logical name. The workstation dial-up program shall store the phone numbers of each remote site, so the user shall not be required to remember or manually dial telephone numbers.
 - ii. A PC workstation may serve as an operator device on a network, as well as a dial-up workstation for multiple auto-dial DDC Controllers or networks. Alarm and data file transfers handled via dial-up transactions shall not interfere with network activity, nor shall network activity keep the workstation from handling incoming calls.
- d. Dial-up communications shall make use of Hayes compatible modems and voice-grade telephone lines. Provide modems rated at 9600 baud unless otherwise directed.

D. Transmission Network.

1. The control system shall include a multi-drop digital transmission network that provides the communication link between the microprocessor controllers and the console. The system shall utilize a cyclic redundancy check or dual transmission with parity check to insure signal reliability.

2. The transmission network shall be minimum 22AWG, 1 pair, non-shield Level 4 Plenum Cable compatible with LonWorks technology with the following features: LonWorks specified jacket colors and print legends for quick identification and troubleshooting, sequential foot markings, UL listed, manufactured in ISO 9002 certified plants and certified for use in LonWorks systems.

E. Control Devices and Sensors

1. Duct Temperature Sensor

- a. Device shall include a RTD temperature sensor capable of $\pm 0.5^{\circ}\text{F}$ accuracy or less. The sensor operating range without loss of accuracy shall be 30°F to 130°F .
- b. All duct sensors shall have an accessible NEMA 1 electrical box for connections and terminations.
- c. Manufacturer/ Model: ACI model ACI Duct or approved equal

2. Duct Averaging Temperature Sensor

- a. Device shall include a platinum curve averaging temperature sensor with copper probe capable of $\pm 0.3^{\circ}\text{F}$ accuracy or less. The sensor operating range without loss of accuracy shall be 30°F to 130°F .
- b. All duct sensors shall have an accessible NEMA 1 electrical box for connections and terminations.
- c. Provide capillary mounting clips for support of the probe.
- d. Manufacturer/Model: Minco model ST-AV8 or approved equal

3. Immersion Temperature Sensor

- a. Device shall include a RTD temperature sensor capable of $\pm 0.5^{\circ}\text{F}$ accuracy or less. The sensor operating range without loss of accuracy shall be 30°F to 130°F .
- b. All duct sensors shall have an accessible NEMA 1 electrical box for connections and terminations.
- c. Manufacturer/ Model : ACI model ACI Immersion, Precon model ST-TS or approved equal

4. Space Temperature Sensor

- a. Provide a minimum of one space temperature sensor per control zone or quantity as shown on plans, whichever is greater.
- b. Sensors shall be thermistor type with accuracy equal to $\pm 0.36^{\circ}\text{F}$ through minimum range of 30°F to 80°F without display.

- c. Manufacturer/Model: Siemens model QAA-20 or approved equal
5. Combination Temperature, Relative Humidity and Carbon Dioxide Space Sensor
- a. A single wall-mounted sensor capable of measuring CO₂ concentration (ppm), temperature (°F) and relative humidity (%RH). Sensors with displays are not acceptable.
 - b. Accuracy:
 - (1) CO₂: ±50ppm
 - (2) Temperature between 59°F & 95°F: ±0.8K
 - (3) Relative Humidity at 73°F and between 30 & 70%RH: ±3%RH
 - c. Stability: CO₂ recalibration free for 5 year
 - d. Output: multiple 0-10 Vdc
 - e. Dimensions: maximum 4" tall x 3-1/2" wide x 1-1/2" deep
 - f. Manufacturer: Siemens QPA-20
6. Duct-Mounted Carbon Dioxide Sensors
- a. Provide a minimum of one duct-mounted carbon dioxide sensor at the common return air duct of each air system or quantity as shown on plans, whichever is greater.
 - b. Sensors shall measure carbon dioxide concentration with accuracy equal to ±40ppm through minimum carbon dioxide range of 0 to 2000ppm, minimum temperature range of 32°F to 120°F.
 - c. Provide the following options: duct-mount accessory enclosure, calibration software kit and hand-held meter for field verification.
 - d. Manufacturer/Model: Vaisala model GMD20, Siemens model QPA63.1, GE model T8300 or approved equal
7. Duct-Mounted Relative Humidity Sensors
- a. Device shall include a relative humidity sensor capable of ±1%RH accuracy or less. The sensor operating range without loss of accuracy shall be 20% to 90%RH.
 - b. All duct sensors shall have an accessible NEMA 1 electrical box for connections and terminations.
 - c. Manufacturer/Model: ACI model ACI/RH1 Duct or approved equal
8. Flow sensors

- a. Ultra sonic, clamp on type. The unit shall be capable of measuring flow over a range of 0.1 to 40.0 feet per second pipe velocity, with flow in either direction.
- b. The transducers shall be NEMA 4, standard temperature metal body. The flow computer shall be a two channel type in a "blind" configuration capable of monitoring two flow stations simultaneously.
- c. The unit shall be capable of measuring the flow within pipes over a size range of 1/2" to 24" diameter. Mounting track shall be dielectrically compatible with the pipe to which the unit is mounted.
- d. Performance:

Liquid temperature:	-40°F to 250 °F
Accuracy:	± 2%
Repeatability	1/2%
Sensitivity:	0.001 fps
- e. The unit shall provide a 4-20 ma input signal to the DDC system.

Manufacturer: Controltron Inc.
 155 Plant Avenue
 Hauppauge, NY
 (516) 231-3600

Model: System 990 Uniflow or approved equal

9. Current Sensing Relay (CSR)

- a. Provide a current sensing relay where indicated on the drawings for monitoring electrical current to operating electrical motors. Each relay shall be selected for the brake horsepower of the motor and shall provide a signal to the DDC system when the current exceeds specified parameters (locked rotor current).
- b. The SCR shall be selected with extended frequency feature for the low frequency applications.
- c. Features shall include variable trip point and time delay, current monitoring from 10 mA to 60 AC Amps, electrical isolation between circuits, LED trip status indicator, calibrated dial and external current transformers where applicable.
- d. Provide Power-On delay: 100 ms max. Frequency 12 to 400 Hz. Mechanical life 10,000,000 operations @ rated load.
- e. Manufacturer: CR Magnetics Inc., Model: CR 4395 or approved equal.

10. Current indicator: (CI)

- a. Provide a current indicator at each fan motor. The current indicator shall sense voltage drop due to broken fan belt or detached fan wheel and send a signal to the DDC system.

- b. The indicators shall be factory calibrated for the turn on point. The value of the turn on point shall be determined by the temperature Contract #3 Contractor and submitted for Commissioner's approval.
- c. Indicators shall be fully isolated, self powered units and supplied with the LED attached to the current sensing transformer.
- d. Manufacturer: CR Magnetics, Inc. Model: CR2530 or approved equal

F. Central Operators' Terminal.

- 1. A central operators' terminal shall provided for monitoring of all DDC system functions. The central operators terminal shall be installed in a location which shall be determined in consultation with the City of New York's facilities manager.

Provide a second Operators' Terminal, identical to the Central Operators Terminal, in the location defined on the drawings or as directed in field.

Provide the software necessary to permit an City of New York purchased notebook computer to operate as a fully capable operators terminal.

- 2. Output shall be 30 character alpha numeric display in English Language which can be scrolled up to 80 characters wide per line to indicate all dynamic temperature, pressure, humidity and flow values, equipment status and alarms and alarm limit set points. This shall also display set points of all DDC loops, control pressure to controlled actuators and complete DDC control loop strategies.
- 3. Input and control shall be via an alpha numeric keyboard with the following commands and control initiated at the keyboards; start/stop equipment, set or change alarm limits, add, modify, enable or disable control strategies, tune-up control strategies by adjusting parameters, define and set alarm status and limits, add or delete points to system and initiate hard copy record of any data and select points to be trended over a period of time.
- 4. Command Entry/Menu Selection Process: Operator Workstation interface software shall minimize operator training through the use of English language prompting, English language point identification, and industry standard PC application software.

The operator interface shall minimize the use of a typewriter style keyboard through the use of a mouse or similar pointing device, and "point and click" approach to menu selection. For example, users shall be able to start and stop equipment or change setpoints from graphical displays through the use of a mouse or similar pointing device.

- 5. Graphical and Text-Based Displays: At the option of the user, Operator Workstations shall provide consistent graphical or text-based displays of all system point and application data described in this specification. Point identification, engineering units, status indication, and application naming conventions shall be the same at all operator devices.
- 6. Multiple, Concurrent Displays: The Operator Interface shall provide the ability to simultaneously view several different types of system displays in a windowing environment to speed facility operation and analysis. For example, the interface shall provide the ability to simultaneously display a graphic depicting an air

handling unit, while displaying the trend graph of several associated space temperatures to allow the user to analyze system performance. If the interface is unable to display several different types of displays at the same time, the Contract #3 Contractor shall provide at least two operator stations.

7. Password Protection: Multiple-level password access protection shall be provided to allow the user/manager to limit workstation control, display and data base manipulation capabilities as he deems appropriate for each user, based upon an assigned password.
 - a. Passwords shall be exactly the same for all operator devices, including DDC panel portable or panel-mounted network terminals. Any additions or changes made to password definition shall automatically cause passwords at all DDC panels on a network to be updated and downloaded to minimize the task of maintaining system security. Users shall not be required to update passwords for DDC panels individually.
 - b. A minimum of five levels of access shall be supported:
 - c. A minimum of 50 passwords shall be supported at each DDC panel.
 - d. Operators will be able to perform only those commands available for their respective passwords. Menu selections displayed at any operator device, including portable or panel mounted devices, shall be limited to only those items defined for the access level of the password used to log-on.
 - e. User-definable, automatic log-off timers of from 1 to 60 minutes shall be provided to prevent operators from inadvertently leaving devices on-line.
8. Operator Commands: The operator interface shall allow the operator to perform commands including, but not limited to, the following:
 - a. Start-up or shutdown selected equipment
 - b. Adjust setpoints
 - c. Add/Modify/Delete time programming
 - d. Enable/Disable process execution
 - e. Lock/Unlock alarm reporting for each point
 - f. Enable/Disable Totalization for each point
 - g. Enable/Disable Trending for each point
 - h. Override PID Loop setpoints
 - i. Enter temporary override schedules
 - j. Define Holiday Schedules
 - k. Change time/date
 - l. Enter/Modify analog alarm limits
 - m. Enter/Modify analog warning limits
 - n. View limits
 - o. Enable/Disable Demand Limiting for each meter
 - p. Enable/Disable Duty Cycle for each load
9. Logs and Summaries: Reports shall be generated automatically or manually, and directed to either CRT displays, printers, or disk files. As a minimum, the system shall allow the user to easily obtain the following types of reports:
 - a. A general listing of all points in the network
 - b. List all points currently in alarm
 - c. List of all off-line points

- d. List all points currently in override status
- e. List of all disabled points
- f. List all points currently locked out
- g. List of all items defined in a "Follow-Up" file
- h. List all Weekly Schedules
- i. List all Holiday Programming
- j. List of Limits and Deadbands

Summaries shall be provided for specific points, for a logical point group, for a user-selected group of groups, or for the entire facility without restriction due to the hardware configuration of the facility management system. Under no conditions shall the operator need to specify the address of hardware controller to obtain system information.

10. Features:

Minimum 2.0 GHz Intel "Pentium IV" processor.
 3.5" 1.44MB floppy drive
 Iomega Zip Drive
 Minimum 52X CD ROM
 Minimum 24x10x40 Read-Write CD ROM
 Adjustable display contrast.
 Typewriter keyboard with quick entry numeric pad.
 ASCII character set.
 (2) USB, (1) Serial, (1) parallel, and mouse ports.
 17" SVGA (1024X768) Monitor
 512 KB Static RAM
 Integral surge suppressor AC power supply
 Latest Windows operating system
 Latest Version of Microsoft Office Professional

11. Ratings:

Temperature 50°F - 150°F
 Humidity to 98% R.H.

12. Accessories:

- a. Minimum 60 gigabyte hard disk including an allowance of at least 40 gigabytes for storage of archived trend logged data and other City of New York provide software."
- b. Operators "mouse" with pad
- c. Modem
- d. UPS (Uninterruptible Power Supply)
- e. Library of interactive computer graphics, prepared by the DDC vendor, of HVAC system arrangements similar to those depicted on mechanical flow and control diagrams; Insight package for PC's.
- f. Archiving software package capable of downloading data to the hard drive in ASCII format and/or downloading data to Microsoft Excel.
- g. System 600 management applications library
- h. System 600 Dial-Up software
- i. System 600 Maintenance Management for Insight
- j. Remote monochrome video terminal for additional monitoring locations.

G. Terminal Control Unit

- 1. Control of terminal units shall be accomplished by a microprocessor based stand

alone controller utilizing Direct Digital Control. The Terminal Control Unit shall interface to the building control system in a multi-drop communications network originating at the control system field panel. An individual controller shall be provided for each terminal unit.

- a. Each Terminal Control Unit shall contain resident programs which are field selectable for a specific application. All resident programs shall be contained in non-volatile memory using EEPROM, EPROM, and PROM. Systems that employ volatile (RAM) memory shall provide 72 hour battery back-up for each Terminal Control Unit.
2. Each Terminal Control Unit shall be accessible for purposes of control and monitoring from central or remote operator's terminals as specified herein.
3. The Terminal Control Unit shall continue its primary control function independent of other network communication. Reversion to a failed (normally open or normally closed contact position) mode on separation from the communication bus is not acceptable.
4. An operator's terminal connected to any field panel on the network, directly or via modem, will have access to all Terminal Control Units connected to all communication bus. Under no circumstances will it be necessary to identify the specific bus, field panel, or Terminal Control Unit prior to obtaining values or status for any point in the building system.

H. Printer

1. A wide carriage high-speed keyboard/printer shall be provided for hard copy data and alarm printouts. The minimum print speed shall be 160 characters per second. The printer shall have a line length of at least 132 characters and the character set shall be the standard 96 character ASCII upper class and lower case character set.
 - a. The printer shall be equipped with a compressed mode option for 220 characters per line. The printer shall have both 9 x 9 DOT matrix character structure and 9 x 18 DOT matrix for letter quality output.
 - b. Accessories:
 - i. Adjustable line spacing of 6 or 8 lines per inch.
 - ii. Adjustable tractor for 5 to 15 inch paper widths.
 - iii. Software selectable emphasized, double strike, and double width character capability.

I. Man-Machine Interfacing.

1. The following functions shall be capable through the operators' terminal or printer/keyboard.
 - a. Add, delete, or change points without vendor assistance.
 - b. Write custom control sequences without vendor assistance.
 - c. Time of day scheduling.
 - d. Start/stop time optimization.
 - e. Night setback.
 - f. Economizer cycle.
 - g. Holiday schedule.
 - h. Run time totalization.

- i. Trending.
 - j. Duct cycle program.
- 2. Operator shall be able to interface with the system in English Language as follows:
 - a. Display.
 - b. Command.
 - c. Edit.
 - d. Add.
 - e. Modify.
 - f. Copy.
 - g. Delete.
- 3. Output information shall be displayed or printed for hard copy record and shall include:
 - a. 6 alpha/numeric character for point names.
 - b. 12 alpha/numeric characters for point descriptors.
 - c. Appropriate alpha/numeric characters for values such as temperature, pressure and humidity.
 - d. Appropriate alpha/numeric characters for status and alarms.
Example: "EC-1 Ret Air Temp 78.5°F Hi Alarm"
 - e. All points may be displayed or printed including:
 - i. All values, may be shown to nearest 1/10.
 - ii. All motors, may be commanded and shown on/off or automatic.
 - iii. All alarms shall have condition to be displayed or printed.
 - iv. All control point adjustments to be shown to the nearest 1/10 of a pound.
- 4. User Programmability.
 - a. All temperature control strategies and energy management routings shall be definable by the operator through the operators' terminal. It shall be possible for the operator to modify system functions independently after receiving the training from the Contract #3 Contractor. The system shall be provided complete with all equipment and documentation necessary to allow a trained operator to independently perform the functions listed below:
 - i. Read the value of a measured variable (i.e. temperature).
 - ii. Start or stop equipment.
 - iii. Monitor the status of equipment being controlled.
 - iv. Read the setpoint of a control loop.
 - v. Determine the control strategies that have been defined for a specific piece of equipment.
 - vi. Generate displays of control strategies.
 - vii. Add/delete control loops to the system.
 - viii. Add/delete points to the system.
 - ix. Create, modify or delete control strategies.
 - x. Assign sensors and/or actuators to a control strategy.
 - xi. Tune control loops through the adjustment of control loop parameters.
 - xii. Enable or disable control strategies.
 - xiii. Generate hardcopy records of control strategies on a printer.

xiv. Select points to be alarmable and define the alarm state(s).

J. Programming

1. Include all programming necessary to perform the sequences of operation as specified.
2. Submit the logic programming to Commissioner for review and comment. Include time to personally the program logic with the Commissioner.
3. Submit to the City of New York a complete list of the alarms to be annunciated by the system including typical families of analog limit alarms with their proposed values. The City of New York will provide a custom text relative to each alarm point including instructions as to what action to be taken.
4. The system shall be capable of supporting proportional, proportional-integral, and proportional-integral-derivative control alogarithms.
5. Custom graphics are to be prepared by the DDC system vendor for each mechanical system indicted on the contract flow and control diagram, or for which there is a unique sequence of operation indicated in PART 3 of this specification section.

K. Training/City of New York's instruction: The Contract #3 Contractor shall provide four copies of an operator's manual describing all operating and routine maintenance service procedures to be used with the system. The Contract #3 Contractor shall instruct the City of New York personnel in these procedures during the start up and period. The duration of the instruction period shall be no less than 40 hours. These instructions are to be conducted during normal working hours. The instructions shall consist of both hands-on and classroom training at the job site. The City of New York reserves the right to video tape these instruction periods.

L. VALVES

1. Control valves shall be selected with a maximum pressure drop of 5.0 psi for valves 2" and larger and 2.0 psi for valves smaller than 2".
2. Valves shall be single seated for tight shut off against system pressures encountered during the full range of operation.
3. "Motorized" butterfly valves shall be Dezurik HP with double acting high pressure rotary cylinder actuators for two position service. Type T actuators for valves 6" and smaller; type G gear actuator for sizes 8" and larger.
 - a. For modulating service provide rotary diaphragm actuators, complete with pilot positioners, suitable for operation with 55 psi compressed air. See Section 230523 for details of valve construction.

PART 3 - EXECUTION

3.1 AUTOMATIC CONTROLS - GENERAL

A. Provide all relays, switches, sources of electricity and all other auxiliaries, accessories and connections necessary to make a complete operable system in accordance with the sequences specified. Junction boxes and/or circuit breakers for the automatic control system are provided by the Contract #4 Contractor. All low-voltage field wiring, to all control panels and electric control components of the automatic control system shall be

provided and installed by the Contract #3 Contractor:

- B. Install controls so that adjustments and calibrations can be readily made. Controls are to be installed by, or under the supervision of the control equipment manufacturer.
- C. Mount surface-mounted control devices on brackets to clear the final finished surface on insulation.
- D. Conceal control conduit and piping and capillaries in all spaces except in the Mechanical Equipment Rooms and in unfinished spaces. Install in parallel banks with all changes in directions made at 90 degree angles.
- E. Install control valves horizontally with the power unit up.
- F. Unless otherwise noted, install wall mounted thermostats and humidistats 4'-6" above the floor measured to the center line of the instrument. Room devices are to be of the concealed adjustment type without indicator.
- G. Install outdoor thermostats in perforated tube and sunshield.
- H. Static pressure sensors shall be located as far from the fan as possible.
- I. Electronic and pneumatic space mounted devices are to be identical in appearance. All devices shall be mounted under the same style cover.
- J. Install control wiring in EMT conduit. Flexible metal conduit, up to 36 inches in length, shall be permitted for final connections to devices. MC cable may be used for 120 volt control wiring where run within concealed spaces, such as walls and above hung or furred ceilings.
- K. Low voltage, plenum-rated control wiring may be installed without conduit where run in accessible concealed ceiling spaces. Wiring shall be run in EMT in all cases where stubbed down into walls and run below 8 feet.
- L. Control wiring for engineered smoke control systems and components shall be completely enclosed within continuous EMT raceways. Exposed raceways run within 8' of finished floor in garages, mechanical rooms, elevator machine rooms, loading docks and elsewhere where subject to mechanical damage shall be rigid galvanized steel conduit.
- M. "Bridle ring" type supports may be used for support of control system cables where permitted above to be run without conduit. "Bridle rings" shall be supported by bolt-on C-clamps or trapeze hangers. Do not use "tie-wraps" for cable attachment to other support systems.

3.2 ADJUSTMENTS AND TESTS

- A. Adjust and calibrate controls and test all safety devices when systems are operative for the required performance prior to the performance tests.
- B. At final performance test, demonstrate performance of controls and safety devices.
- C. Adjustment and tests are to be performed by the control manufacturer.
- D. Excluding the work called for in Paragraphs A through C above, the Contract #3 Contractor shall, as part of his proposal, allow for an additional 120 hours of qualified mechanics' time for system readjustment and/or instruction of City of New York's

personnel.

3.3 PERFORMANCE

- A. Unless stated otherwise, control temperatures within plus or minus 2°F and humidity within plus or minus 5% of the set point.
- B. Provide fully compensated capillaries with remote bulb instruments.

3.4 EVENT INITIATED TRENDING

- A. In the event that the temperature or humidity of any zone shall enter alarm condition, the DDC system shall begin a trend of the parameters which affect the ability of the system to maintain conditions.
- B. The points trended shall be similar but not limited to:
 - 1. Air handling unit discharge temperature.
 - 2. Air handling unit discharge humidity.
 - 3. Zone supply air temperature.
 - 4. Base building chilled water supply and return temperature.
 - 5. Pre-treatment system supply temperature
 - 6. Pre treatment system supply humidity.
 - 7. Hot water supply and return temperature.
 - 8. Steam supply pressure.
 - 9. Outside air temperature
 - 10. Outside air humidity.
- C. The DDC system shall plot the variables on a single real time graphic display.
- D. The DDC system shall monitor these points at 2 minute intervals and periodically download the values into Microsoft Excel.

3.5 INITIAL SET POINTS

- A. The figures listed below are to be considered the initial settings within the BMS system. All set points are to be adjustable by the BMS Operator through the BMS Workstation.
 - 1. Zone Cooling Temperature 75°F
 - 2. Zone Setback Cooling Temperature 80°F
 - 3. Zone Heating Temperature 70°F
 - 4. Zone Setback Heating Temperature 65°F
 - 5. Zone Minimum Relative Humidity 30%RH
 - 6. Zone Maximum Relative Humidity 55%RH

3.6 SEQUENCE OF OPERATION – AIR HANDLING UNITS

- A. General
 - 1. The unit shall be enabled and disabled through the BMS system. All control functions shall be accomplished through the BMS system.
 - 2. The Operator shall have the ability to choose normal mode heating, normal mode cooling, setback heating mode or set back cooling mode as well as organize the occupied and unoccupied schedules.

B. Disabled Mode

1. When the units are disabled; the fan shall be off, the humidifier steam generator shall be disabled, the chilled water control valve shall be closed and all heat coil control valves shall be closed.

C. Normal Operating Mode

1. When the unit is enabled in normal operating mode by the BMS the supply fan shall start. The supply fan VFD shall modulate to maintain the normal airflow set point (adjustable) and the relief air fan shall initially be disabled.
2. When the system is in Occupied Mode, the BMS shall enable and modulate the local relief air fan VFDs to maintain the set point air flow schedule below.

Ventilation Airflow	Conditions
30% design vent. air	CO2 <999 ppm
75% design vent. air	1000 ppm < CO2 <1199 ppm
100% design vent. air	CO2 >1200 ppm

3. The BMS shall modulate the cooling coil control valve to maintain the cooling set point.
4. The BMS shall modulate the heating coil control valve to maintain the heating set point.
5. The minimum and maximum set point dew points shall be calculated by the BMS system based on the temperature and relative humidity set points for each air handling unit. The return air dew point shall be calculated by the BMS system for each air handling unit based on return air temperature and return air relative humidity readings.
 - a. When the return air dew point is above the maximum set point dew point, the BMS shall modulate open the cooling coil control valve to maintain the return air maximum set point dew point in the return air. The BMS shall modulate the zone reheat coil to maintain zone space temperature set point.
 - b. When the return air dew point is below the minimum set point dew point, the BMS shall command the humidifier steam generator to turn on and modulate the humidifier steam generator to maintain the minimum set point dew point in the return air.
 - c. A discharge high limit sensor shall overcall the humidifier steam generator command to limit the humidity in the supply duct to 80%RH.
6. When each air handling unit system is in Unoccupied Mode, the heating, cooling and humidification sequences described above shall use the setback supply fan air flow set point (adjustable, initially 60% of design supply airflow), setback cooling temperature set point (adjustable), setback heating temperature set point (adjustable), and setback minimum relative humidity set point (adjustable). The supply fan shall be cycled off at times when the setback space set points are maintained. When the air handling unit is operating with setback supply air flow and either the cooling coil, heating coil or steam generator are operating at 100% and the space set points are not satisfied, the air handling unit supply air shall be modulated up to the design air flow to maintain the space set points.

D. Safeties and Alarms

1. A freeze-stat located upstream of the chilled water coil shall send a signal to the Operator's Workstation when the air temperature sensed on any segment of the serpentine sensing element has dropped below 20°F (adjustable). Upon activation of the freeze-stat the supply fan shall be disabled and alarms shall be initiated at the Operator's Workstation and at the local control panel. The freeze-stat shall be reset locally with its own manual reset button.
2. Upon activation of any duct smoke detector, the supply fan shall shut down. The fire alarm system shall be wired directly to the fan start circuit.
3. Upon activation of any smoke detector, an alarm shall be initiated at the Operator's Workstation and at the local control panel. Smoke detectors shall be furnished, installed and wired to the fire alarm system by Contract #4 Contractor. Smoke detectors shall be located per Contract #3 Contractor shop drawings.
4. A water sensor located in the drain pan below each AHU shall send a signal to the Operator's Workstation when water is sensed in the drain pan. Upon activation of the water sensor, the local supply fan shall be disabled and alarms shall be initiated at the Operator's Workstation and at the local control panel.

3.7 SEQUENCE OF OPERATION – VENTILATION AIR (EXISTING MUA-1)

- A. Existing MUA-1 system shall serve to provide ventilation air to all three theater tenants in the Archstone complex including MCC Theater, ArtNY and 52nd Street Theater.
- B. Existing MUA-1 shall be enabled and disabled through the BMS system. All control functions shall be accomplished through the BMS system. The ventilation air VAV boxes for MCC Theater and 52nd Street Theater shall be installed by Contract #3 Contractor. The ventilation air VAV boxes for Art/NY shall be provided by others and Contract #3 Contractor BMS shall provide all control functions.
- C. The maximum ventilation air for each theater is per the below schedule:
 1. 52nd Street Theater 3,980cfm
 2. MCC Theater 2,920cfm
 3. ArtNY 5,100cfm
 - a. When all three tenants are simultaneously calling for peak ventilation air, the above values will be the maximum aggregate ventilation air provided to each of the three tenants. The BMS shall only exceed the scheduled rates above when one (or two) of the theater tenants are calling for less than peak ventilation air. The unused airflow capacity of MUA-1 shall be available to the other tenants.
- D. The fan will be off when no tenants are calling for ventilation air. When any of the Air Handling Units are in Occupied Mode, the supply fan will operate continuously and its speed will be modulated to maintain the duct static pressure set point. If the supply fan fails to prove status for 30 seconds (adjustable), the fan will be commanded off, the outside air damper will close and all operating sequences will be disabled and an alarm will be annunciated. A manual reset is required to restart the fan. A hardwired, high static pressure cut-off switch is electrically interlocked with the variable speed drive. If the high static pressure cut-off switch is tripped the fan will stop, the outside air damper will close, all sequences will be disabled, and an alarm will be annunciated. A manual reset of the high static pressure cut-off switch will be required to restart the fan.

- E. The duct static pressure set point is sent by the BMS and is reset by the following Discharge Duct Static Pressure Set Point Optimization Sequence:
1. When any VAV damper is more than 75% (adjustable) open, the supply fan discharge duct static pressure set point shall be reset upward by 0.1 in W.C. (adjustable), at a frequency of 15 minutes (adjustable), until no damper is more than 75% open or the static pressure set point has reset upward to the system maximum duct static pressure set point or the AHU variable-frequency drive is at the maximum speed setting.
 2. When all VAV dampers are less than 65% (adjustable) open, the supply fan discharge duct static pressure set point shall be reset downward by 0.1 in W.C. (adjustable), at a frequency of 15 minutes (adjustable), until at least one damper is more than 65% open or the static pressure set point has reset downward to the system minimum duct static pressure set point or the AHU variable-frequency drive is at the minimum speed setting.
 3. The control bands, set point increment values, set point decrement values and adjustment frequencies shall be adjusted to maintain maximum static pressure optimization with stable system control and maximum comfort control.
 4. The BMS shall have the capability to allow the operator to exclude "problem" zones that should not be considered when determining the optimized set point.
 5. The BMS shall also read the status of the supply air static pressure sensor and display the active duct static pressure reading on the status screen.
 6. The BMS shall have the ability to identify, and display to the user, the VAV box that serves the Critical Zone (that is, the zone with the most wide-open VAV damper). This information shall update dynamically as the location of the Critical Zone changes based on building load, and duct static pressure set point optimization control.
 7. During the commissioning process, the controls contractor shall demonstrate the performance of fan pressure optimization.
- F. The BMS shall modulate the cooling coil control valve to maintain the cooling set point.
- G. The BMS shall modulate the heating coil control valve to maintain the heating set point.
- H. Safeties and Alarms
1. A freeze-stat shall send a signal to the Operator's Workstation when the air temperature sensed on any segment of the serpentine sensing element has dropped below 34°F (adjustable). Upon activation of the freeze-stat the supply fan shall be disabled and alarms shall be initiated at the Operator's Workstation and at the local control panel. The freeze-stat shall be reset locally with its own manual reset button.
 2. Upon activation of any duct smoke detector, the supply fan shall shut down. The fire alarm system shall be wired directly to the fan start circuit.
 3. Upon activation of any smoke detector, an alarm shall be initiated at the Operator's Workstation and at the local control panel. Smoke detectors shall be furnished, installed and wired to the fire alarm system by Contract #4 Contractor. Smoke detectors shall be located per Contract #3 Contractor shop drawings.

3.8 SEQUENCE OF OPERATION – RELIEF AIR (RLF-1)

- A. Relief Air Fan (RLF-1) shall be enabled and disabled through the BMS system. All control functions shall be accomplished through the BMS system.
- B. When any of the air handling units are in Occupied Mode, RLF-1 shall be enabled. The relief air flow rate of RLF-1 shall be equal to the sum of all local relief air fans serving local air handling units. The BMS shall modulate the Relief Air Fan VFD to maintain the total relief air flow rate.

3.9 SEQUENCE OF OPERATION – TOILET EXHAUST

- A. Existing base-building toilet exhaust fan controls shall remain.

3.10 SEQUENCE OF OPERATION – DRYER EXHAUST

- A. Dryer exhaust booster fan shall be controlled by the dryer booster manufacturer's controller and sequences of operation.
- B. The BMS shall monitor the dryer booster fan controller for alarm (alarm/clear) and status (on/off).

3.11 SEQUENCE OF OPERATION – THEATRICAL STAGE EXHAUST

- A. Theatrical Stage Exhaust Fan (EF-6) shall be enabled and disabled through the BMS system. All control functions shall be accomplished through the BMS system.
- B. The BMS shall monitor a wall switch located at the side stage. When the wall switch is indexed to ON, the BMS shall command the motorized damper to open. Once the position of dampers is confirmed open with end switches, the BMS shall enable the exhaust fan.

3.12 SEQUENCE OF OPERATION – TRASH ROOM EXHAUST

- A. Theatrical Stage Exhaust Fan (EF-4) shall be enabled and disabled through the BMS system. All control functions shall be accomplished through the BMS system.
- B. The operator shall schedule the operation of EF-4 on a seven day schedule through the Operator's Workstation. The BMS shall monitor a wall switch located in the trash room.
- C. If either the schedule or wall switch is indexed to ON, the BMS shall command the motorized damper to open. Once the position of dampers is confirmed open with end switches, the BMS shall enable the exhaust fan.

3.13 SEQUENCE OF OPERATION – FAN COIL UNIT

- A. All fan coil units and unit heaters shall be enabled and disabled through the BMS system. All control functions shall be accomplished through the BMS system.
- B. The BMS shall modulate the heating coil and cooling coil to maintain the space temperature set point (adjustable). In units with multiple coils, only one of the coil control valves may be open at one time.

3.14 SEQUENCE OF OPERATION – DOMESTIC HOT WATER RECIRCULATION PUMPS

- A. When the building is in occupied mode, the BMS shall enable or disable the domestic water

recirculation pumps to maintain the recirculation water temperature set point (adjustable).

3.15 SEQUENCE OF OPERATION – FIRE/SMOKE AND SMOKE DAMPERS

- A. All fire/smoke dampers and smoke dampers shall be controlled by the Fire Alarm system provided by the Contract #4 Contractor.
- B. Some fire/smoke and smoke dampers shall be controlled through the BMS system as described in Sequence of Operation outlined in this section. The fire alarm system control shall always have priority to BMS.

3.16 SEQUENCE OF OPERATION – MONITORING POINTS

- A. The BMS shall monitor general conditions, which are typically not used in any of the other above sequences and report alarms for each point based on BMS Operator values.
- B. The points include, but are not limited to: base-building chilled water supply temperature, base-building chilled water flow, base-building chilled water pressure, base-building hot water supply temperature, base-building hot water flow, base-building hot water pressure, base-building ventilation air pressure, base-building ventilation air temperature and base-building ventilation air flow.

END OF SECTION

SECTION 23 20 00

PUMPING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 230000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #3 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 230000, general provision, and with the provisions of all applicable codes and laws.

1.3 SUBMITTALS

- A. Procedure: Prepare and make the submissions listed below and in Section 230000 in accordance with the procedure specified in Section 230000.
- B. Shop Drawings
 - 1. Air conditioning condensate pump.
 - 2. Pump related accessories.
 - 3. Pump curves.

1.4 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 230000.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Construct all apparatus of materials and pressure ratings suitable for the conditions encountered during continuous operation.
- B. Provide casing connections for vent, drain, suction and discharge pressure gauges.
- C. Balance impellers and all other moving components statically and dynamically.
- D. Completely align and level pumps, motors and bases. Where pumps and motors are shipped as a unit, realign them in the field.
- E. Install and align mechanical seals in accordance with the manufacturer's recommendations.
- F. Provide water supply for cooling and lubricating of seals and/or packing.

- G. Match centrifugal pump impellers and casings so that at specified operating conditions, the impeller diameter is not more than 90% of the maximum diameter impeller which can satisfactorily operate in the casing.
- H. Pumps must operate stably without pulsation, vibration or internal recirculation. Pump operating characteristics at the design point must be such that a variation of 10% in head results in not more than 15% variation in GPM and does not affect the stability of operation of the pump.
- I. Motor sizes scheduled are minimum for the specific pumps indicated on pump schedules. When submitting pumps other than those specifically selected, size motors so that when operating at rated RPM, the pump motor brake horsepower does not exceed the nominal motor rating despite variations in pumping head or when operated singly or in parallel with other pumps serving the same system.
- J. Motors to be high efficiency type with guaranteed minimum efficiency rated in accordance with IEEE standard 112, method B - General Electric Company "Energy Saver" or equal.

2.2 AIR CONDITIONING CONDENSATE PUMP

- A. Complete assembly of receiver, pump, and motor float switch.
- B. Receiver shall be ABS plastic with 1 gallon capacity. Insulate exterior of receiver sump per 230700.
- C. Vertical type pump shall be constructed with stainless steel shaft bronze bearing and Polypropylene impeller. Pump shall be capable of 150 GPH at 17 ft. head.
- D. Motor shall be 1/18HP, 1750 RPM, 120 volts, single phase, 60 Hz, with built-in overload protection.
- E. Pump features a safety switch that can be connected to shut down the air conditioner condenser or wired to an alarm to warn of possible tank overflow.
- F. Discharge shall be a 3/8" O.D. barbed tubing adapter. Pump shall be rated for high-efficiency gas furnace applications that produce an acidic condensate.
- G. Thermally protected motor shall be UL and CSA listed.
- H.

Manufacturer:	Model/Series:
Little Giant	VCL-24
Domestic	
Federal	

PART 3 - EXECUTION

3.1 EQUIPMENT

- A. Install equipment in conformance with manufacturer's recommendations.

END OF SECTION

SECTION 23 30 00

DUCTWORK AND AIR OUTLETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 230000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #3 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 230000, General Provisions, and with the provisions of all applicable codes and laws.

1.3 SUBMITTALS

- A. Procedure: Prepare and make the submissions listed below and in Section 230000 in accordance with the procedure specified in Section 230000.
- B. Shop Drawings
 - 1. Typical duct construction details (elbows, taps, splits, transitions, plenums, supports).
 - 2. Ductwork layouts at 3/8" scale, with match lines as necessary to maintain maximum sheet size of 48x36.
 - 3. Fire dampers and sheet metal hardware.
 - 4. Volume & motorized dampers, accessories and access doors.
 - 5. Combination fire/smoke and smoke dampers and accessories.
 - 6. Duct mounted smoke detector locations.
 - 7. Grilles, registers, diffusers and terminal outlets.
 - 8. Casing construction details.
 - 9. Acoustical lining and application methods.
 - 10. Air duct leakage test procedures.
 - 11. Air duct leakage test report.
 - 12. Air balance contractors qualifications, procedures and report format.
 - 13. Air balance report.
 - 14. Sound Attenuators.
 - 15. Dust collector and accessories.
- C. Samples: Typical finished grilles and terminal air distributing devices. Color samples for pre-finished items. Samples will not be returned, nor used in the project.
- D. Sheetmetal shop drawings shall be coordinated, showing the work of other trades, including but not limited to, sprinklers, light fixtures, conduits, structural steel, plumbing and HVAC piping. Refer to Specification Section 230000, Coordination drawings, for submission requirements. Drawings shall show the following, as a minimum:
 - 1. Ductwork including sizes, bottom of duct elevations, material and pressure class.
 - 2. Duct fittings, transitions, takeoffs, and flexible connections.

3. Equipment including, but not limited to, diffusers, grilles, fans, air handling units, air flow stations, humidifiers, coils, and sound attenuators.
 4. Volume, fire, smoke, combination fire/smoke and automatic control dampers.
 5. Duct smoke detectors.
 6. Duct access doors.
 7. Section views shall be provided for mechanical rooms and other sheet metal intensive spaces to clearly represent all sheet metal work.
- E. Sheetmetal shop drawings shall be submitted on drawings no larger than 48" long by 36" high, at minimum 3/8"=1'-0" scale. Provide match lines and key plans as required.

1.4 SYSTEM TESTING

- A. Perform operating tests and instruct City of New York's personnel as specified in Section 230000. Produce and maintain ventilation and air conditioning under operating criteria.

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTWORK

- A. Construct all ducts and casings of lock forming quality sheet, light commercial galvanized coating class - ASTM - A525, 526, 527; stainless steel sheet ASTM - A480; aluminum sheet Alloy 3003-H-14. Metal thicknesses are U.S. Standard gauge. Duct joints, seams and reinforcing shall meet or exceed requirements as per SMACNA HVAC Duct Construction Standards 1995 edition.
- B. Duct construction shall follow standards set forth in Tables 1-5 through 1-13M of SMACNA HVAC Duct Construction Standards 1995 edition. Ductwork shall be fabricated for the pressure and minimum gauge listed below. Minimum pressure construction shall be +/- 4" WG. Pressure classification for ducts serving or connected to SEF-1 or SEF-2 shall be +/- 10" WG.
- C. Minimum gauges for rectangular ducts and fittings - 4" WG. where either dimension is:

STEEL	DUCT DIMENSION
No. 24 ga.	Up to 12"
No. 22 ga.	13" to 30"
No. 20 ga.	31" to 54"
No. 18 ga.	55" to 72"
No. 16 ga.	73" and larger

- D. Minimum gauges for rectangular ducts and fittings - 10" WG. where either dimension is:

STEEL	DUCT DIMENSION
No. 24 ga.	Up to 12"
No. 22 ga.	13" to 30"
No. 20 ga.	31" to 54"
No. 18 ga.	55" to 72"
No. 16 ga.	73" and larger

2.2 ROUND AND FLAT OVAL DUCTWORK

- A. Construct all ducts and fittings of lock forming quality sheet, light commercial galvanized coating class - ASTM - A525, 526, 527; stainless steel sheet ASTM - A480; aluminum sheet Alloy 3003-H-14. Metal thicknesses are U.S. Standard gauge.

- B. Gauges for round and flat-oval ducts - low and medium pressure - unless noted otherwise on plans -

	SPIRAL LOCK SEAM	LONGI. SEAM
No. 26 gauge	Up to 8" dia.	---
No. 24 gauge	9" to 22"	Up to 8" dia.
No. 22 gauge	23" to 36"	9" to 22"
No. 20 gauge	37" to 50"	23" to 50"
No. 18 gauge	---	51" to 60"
No. 16 gauge	---	61" and larger

- C. Gauges for round fittings.

No. 20 gauge	up to 36" dia.
No. 18 gauge	37" to 50"
No. 16 gauge	51" and larger.

2.3 DUCT CLASSIFICATION

- A. All ductwork shall be constructed to commercial SMACNA standards for internal pressures of +/- 4 inches of static pressure (water gauge).

2.4 DUCT SEALING

- A. All ductwork shall be sealed to SMACNA Seal Class A.

2.5 VOLUME DAMPERS

- A. General - provide in ALL branch duct connections at mains to control and adjust the total volume of the system. Outlet dampers shall not be used for system adjustment.
- B. Single Blade Dampers. Maximum width of single blade shall be 14", use opposed blade damper for height exceeding 14". Pre-manufactured dampers shall be part of an assembly complete with damper, frame, axle and bearings. The damper frame shall be installed internal to the duct and fastened with the appropriate hardware. The installation shall not interfere with the operation of the damper blade(s). Approved products for pre-manufactured devices are as follows:

Device	Manufacturer	Model
Rectangular	Air Balance	AC-111
	Greenheck	MBD-15
	Ruskin	MD25
Round	Air Balance	AC-112
	Greenheck	MBDR50
	Ruskin	MDRS25

- C. Multiple Blade Dampers. Opposed blade damper shall be used where duct height exceeds 14". Approved products for pre-manufactured devices are as follows:

Opposed Blade	Air Balance	AC-2
	Greenheck	MBD-15
	Ruskin	MD35OB

- D. On uninsulated round ducts, equip dampers with heavy duty locking quadrant. The locking quadrant shall be mounted on a 2" x 3" x 1/8" stand off plate held to duct in a manner so as not to interfere with the operation of the damper blade.
- E. On uninsulated rectangular ducts, equip dampers with heavy duty locking quadrant and one close end gasketed damper bearing. The end bearing be mounted on a 4" x 4" x 1/8" plate held to duct in a manner so as not to interfere with damper blade operation. The locking quadrant shall be mounted on a 2" x 3" x 1/8" standoff plate held to duct in a manner so as not to interfere with the operation of the damper blade.
- F. On insulated round ducts, equip dampers with heavy duty locking quadrant. The locking quadrant shall be mounted on a 8" x 8" x 1/8" stand off plate. The standoff shall be the insulation thickness plus 1/2". The plate shall be held to duct in a manner so as not to interfere with the operation of the damper blade.
- G. On insulated rectangular ducts, equip dampers with heavy duty locking quadrant and one close end gasketed damper bearing. The locking quadrant shall be mounted on an 8" x 8" x 1/8" stand off plate. The standoff shall be the insulation thickness plus 1/2". The end bearing be mounted on a 4" x 4" x 1/8" plate. Both plates shall be held to duct in a manner so as not to interfere with damper blade operation.
- H. Cable operated dampers (COD) shall be provided where indicated on plans, and/or where required due to damper location above/behind finished construction, where access to damper would require access door in finished construction. Rectangular dampers shall have opposed blade action. Dampers shall be equipped with internally controlled operators and cable. Cable shall terminate at face of outlet.
- I. Volume extractors shall be used where radius tap or split is not possible or where square elbows inlet and outlet throat radii vary by more than 15%.

2.6 FIRE DAMPERS - DYNAMIC

- A. Provide dynamic fire dampers with fusible links in all fire rated partitions, with ratings to conform to fire rating of construction where installed. Blades are to be of interlocking design mounted in a frame having two folder guides that serve as stops. Both frame and blades are to be of galvanized steel construction. Dampers shall be vertical or horizontal with blades out of the air stream. Damper shall be designed to close against a velocity and pressure per UL 555. Damper shall be constructed, tested, and labeled in accordance with the current edition of UL-555 Standard for Fire Dampers. Units with blades in the air stream shall be utilized only when space limitations preclude used standard damper and the Commissioner approves each specific instance.
- B.

Manufacturer:	Model:
Air Balance Inc.	Series D19, D19
Greenheck	Series DFD
Imperial	
Prefco Products	Series 5500
Ruskin	Series DIBD2, DIBD23

2.7 SMOKE DAMPER - AIRFOIL BLADE

- A. Damper to be UL listed Class I smoke damper. Unit including operator shall be rated for 350°F.
- B. Blades to be double skin airfoil shape 16 gauge galvanized steel construction mounted in 16 gauge galvanized channel. Unit to incorporate flexible blade and jamb seals, bronze or stainless steel bearings, 1/2" axle, blade interconnecting linkage out of air stream, 16 gauge galvanized steel sleeve.

- C. Unit shall incorporate blade end switches (open and closed), and outside the duct mounted UL listed operator. Operator to be compatible with sequence of operation as stated in Section 230923. Provide manufacturer's standard U. L. listed open - close - reset switch and position pilot lights in unit mounted enclosure. Enclosure to be capable of being removed for remote mounting to ensure visibility after system installation.
- D. The damper shall include factory mounted no-flow duct smoke detectors designed for use with the damper. The smoke detector shall be capable of interfacing with the building fire alarm system. All damper wiring shall be 24 volt or 12 volt.
- E. Unit shall meet UL 555S, and NFPA90A requirements for smoke dampers. Unit shall bear UL label.
- F.

Manufacturer:	Model:
Air Balance Inc.	SA1
Greenheck	SMD311
Ruskin	SD60
Imperial	

2.8 SMOKE/FIRE DAMPER

- A. Damper to be combination UL classified 1-1/2 hour fire damper and UL listed Class 1 smoke damper. Unit shall be approved for use in New York City.
- B. Blades to be double skin airfoil shape 16 gauge galvanized steel construction mounted in 16 gauge galvanized channel. Unit to incorporate flexible blade and jamb seals, bronze or stainless steel bearings, 1/2" axle, blade interconnecting linkage out of air stream, 16 gauge galvanized steel sleeve.
- C. Unit shall incorporate re-operable electric temperature sensor; blade end switches (open and closed), and outside the duct mounted UL listed operator. Operator to be compatible with sequence of operation as stated in Section 230923. Provide manufacturer's standard U. L. listed open - close - reset switch and position pilot lights in unit mounted enclosure. Enclosure to be capable of being removed for remote mounting to ensure visibility after system installation.
- D. The damper shall include factory mounted no-flow duct smoke detectors designed for use with the damper. The smoke detector shall be capable of interfacing with the building fire alarm system. All damper wiring shall be 24 volt or 12 volt.
- E. Unit shall meet UL 555, UL 555S, and NFPA90A requirements for fire and smoke dampers. Unit shall bear UL label.
- F.

Manufacturer:	Model:
Greenheck	FSD311
Prefco	Series 5000
Ruskin	FSD60

2.9 ACOUSTICAL LINING

- A. Sound insulation - where indicated on drawings, and within 10 lineal feet of fans, ductwork shall be lined with fiberglass duct liner of minimum 2 lbs. per cubic foot density and covered with a fire resistant black coating that includes an EPA-registered antimicrobial agent bonded to fiberglass. Thickness of liner 1-1/2" in ducts, 2" in fan and outside air plena. Duct called to have thermal insulation, but also indicated on drawings for sound insulation shall receive sound insulation on inside only consisting of 1-1/2" thick fiberglass minimum 2 lbs. density rigid duct liner with fire resistant coating that includes an EPA-registered antimicrobial agent bonded to fiberglass.

- | | | |
|----|---|--|
| B. | Manufacturer:
Owens Corning
Certainteed | Model:
Aeroflex Plus (2# density)
ToughGard Rigid Liner Board (3# density) |
|----|---|--|

2.10 TERMINAL AIR DISTRIBUTING OUTLETS

- A. Finishes - all exposed surfaces of terminal air distributing devices shall be finished as scheduled on drawings.
1. Baked enamel - chemically clean all surfaces after fabrication and apply rust resisting primer. Apply two finish coats of baked or heat-dried enamel of color and gloss matching Commissioner's samples.
 2. Aluminum - anodized natural aluminum of uniform appearance and matching Commissioner's samples.
 3. All ductwork and accessories visible through the air inlets and outlets shall be painted flat black.
- B. Seal all air outlets around edges with foam rubber gaskets to minimize leakage.
- C. Size and type - tabulated on the drawings.
- D. Manufacturer:
Anemostat
Metalaire
Titus
Price

2.11 ACCESS DOORS IN WALLS AND CEILINGS

- A. At each control and balancing damper in ductwork, at each fire damper and volume box when located above ceiling or inside the wall not accessible by removal of grille or from the air shafts, furnish an access door for installation by the Contract #1 Contractor. Access doors shall be 18" x 18" (minimum) unless otherwise indicated on plans; rigid construction with two hinges and a latch. In plenum ceilings, provide felt between the door and frame to make an air tight seal.
- B. Door shall be suitable for flush mounting, prime coated with rust inhibitive paint, concealed frame, flush screwdriver operated locks with metal cams and anchors as required.
- C. Door(s) shall be manufactured by Milcor - Model M or approved equal by Cesco, Karp or J L Industries.

PART 3 - EXECUTION

3.1 RECTANGULAR DUCT CONSTRUCTION - GENERAL

- A. Make turns in main duct runs affecting the static of the system with elbows having a throat radius not less than the width of the duct.
- B. Make turns in duct branch runs with elbows having a throat radius not less than one half the width of the duct or with square elbows with internal factory manufactured duct turns of a type acceptable to the Commissioner.
- C. Low and medium pressure ducts shall be constructed in a substantial and airtight manner with "Pittsburgh" and double locked longitudinal seams, properly hammered down. Other

seams shall be SMACNA tables.

- D. Make transitions and reducing sections of sufficient length to maintain the angle of deflection of any side less than 20 degrees.
- E. Cut sheet metal screws extending inside accessible casing to be smooth and flush with inside of duct.
- F. Make airtight, caulked connections between metal ducts and grilles or masonry.
- G. Insulate joints between non-ferrous and galvanized iron materials with non-ferrous and galvanized iron angles separated with tar paper strips and fastened with non-ferrous stove bolts.

3.2 DUCT ACCESSORIES, AND HARDWARE

- A. Provide access doors to all equipment. Make doors not less than 16" x 16" where not otherwise sized on the drawings. Provide rigid pan construction with two hinges and latch. Provide access on entering and leaving sides of coil and heater sections, and at leaving side of volume boxes. Reinforce duct openings with angle iron frame. Where ducts are insulated, frame is to be raised to surface acting as an insulation stop. Provide felt between door and duct to make airtight seal when locked. Door shall be the double wall insulated type.
- B. Latches similar to Ventfabrics, Inc. No. 100 (or approved equal) for small doors and No. 310 (or approved equal) where physical access is possible. Window latch type hardware is specifically prohibited except where the door swing for a hinged door is restricted by the hung ceiling or some other obstruction.
- C. Provide 8" x 8" frame around damper quadrants in insulated ducts for insulation stop, of same height as insulation thickness.
- D. Fan and unit connections - 30 oz. neoprene coated cloth connection with 2" clear distance, double wrapped, securely strapped to fan and cut and sewn airtight. Provide in each connection, including mixing box discharge.

3.3 DUCT SUPPORT

- A. Rectangular ducts below 30 inches in width shall be hung with 1" x 1/8" galvanized strap iron bent 1" under bottom side of the duct and fastened to the duct with sheet metal screws using one on underside and not less than 2 screws per side and as many more needed so that they are no greater than 6" centers.
- B. Rectangular ducts above 30 inches in width shall be hung with galvanized rods fastened to galvanized 1" angles running under the ducts as per detail.
- C. Structural attachment of hanging rods and straps to be per detail. Friction type beam attachments for rod or strap hangers is not acceptable. Attachment to metal deck tabs is also not acceptable (refer to detail on plans).
- D. Provide hangers on not greater than 8 feet centers.
- E. Provide 18 gauge galvanized sheet metal escutcheon plates attached to ducts and on both sides around all exposed ducts passing through partitions, where visible, except within equipment rooms.
- F. Provide 2" galvanized ground angles secured to floor on all ducts passing through floors.

3.4 BRACING OF RECTANGULAR DUCTS

- A. Ducts shall be reinforced per SMACNA HVAC Duct Construction Standards 1995 edition Tables 1-5 through 1-13M.
- B. Tie rods reinforcement shall be per SMACNA HVAC Duct Construction Standards 1995 edition Tables 1-5 through 1-13M.

3.5 ROUND AND FLAT-OVAL DUCTS

- A. Round ducts with fittings and accessories are to be machine made, spiral type welded, factory manufactured by United Sheet Metal Co., or another acceptable to the Commissioner.
- B. Make duct sections not longer than 20'-0".
- C. Make elbows with welded sections using 5 pieces for 90 degree and 3 pieces for 45 degree turns and having a center line radius of one times the diameter of the duct.
- D. Make joints in ducts with inside couplings not less than 6" long and seal joint with Minnesota Mining No. EC 800 adhesive or equal as recommended by the Supplier. Butt ends of duct tight to coupling bead.
- E. Hang and encircle all round ducts with 1" x 1/8" galvanized strap iron. On ducts below 10 ft. circumference, clamp strap iron at top and hang with single rod. Above 10 ft. circumference, clamp strap iron on both sides and hang with 2 rods. Provide hangers on not greater than 8 ft. centers unless noted otherwise on drawings.
- F. Make all reducers and reducing fittings concentric and of sufficient length to maintain the angle of deflection of the perimeter below 15 degrees.
- G. Make all other fittings including, rectangular to round transitions, access doors with sleeves, volume dampers, and fire damper to conform to manufacturer's standards.
- H. Where ducts pass through floors use short length of duct for sleeve. Provide couplings and temporary caps at both ends.
- I. Where ducts pass through walls provide sleeves using a coupling one size larger than duct and of length to conform to the thickness of the finished wall. Pack angular spaces with fiberglass insulation.
- J. Factory, cut, reinforce, and provide flanges on main ducts for grille and branch connections.

3.6 ROUND AND FLAT-OVAL DOUBLE WALL DUCTS

- A. Double wall round ducts and flat oval ducts with fittings and accessories are to be machine made, spiral type welded, factory manufactured by United Sheet Metal Co., or another acceptable to the Commissioner.
- B. Make duct sections not longer than 20'-0".
- C. Make elbows with welded sections using 5 pieces for 90 degree and 3 pieces for 45 degree turns and having a center line radius of one times the diameter of the duct. Elbows shall be standard product of manufacturer of double wall duct system.
- D. Duct system shall be furnished with inner liner couplings and outer pressure shell couplings. Outer shell connections may be either slip joint or flanged joint, except flanged joints shall be used at ducts with outer shell diameters in excess of 36". Slip couplings shall join inner liner sections at duct to duct joints. Fitting liners shall be

extended 2" beyond the outer shell cutoff to provide an inner liner coupling at duct to fitting joints. Flanged joints shall provide Van Stone connections to fittings, and shall be welded to duct.

- E. Hang and encircle all round ducts with 1" x 1/8" galvanized strap iron. On ducts below 10 ft. circumference, clamp strap iron at top and hang with single rod. Above 10 ft. circumference, clamp strap iron on both sides and hang with 2 rods. Provide hangers on not greater than 8 ft. centers unless noted otherwise on drawings.
- F. Provide all reducers and reducing fittings from manufacturer's standard offerings. Reducers shall be concentric and of sufficient length to maintain the angle of deflection of the perimeter below 15 degrees.
- G. Make all other fittings including, rectangular to round transitions, access doors with sleeves, volume dampers, and fire damper to conform to manufacturer's standards.
- H. Where ducts pass through walls provide sleeves using a coupling one size larger than duct and of length to conform to the thickness of the finished wall. Pack angular spaces with fiberglass insulation.

3.7 TURNING VANES

- A. Turning vanes shall be double wall construction of minimum 24 gauge galvanized metal. Each vane shall be securely riveted or welded to minimum 22 gauge runner or directly to duct.
- B. Turning vanes shall have 2" inside radius spaced 2-1/8" apart through 36" wide duct. Vanes in elbows larger than 36" shall have a 4 1/2" radius and be spaced 3 1/4" apart.
- C. Vanes shall be installed in sections to reduce unsupported length for duct depths exceeding 60".

3.8 TEST CONNECTIONS

- A. On the discharge duct from each air handling unit downstream at least 5'-0" from unit if duct is accessible, or closer to unit if necessary, install a #699 Ventlock instrument test hold device for balancing and testing of system.

3.9 ACOUSTICAL LINING

- A. Install sound insulation over adhesive, on welding pins not more than 12" O.C. with a minimum of two rows per side. Secure lining to pins with speed washers or clips. Apply 4" continuous strip of adhesive along edges at all joints and apply 50% coverage of adhesive between joints. Seal and caulk all joints between boards with adhesive at corners of ducts.
- B. Interrupt lining at fire dampers. Insulate exterior of duct at liner interruption if duct requires insulation. Refer to Section 230700.
- C. Duct mounted items such as dampers, turning vanes, and coils shall be installed on a continuous circumferential hat section of height equal to liner thickness and width to accommodate item. Provide liner section behind hat section or provide external duct insulation.
- D. Provide continuous circumferential sheet metal protection nosing at leading edges of lining on all lined duct sections.

3.10 COORDINATION AND COMPLETION

- A. Conform to all applicable provisions of Section 230000 and coordinate with the requirements of the other mechanical work specification sections to provide complete operating systems.

3.11 AIR BALANCE

- A. Balance all new air systems and those designated existing air systems to the quantities shown with the following tolerances:
 - Fans: Design volume plus 5%
 - Outlets: Design volume plus 5%
 - Leakage: 3% maximum.
- B. Balance in accordance with ASHRAE, AABC or NEBB procedures and submit all readings.
- C. Air system balancing is to be performed by a professional organization, qualified by experience and practice to perform this service. Submit evidence of qualifications, balancing procedures, and report forms for approval prior to start of work.
- D. Provide one extra set of drive sheaves per fan as part of the system balancing. Sheaves shall be installed as directed by the Contract #3 Contractor to achieve design CFM at the minimum RPM with an allowance for filter loading.
- E. Submit three bound copies of the air balance report to the Commissioner. Balance Report to include the following data for each fan system (supply, return, relief and exhaust).
 1. System designation and location.
 2. System description including areas served.
 3. Manufacturer, model number, size designation, class and arrangement.
 4. Supply/return/outside air CFM - Design vs. Actual (unit air quantities to be determined by duct traverse not sum of outlets - Submit data of traverse/minimum traverse points = 16 - max. distance between traverse points = 6")
 5. Unit suction and discharge static pressure - design vs. actual.
 6. Individual unit component static pressure drops (coils, filters, dampers)
 7. Motor manufacturer, frame, horsepower, volts, phase, hertz and RPM.
 8. Motor AMPS - design vs. actual.
 9. Fan RPM
 10. Sheave and belt data.
 11. Air outlet number, type, size, Ak, design CFM and velocity, intermediate velocity readings, final CFM and velocity.
 12. Reduced plans with air outlets cross-referenced to number.
 13. CFM, static pressure drop, (CFM and static pressure at minimum setting for VAV boxes) for all duct mounted items such as coils, VAV boxes, filters, induction units.

3.12 AIR DUCT LEAKAGE TEST

- A. Supply ductwork from the supply air fan to the terminal boxes shall be subject to inspection and leakage testing by the testing, adjusting, and balancing (tab) agency.
- B. The duct system testing shall be performed before the installation of duct insulation and ceilings. Testing shall be conducted at the design pressure of the ductwork being tested. Duct leakage test shall be coordinated by the Contract #3 Contractor. The Contract #3 Contractor shall prepare a schedule for testing indicating specific dates and procedures. The City of New York and Commissioner shall be notified a minimum of two (2) weeks

before testing is performed.

- C. Procedures for conducting the leakage test shall be in accordance with SMACNA air duct leakage test manual. Procedures shall be submitted to the Commissioner for approval prior to actual testing.
- D. Maximum leakage shall not exceed the requirements for leakage class 6.
- E. Leakage for non-duct components such as fire, smoke, and volume dampers, and terminal boxes is an integral part of the overall system leakage, and these components shall be included in the duct leakage tests.
- F. Ductwork failing to meet the maximum leakage criteria shall be resealed and or reconstructed as required.
- G. The Contract #3 Contractor shall submit a report on the leakage test. The report shall include an accurate description of the test procedure and results, including recommendations for any remedial action required to meet the specified leakage criteria. Copies of certified calibration data for the leakage test apparatus shall be provided as part of the test report.

3.13 DUCT MOUNTED SMOKE DETECTORS

- A. Coordinate with Contract #4 Contractor for quantities of duct mounted smoke detectors.
- B. Exact locations of duct mounted smoke detectors shall be determined by the Contract #3 Contractor and indicated on sheet metal shop drawings.
- C. Duct mounted smoke detectors shall be furnished and wired by the Contract #4 Contractor. Installation of the duct mounted smoke detectors in the ductwork shall be by the Contract #3 Contractor.

3.14 NOISE CONTROL ENCLOSURES & PLENUMS

- A. Plenum shall be furnished and installed as shown on the drawings and/or as hereinafter specified.
- B. 4" thick (nominal) noise control panels shall comprise 16-18 gauge solid sheet metal outer faces with 20-22 gauge perforated (providing 23% minimum open area) inner faces. The space between faces shall be filled with a mineral or glass fiber blanket, 3" to 4" thick of minimum density 3 lb/ ft³, packed under compression and two layers of 1/2" thick drywall, adhered to the solid steel side with mastic, for high STC panel. Panel framing and stiffeners shall be 16-18 gauge sheet metal. Perforated face of panel shall provide minimum Noise Reduction Coefficient (NRC) of 0.95 and entire panel shall provide a minimum Sound Transmission Class (STC) of 40, and minimum sound transmission loss values in the 1/1 octave bands as follows when tested in accordance with ASTM E90-75 or later:

Transmission Loss in dB	Octave Band Frequency, Hz.								STC
	63	125	250	500	1000	2000	4000	8000	
Regular	20	21	27	38	48	58	67	66	40
High STC	27	30	32	41	50	59	67	71	45

- C. Plenum shall be mounted on Mason Type ND mounts with a 0.35" deflection, or approved equal.
- D. Door panels shall be constructed of solid #18 gauge galvanized metal sides. Doors shall be supplied 24" wide x 60" high or 36" wide x 72" high as shown on the drawings. The doors shall be 4" thick of the overlapping seal type. Each door shall be supplied with single continuous acoustic seals around the sill, jamb and head. Doors shall have 2 hinges and 2 latches with an inside release handle. Each door shall be assembled with hinge hardware attached and adjusted and latches to be installed in the field. Door latches are to be the wedge lever type with inside handle. Hinges shall be heavy duty and designed for door size and weight. Door shall be designed to open against the air pressure.
- E. Windows shall be furnished for doors where shown on the drawings and shall consist of two layers of 1/4" safety glass separated by an air space and sealed acoustically and air tight with rubber seals. Air space shall contain a desiccant material to prevent misting.
- F. Roof channels, aprons and corner joiners shall be made of #16 gauge galvanized steel formed to prevent a direct path for sound and/or air leakage. Floor channels shall be made of #18 gauge galvanized steel. Panel joiners shall be made of #20 gauge galvanized steel and shall be roll formed to be greater in strength than standard #16 gauge joiners. Where roll joiners are not utilized, #16 gauge shall be provided. All panel accessories shall be furnished in standard lengths to be field cut to required dimensions. When Ramset can not be used, floor channels shall be pre-punched with 9/32" holes spaced 24" on center for attachment by 1/4" round head screws with expansion type inserts. All panel joiners and connectors requiring neoprene seals shall have the neoprene field applied.
- G. Openings for acoustical louvers, fan and duct connections where required, shall be provided by the plenum manufacturer. Pipe and conduit penetrations shall be located and cut in the field and sealed in accordance with the Manufacturer's instructions.
- H. The plenum shall be normally self-supporting. Where roof spans and wall loadings require additional strength, it shall be furnished either by heavier roof and wall joiners or additional structural steel members and/or pipe columns.
- I. Metal surfaces shall be galvanized except for 5" wide flange beams when used which shall be HR steel prime painted. Plenum shall be designed for outdoor use where required with normal weather-proofing and wind and snow loads accounted for.
- J. Panels shall have a maximum Heat Transfer Factor of 0.07 BTU/hour/sq. ft./degree Fahrenheit temperature difference of standard air.
- K. Plenum installation shall be capable of withstanding a positive internal static air pressure of 5.5 inches.
- L. Plenum installation shall be capable of withstanding a negative internal static air pressure of 4.5 inches.

- M. Plenum manufacturer shall warrant that when the plenum is installed in a workman like manner in strict accordance with these specifications and manufacturer's instructions, plenum shall meet the acoustical, thermal and air pressure performance specified.
- N. Plenum components shall be furnished clean, well made and free of any defects which may adversely affect the appearance, serviceability or performance. Manufacturer shall furnish proof of having manufactured similar plenums for at least three years prior to this installation.

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SECTION 23 70 00

AIR HANDLING AND TREATMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and applicable provisions of the Contract, including General and Supplementary Conditions, Division 1 - General Requirements, and the General Provisions, Section 230000, govern the work of this Division.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the Contract #3 Contractor.

1.2 REFERENCES

- A. Perform the work in accordance with the requirements of Section 230000, General Provisions, and with the provisions of all applicable codes and laws.
- B. The installation and equipment is to conform to ANSI B9.1 Safety Code for Mechanical Refrigeration.
- C. Air Moving and Conditioning Association (AMCA) Standards - Air performance of all air moving devices, shall be rated in accordance with AMCA Standard Test Code 210 and shall be licensed to bear the AMCA certified rating. Sound ratings specified in Section 230000 shall be obtained in accordance with the AMCA Standard 300. They shall be published in accordance with AMCA Standard 301, and the products should bear the AMCA sound certified ratings seal.
- D. The quantity and performance criteria for each type of equipment is listed in the equipment schedules.

1.3 SUBMITTALS

- A. Procedure
 - 1. Prepare and make the submissions listed below and in Section 230000 in accordance with the procedure specified in Section 230000.
- B. Shop Drawings
 - 1. Air Handling Equipment and all Related Equipment
 - 2. Fans
 - 3. Fan Performance Curves
 - 4. Heating and cooling coils
 - 5. Filters
 - 6. Variable volume, constant volume, fan terminal units
 - 7. Fan coil units
 - 8. Humidifier / dehumidifier
 - 9. Cabinet and Unit Heaters
 - 10. Sound Absorbers

C. System Testing

1. Perform operating tests and instruct City of New York's personnel as specified in Section 230000. Produce and maintain ventilation and air conditioning under operating criteria determined in advance by agreement with the Commissioner.

PART 2 - EQUIPMENT

2.1 GENERAL REQUIREMENTS

- A. Construct all apparatus of materials suitable for the conditions encountered during operation.
- B. All factory applied acoustical and thermal insulation, including facing and adhesives, sealants and paint, to be fire-resistant or non-combustible, and shall conform to the requirements of NFPA and local codes.
- C. Construct all equipment in accordance with requirements of the local and state codes. Construct all pressure vessels that fall within the scope of ASME Code for unfired pressure vessels to conform to the code and bear the code stamp. Furnish three copies of National Board Inspection and Test Report.
- D. Match and balance all system components to achieve compatibility of equipment for satisfactory operation and performance throughout the entire operating temperature and control range.
- E. Provide all controls, wiring, piping, valves, tubing, accessories and other components necessary to make a complete operating assembly.
- F. Test and rate all fans in accordance with the standards of AMCA. All fans must bear the AMCA rating seal.
- G. Mount grease fittings directly on bearings unless the bearings are not visible or inaccessible. Then provide easily accessible extensions to bearing lubrication fittings.
- H. Balance all fan wheels and other moving components statically and dynamically. Drill all fan shafts on the center line to receive a tachometer point.
- I. Submit to the Commissioner for approval complete curves of fan performance at the operating speed.
- J. Provide coil covers on all coil headers which are installed outside of the air stream.
- K. All filters shall be U.L. Class I.
- L. Certify unit performance in accordance with ARI standard 410-72.
- M. Submit to the Commissioner for approval complete sound power data at the operating speed.
- N. Motors to be premium high efficiency type with guaranteed minimum efficiency rated in accordance with IEEE standard 112, method B. Refer to Specification Section 230513 for required motor efficiencies and acceptable manufacturers.

- O. Fans scheduled for variable speed duty shall be equipped with motors compatible with and specifically designed for variable speed operation. Coordinate with the manufacturer of the variable speed drive as specified in Section 230513.

2.2 AIR HANDLING UNITS

- A. Factory assembled unit of matched components including fans, cooling and heating coil, filter and access section and all accessories and hardware.
- B. Casing Construction
 - 1. Unit air leakage shall not exceed 1.0% of design cfm at +10.0" w.g. in all positive-pressure sections and -10.0" w.g. in all negative-pressure sections. Leakage shall be calculated by totaling all leakage either in to or out of the unit.
 - 2. Casing deflection shall not exceed $L/200$ at +10.0" w.g. in all positive-pressure sections and -10.0" w.g. in all negative-pressure sections, where L is defined as the panel span.
 - 3. Insulation that meets a minimum R-value of 12.5 shall be provided at all casing surfaces including the entire unit floor. Insulation shall be closed-cell foam.
 - 4. Wall assemblies shall be double-wall construction with galvanized steel solid exterior and galvanized steel interior. The entire unit shall have a solid wall liner on the interior. All spaces and joints of wall assemblies shall be completely sealed. Wall shall meet the casing deflection limits contained herein.
 - 5. Panel-to-panel joint and corner details and panel-to-roof details, all showing Class "B" thermal breaks. A Class "B" thermal break shall be defined as a thermal break that ensures no member on the exterior of the unit, excluding fasteners, has through metal contact with any member on the interior of the unit, excluding fasteners.
 - 6. External surfaces of all outdoor unit casings shall be prepared and painted. Paint shall be able to withstand a salt spray test in accordance with ASTM B117 for a minimum of 700 consecutive hours.
 - 7. Primary condensate drain pans shall be provided in cooling coil sections as detailed in the drawings. Drain pans in cooling coil sections shall be stainless steel. Primary drain pans shall extend under each entire coil bank, including headers and return bends. Primary drain pans shall extend downstream of the coil bank. Primary drain pans shall be sloped a minimum of 1/8" per foot, shall be a minimum of 2" deep, and shall be double-sloped (sloped in 2 planes) to positively drain.
 - 8. Stainless steel drains pans shall be provided in the humidifier sections. Drain pans shall be sloped a minimum of 1/8" per foot. Drain connections shall be of the same material as the drain pan and shall extend a minimum of 1-1/2" beyond the base to ensure adequate room for field piping.

9. The overall unit acoustics shall comply with the table below, which lists the allowable maximum dB levels per octave band.

	63 Hz	125 Hz	250 Hz	500 Hz	1000H z	2000H z	4000H z	8000 Hz
Discharge	73	72	80	72	65	68	62	56
Casing	77	75	71	75	68	50	37	36
Ducted Inlet	88	83	80	77	69	66	59	52

C. Access Door Construction

1. Access doors shall be provided throughout units as indicated on the schedules and drawings. Access doors shall be double wall construction. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively.
2. A Class "A" thermal break shall be provided on all door assemblies throughout the unit. A Class "A" thermal break shall be defined as a thermal break that ensures no member on the exterior of the unit, including fasteners, has through metal contact with any member on the interior of the unit, including fasteners.
3. Door hinges shall be stainless steel type. Door handles shall be Allegis design for minimized leakage and to provide a Class "A" thermal break. Handles shall fasten against the door frame with a roller cam to eliminate wear of the door frame. All door handles shall be operable from both the unit exterior and interior.

D. Louver and Damper Constructions

1. Louver frames and blade material shall be constructed of aluminum. Louvers shall have a minimum of 50% free area. Louvers shall be flush mounted to the exterior wall of the unit casing.
2. Intake louver frames shall be 6" deep. Intake louvers shall be drainable with stationary blades, front flanges, and bird screens. Intake louvers shall be sized to prevent water penetration greater than 0.01 oz/sq. ft in a 15 minute test period per AMCA Standard 500-L and shall bear the AMCA seal. Intake louvers shall be sized for air velocity through the free area of no more than 800 feet per minute.
3. Exhaust louver frames shall be 4" deep. Exhaust louvers shall be sized for no more than 0.2" w.g. pressure drop.
4. Ultra low-leak modulating dampers with opposed blade arrangement shall be provided. Damper blades shall be aluminum double-skin airfoil design for minimal pressure drop. Leakage rate shall not exceed 4 scfm/ft² at 3.0" w.g. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. All dampers shall be mounted on the AHU interior.
5. In each case where a louver is provided in front of a damper, the louver shall be flush-mounted to the exterior wall of the unit casing and the damper shall be mounted in a housing frame on the unit interior. The damper shall be spaced adequately from the louver to prevent any damper blade from contacting the louver when the damper is open. The width and height of the damper shall be equal to or greater than each corresponding width and height of the louver to ensure the maximum rated velocity of the louver is not exceeded.

E. Filters

1. Pleated media filters 2" deep shall be provided as indicated on the schedule and drawings. The MERV rating shall be 8 when tested in accordance with ANSI/ASHRAE 52.2. Filter media shall be of non-woven fibers with metal grid support. Filters shall be UL Class 2 when tested in accordance with UL Standard 900.
2. Rigid cartridge filters 4" deep shall be provided as indicated on the schedule and drawings. The MERV rating shall be 14 when tested in accordance with ANSI/ASHRAE 52.2. Filters shall consist of high density glass fiber media enclosed in galvanized steel frames with diagonal supports on both the entering and leaving sides. Filters shall be UL Class 1 when tested in accordance with UL Standard 900.

F. Heating Coils

1. Hot water coils shall have 0.0075" thick aluminum fins. Fins shall be mechanically bonded to 5/8" OD seamless copper tubes with 0.035" thick walls. Fins shall have collars drawn, belled and firmly bonded to the tubes by means of mechanical expansion. Coils shall be circuited for counter-flow heat transfer. Coil casings shall be constructed of galvanized steel.
2. Hot water coils shall be proof and leak tested under water. Proof test shall be at 300 psig and leak test shall be at 200 psig.
3. Coil capacities, pressure drops and selection procedures shall be certified to AHRI Standard 410.

G. Cooling Coils

1. Chilled water coils shall have 0.0075" thick aluminum fins. Fins shall be mechanically bonded to 5/8" OD seamless copper tubes with 0.035" thick walls. Fins shall have collars drawn, belled and firmly bonded to the tubes by means of mechanical expansion. Coils shall be circuited for counter-flow heat transfer. Coil casings shall be constructed of stainless steel.
2. Chilled water coils shall be proof and leak tested under water. Proof test shall be at 300 psig and leak test shall be at 200 psig.
3. Coil capacities, pressure drops and selection procedures shall be certified to AHRI Standard 410.

H. Fans

1. All fans shall be tested, rated and certified in accordance with ANSI/AMCA Standard 210 for air delivery and in accordance with AMCA Standard 300 for sound power levels and shall bear the AMCA seal. The fan balancing process, including vibration limits and documentation, shall be performed in accordance with ANSI/AMCA Standard 204. Fan and motor performance requirements shall be as shown on the schedule and drawings. Maximum rated speed of the fans shall not exceed 75% of the first critical speed.

2. Housed Centrifugal Fans (Relief Fans)
 - a. Fan shall be DWDI or SWSI with BC or high-efficient AF blades as indicated on the schedule and drawings. The Hp characteristic of all fans shall be non-overloading.
 - b. Fan bearings shall be heavy duty, grease lubricated, self-aligning, antifriction pillow block type. Fan bearings shall be rated for a minimum average life (L-50) per ANSI/ABMA of 200,000 hours at design operating conditions. For easy accessibility, lubrication lines for fan bearings shall extend to the drive side of the fan, on the unit interior.
3. Unhoused Plenum Fans (Supply Fans)
 - a. Fans shall be unhoused, SWSI plenum type with high efficient AF blades as indicated on the schedule and drawings. Fans shall be direct driven. Fan wheels shall be aluminum. The Hp characteristic of the fans shall be non-overloading. Fans shall be furnished with protective enclosures around the fan wheels. Fans shall be furnished with inlet collars.
4. All fan motors shall conform to ANSI/NEMA MG 1 as well as all applicable requirements of NEC and shall be UL Listed. Motors shall be inverter ready, ODP and of the voltage, phase, frequency, and Hp indicated in the mechanical schedule. Motors shall be premium efficiency, exceeding the EPA efficiency requirements. The motor shall be provided with a heavy duty, adjustable, steel base.
5. Nameplate motor horsepower for all fans, including dual fans, shall be at least 10% greater than design brake horsepower of each fan.
6. Sheaves for motors and fans shall be fixed pitch and shall be selected at a minimum service factor of 1.2. Sheaves shall have multiple grooves, requiring a minimum of two belts for operation.

I. Accessories

1. Marine lights shall be provided at each AHU section with an access door. Lights shall be fluorescent type to minimize amperage draw and shall produce lumens equivalent to a minimum 64 W, instant-start bulb. Lights shall be constructed of safety glass. Lights shall be suitable for wet locations.
2. All lights on a unit shall be wired in the factory to a single on-off switch. On outdoor units, the light switch shall be mounted on the casing exterior in a NEMA 4 enclosure next to the fan access door. Lighting circuit(s) shall be wired by the AHU Manufacturer to a common junction box separate from the VFD or starter so the lights can remain on when the main disconnect to the unit is on or off. A connector plug shall be provided at each shipping split to eliminate field wiring of lights between splits.
3. A 15 amp, 115V GFCI convenience outlet shall be provided by the AHU Manufacturer. On outdoor units, the outlet shall be mounted on the casing exterior in a NEMA 4 enclosure next to the fan access door. The outlet shall be wired by the AHU Manufacturer to the same circuit as the lights.

J.	Manufacturer:	Model/Series
	McQuay	Custom
	Trane	Custom
	York	Custom

2.3 FANS: ROOF MOUNTED UTILITY SET

- A. Roof exhaust fans shall be of the centrifugal belt-driven or direct-drive type as indicated on Drawings. Fans shall be of capacities and characteristics as scheduled on Drawings and specified herein.
- B. Construction of the fan housing shall be of heavy-gauge aluminum.
- C. All spun parts shall have a rolled bead for added rigidity and shall be specially spun so as to seal the pores of the aluminum providing greater resistance against oxidation and deterioration.
- D. The fan wheel shall be all-aluminum of the centrifugal blower type featuring backward-inclined blades and a tapered inlet shroud. Wheels shall be statically and dynamically balanced. Inlet cone shall be aluminum and of the centrifugal blower type. Motor and drives shall be enclosed in a weathertight compartment, separate from the exhaust air stream. Air for cooling the motor shall be supplied to the motor compartment by way of an air passage from an area free of contaminated exhaust fumes. Motors shall be of the duty, permanently lubricated, sealed ball-bearing type. Drives shall be sized for 165 percent of motor horsepower capabilities and of the cast-iron type, keyed to the fan and motor shafts. Variable pitch drives shall be standard. Fan shaft shall be of steel construction, turned, ground, and polished to precise tolerances in relationship to the hub and bearings. Drive belts shall be of the oil-resistant, non-static, non-sparking type with life expectancy of over 24,000 hours.
- E. Bearings shall be flanged and of the permanently lubricated, permanently sealed, ball-bearing type capable of over 200,000 hours bearing life. The entire drive assembly and wheel shall be removable, as a complete unit, from the support structure without disassembling the external fan housing. The complete drive assembly shall be mounted on rubber vibration isolation.
- F. Fans shall be licensed to bear the AMCA ratings seal for air and sound performance.
- G. Fans shall be mounted on an isolation base per spec section 230548.
- H. Fans shall have chemical-resistant heresite finish and spark-proof construction.
- I.

Manufacturers:	Model/Series:
Greenheck	SWB
Loren Cook	CPS
Barry Blower	Dynamo

2.4 FAN: CENTRIFUGAL INLINE - SQUARE CONSTRUCTION

- A. Factory assembled with all components mounted on a reinforced steel stand.

- B. Cabinet: 18 gauge, nominal with 16 gauge front panels; channel formed edges around entire perimeter.
 - C. Chassis: Minimum 18 gauge galvanized steel, reinforced with flanged edges lined with 1/2" thick, 1 lb. density neoprene faced fiberglass. Galvanized steel drain pan with insulating liner.
 - D. Fan: Double inlet, double width, forward curved, galvanized steel wheel and scroll. Fan, motor and drain pan assembly shall be removable as a unit.
 - E. Coils:
 - 1. Cooling/heating coil: 5/8" O.D. seamless copper tubes, with aluminum fins, mechanically bonded.
 - 2. Test coils at the factory for maximum working pressures of up to 300 PSI.
 - F. Motors: Multispeed permanent split capacitor type directly connected to an extension of fan shaft. Maximum fan motor speed 1100 RPM. Provide integral thermal overload protection. Unit mounted fan speed switch. Provide special motors for all units scheduled with external static pressures of 0.10 inches or greater. Motors shall be capable of delivering scheduled CFM at static pressures indicated.
 - G. Filter: 1" disposable woven glass.
 - H. Accessories:
 - 1. Two-pipe valve package with automatic summer/winter changeover (Trane H-37).
 - 2. Four pipe valve package, including two way control valves for hot and chilled water, two stop valves for each service and an air vent on each service. Provide three way chilled water control valves where indicated on plans or in equipment schedules. Control valves shall be provided in conformance with Specification Section 230923.
 - 3. Tamper proof panel
 - 4. Unit sub-base.
 - 5. Extended motor oiler lines.
 - I. Manufacturer: Trane
International Environmental Company
York
- Model/Series:
Unitrane

2.9 HUMIDIFIER: STEAM GRID

- A. Steam grid type, with multiple steel headers, pneumatic operator, trap, temperature switch and strainer. Operator to be compatible with sequence of operation as defined in Section 230923.
- B. Provide support brackets and all interconnection piping.
- C. Manifolds shall be insulated with fiberglass and be provided with stainless steel

PART 3 - EXECUTION

3.1 GENERAL

- A. Install equipment in conformance with manufacturer's recommendations.

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**CONTRACT # 4
ELECTRICAL WORK**

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SECTION 26 00 00

GENERAL PROVISIONS FOR ELECTRIC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Division shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this Division as shown on the drawings, as specified herein, and/or as required by job conditions.
- B. This Section 260000 governs general procedures, materials and workmanship as applicable to the electrical work specified in the other Division 01 sections. Refer to Division 01 sections for additional general requirements.
- C. Perform the work in accordance with the requirements and provisions of applicable codes and laws.
- D. Equipment, materials, and installation shall conform to applicable standards and requirements of the following organizations and documents:

ANSI	-	American National Standards Institute
ASTM	-	American Society for Testing and Materials
AWS	-	American Welding Society
CBM	-	Certified Ballast Manufacturers Association
CSA	-	Canadian Standards Association
ETL	-	ETL Testing Laboratories
FCC	-	Federal Communications Commission
FM	-	Factory Mutual
FS	-	Federal Specifications
ICEA	-	Insulated Cable Engineers Association
IEEE	-	Institute of Electrical and Electronic Engineers
IESNA	-	Illuminating Engineering Society of North America
NEC	-	National Electrical Code
NECA	-	National Electrical Contractors Association
NEMA	-	National Electrical Manufacturers Association
NESC	-	National Electric Safety Code
NETA	-	International Electrical Testing Association
NFPA	-	National Fire Protection Association
NYCA	-	New York City Amendments to the 2008 NEC
OSHA	-	Occupational Safety and Health Administration
UL	-	Underwriters Laboratories, Inc.

1.2 INTENT

- A. It is the intention of the specifications and drawings to obtain finished work, clean, tested, and ready for operation.

1.3 WORK INCLUDED

- A. The work under this Division shall include labor, material, equipment, services and administrative tasks required to complete and make operable the electrical work shown on the drawings and specified herein, and including, but not limited to, the following:
 - 1. Preparation and submission of shop drawings, diagrams and illustrations.

2. Procuring necessary permits and approvals, and paying required fees and charges in connection with the work of this Division.
3. Coordinating with, and complying with requirements of, the local electric utility, telecommunications service provider, and other franchised utility and service companies as applicable to the scope of this work.
4. Record drawings.
5. Operating and maintenance instructions and manuals.
6. Identification labels, tags, charts and diagrams.
7. Final connections to electrical equipment and devices.
8. Cutting, drilling, and patching required for the work of this Division.
9. Concrete housekeeping pads for floor-mounted electrical equipment.
10. Temporary light and power for construction purposes.
11. Maintain existing life safety systems in operation during construction.
12. Testing and adjustment of systems and equipment furnished, installed, and/or connected under this Division.
13. Requirements of Construction Waste Management, Section 017419.
 - a. The Commissioner has established that as many of the surplus and waste material as economically feasible shall be reused, salvaged, or recycled. To that end, the Contractor #4 for Electrical Work shall participate in the development of the Waste Management Plan, and collect, sort and deposit in designated containers, their waste, non-returned surplus materials and rubbish in accordance with the approved Plan.
 - b. Project Diversion Goals are stated in Section 017419 – Construction Waste Management. The Contractor #4 for Electrical Work shall meet or exceed the minimum percentage of waste stated there for diversion from landfill, unless the Contractor #1 for General Construction Work designates a different amount. Specific items/categories shall be in accordance with the Documents and as established in the Plan.

1.4 REFERENCES

- A. DDC General Conditions
- B. Division 1, Section 018113.13 – Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings
- C. Division 1, Section 018113 – Sustainable Design Requirements (LEED Building)
- D. Division 1, Section 017419 - Construction Waste Requirements
- E. Division 1, Section 018119 - Construction IAQ Requirements

1.5 APPROVALS

- A. See General Conditions, in addition to the following requirements.
- B. Submit for approval a list of manufacturers of equipment proposed for the work. Contractor #4's intent to use exact make specified does not relieve him of responsibility for submitting such a list.
- C. Where any specific material, process or method of construction, or manufactured article is specified by name or by reference to catalog number of a manufacturer, or other standards, the intent is not to take precedence over the basic duty and performance specified, noted on drawings, or as required for intended results. The Contractor #4 shall verify the duty specified with the specific characteristics of the equipment offered for approval.
- D. If material or equipment is installed before it is approved, the Contractor #4 shall be liable for its removal and replacement with no additional cost.

1.6 COORDINATION WITH OTHER TRADES

- A. Prepare complete set of drawings showing necessary slab openings, cuts or holes in structural members and structural supports that require structural framing. Drawings shall clearly indicate sizes and location relative to established column lines. Drawings shall be made using the latest backgrounds available from the Commissioner. Drawings shall be completed in sufficient time to allow for structural steel fabrication so as not to delay project schedule.
- B. Shop drawing submissions shall demonstrate knowledge of the work of other trades, and shall show the locations of the work of other trades that affect the work of this contract.

1.7 COORDINATION DRAWINGS

- A. Coordination drawings shall be completed as required in Division 01. Refer to Section 230000 for requirements and sequence of drawing development.
- B. The electrical Contractor #4 shall add electrical work on the coordination drawings. Electrical work to be shown on the coordination drawings shall include, but not be limited to, panelboards, switchgear, transformers, motor control centers, variable frequency drives, and cable tray and conduit 2" and larger. Additional electrical work shall be shown on coordination drawings where close coordination is required. Access requirements shall be shown for equipment.

- C. After other trades have included their work on the coordination drawings and noted conflicts, the trades shall meet to resolve conflicts and agree to acceptable solutions. Each trade shall sign coordination drawings. Items not shown on the coordination drawings are the responsibility of the omitting Contractor #4 and the Contractor #4 is subject to additional costs incurred by other trades.
- D. The Commissioner and Engineer are not part of the coordination drawing process. The Commissioner will provide assistance relative to acceptability of proposed installations to resolve conflicts.
- E. Submit final signed coordination drawing to engineer. Only submit items that are different from previously approved shop drawings. Revisions shall be clearly indicated.
- F. Any work fabricated or installed prior to sign off by the applicable trades shall be removed and re-installed in conformance with coordination drawings.
- G. The overall coordination of the coordination process is the responsibility of the general Contractor #1.

1.8 SUBMITTALS

A. Shop Drawing Schedule

- 1. The Contractor #4 shall submit, within 30 days of the award of his contract, a schedule of proposed shop drawing submissions.
- 2. The schedule shall include the following information.
 - a. Item to be submitted
 - b. Date of submission
 - c. Latest date for approval
 - d. Manufacturers of the specified item.
- 3. Items not specifically listed as "approved equal" should be listed for consideration at this time.

B. See Division 260000 equipment sections for specific submittals required. Unless otherwise indicated, submittals are required for electrical devices, equipment, and systems including basic construction materials such as conduit, 600 volt building wire, and standard fittings and boxes.

C. Manufacturers' Data

- 1. If catalog cuts of standard manufactured items show different types, options, finishes, performance requirements, or other variations, those features that the Contractor #4 proposes to furnish shall be clearly identified. If any variations from the catalog description are proposed or required, such variations must be clearly noted on the cut.

D. Shop Drawings

- 1. Shop drawings shall clearly indicate details, sectional views, arrangements, working and erection dimensions, kinds and quality of materials and their finishes, and other information necessary for proper checking and for fabrication and installation of the items, and shall include information required for making connections to other work.

2. Shop drawings shall be numbered consecutively, and drawings related to various units comprising a proposed assembly shall be submitted simultaneously so that such units may be checked both individually and as an assembly.
 3. Shop drawings shall include a listing and labeling statement indicating products are listed and labeled by a certified testing laboratory or agency for all electrical materials, devices, appliances and equipment.
 4. Contractor #4 shall keep on the site, in good order, a complete up-to-date set of approved shop drawings. Shop drawings shall be made available for inspection by the Commissioner.
 5. The approval of shop drawings will be for general conformance to drawings and specifications, and shall not be construed as permitting any departure from the contract requirements. If the shop drawings show any variations from contract requirements because of standard shop practices or other reasons, such variations shall be clearly identified on the drawings or specifically noted in the letter of transmittal, in order that, if acceptable, suitable action may be taken for proper adjustment in other work affected thereby. If the Contractor #4 fails to so identify such variations, he will not be relieved of responsibility for executing the work in accordance with the contract, even though such shop drawings have been approved and the work installed. Approval shall not relieve the Contractor #4 of responsibility for any error in details, dimensions, etc. that may exist on shop drawings, nor for the furnishing of materials or work required by the contract and not indicated on the shop drawings. Approval shall not be construed as approved departure from details or instructions previously furnished by the Commissioner.
 6. No work for which shop drawings are required shall be executed until the Commissioner's approval is obtained.
- E. Submittals will be reviewed for conformance with the contract drawings and specifications. The Professional Engineer licensed in New York State's review stamp will be affixed to submittals. One of the following actions will be taken.
1. **NO EXCEPTION** - Submittal appears to comply with the contract drawings and specifications. Contractor #4 is not relieved of responsibility to meet the requirements of the contract drawings and specifications due to errors, omissions, or conflicts with other equipment or trades.
 2. **EXCEPTIONS AS NOTED** - Submittal appears to comply with the contract drawings and specifications except for the items noted by the engineer. Contractor #4 is not relieved of responsibility to meet the requirements of the contract drawings and specifications due to errors, omissions, or conflicts with other equipment or trades.
 3. **REVISE AND RESUBMIT** - In the opinion of the engineer the nature and/or quantity of exceptions is sufficient to require resubmission to demonstrate compliance. Submittals must be returned within 30 days for contingent acceptance to remain valid. Submittals will become rejected if not returned within 30 days.
 4. **REJECTED** - Submittal does not comply with contract drawings and specifications.

1.9 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Furnish manufacturers operating and maintenance instructions, parts lists and sources of supply for replacements in accordance with Division 01 - General Requirements.
- B. Provide the following:
 - 1. Complete sets of final and correct shop drawings, maintenance and replacement parts manuals, and operating instructions, for equipment supplied.
 - 2. Bind each set within a common binder. Index and organize with a table of contents, to permit quick and convenient reference.
 - 3. Two days of instruction in operation and maintenance of equipment to City of New York's maintenance force. Schedule a 2-week period, convenient to City of New York, during which qualified personnel, including manufacturers' technicians and engineers will be available for City of New York's instruction.
 - 4. Master Operating Manual (submit in quadruplicate).
 - 5. Manufacturer's mechanical and electrical equipment parts list of components of the systems listed on the equipment schedules, control diagrams and wiring diagrams of controllers.
 - 6. List shall give system number, unit number, manufacturer's model number, and manufacturer's drawing numbers.
 - 7. Step by step operating instructions for each system including preparation for starting, re-starting after power failure, or re-setting after overcurrent or short-circuit operation.
 - 8. Maintenance instructions for each type of equipment.
 - 9. Possible breakdowns and repairs for each type of equipment.
 - 10. List of nearest local suppliers for equipment.
 - 11. Manufacturer's literature describing each piece of equipment listed on the fixture, panel and equipment schedules and in the specifications including wiring diagrams and a copy of any applicable test reports.
 - 12. As-installed control diagrams by the control manufacturer.

13. Recommended trouble shooting procedures in the event of foreseeable electrical system failure.
14. Complete "As-Installed" color coded wiring diagrams of systems and electrical motor controller connections.
15. Copies of the following test reports or study reports:
 - a. Branch circuit transfer system.
 - b. Dry type transformer.
 - c. Computer grade isolation transformer.
 - d. Lighting control system.
 - e. Architectural dimming control system.
 - f. Fire alarm system.
 - g. Short circuit, arc flash and coordination study with final settings.
 - h. Thermographic survey.

1.10 GUARANTEES AND SERVICES

- A. Workmanship, installation materials, and equipment shall be guaranteed as specified in the General Conditions.
- B. Contractor #4 shall leave entire system installed under this Contract in proper working order, and shall replace any work or material which develops defects within the 1 year guarantee period, including other work damaged as a result of such defects, without additional cost.

1.11 PERMITS AND CERTIFICATES

- A. Prior to proceeding with any installation, the Contractor #4 shall prepare and submit to the proper authorities for their approval working drawings required by them, and shall give necessary notices, obtain permits, and pay local, state and federal taxes, fees and other costs in connection with this work.

1.12 SHORT CIRCUIT, ARC FLASH AND OVERCURRENT PROTECTION COORDINATION STUDY

- A. The equipment manufacturer shall perform and submit for review and approval (1) a short circuit study and (2) an overcurrent protection coordination study in accordance with IEEE "Red Book" Standard 141 for service and distribution equipment supplied, including (3) arc flash hazard calculations per IEEE 1584 and complying with NFPA 70E. The study shall include existing equipment and equipment specified in: Sections 260962 Branch Circuit Transfer System, 262416 Panelboards, 263623 Automatic Transfer Switches, and 260943 Architectural Dimming Control Systems and Theatrical Lighting Controls. Include all portions of the existing and proposed electrical distribution system from the normal power incoming primary source down to and including all panels and distribution equipment shown on the drawings. Provide a computer generated format similar to SKM Systems Power Tools, EDSA Easy Power or approved equivalent. Study reports shall be reviewed and sealed by a Professional Engineer licensed in New York State with the appropriate seal annotated on the title page.
- B. Reports shall include as minimum:
 1. Single-line diagram(s) of service & distribution to include:
 - a. Complete component identification to match project labels
 - b. Transformer KVA and temperature rise
 - c. Circuit breaker & fuse type, frame & trip
 - d. Conductor quantity, type, size and length

- e. UL listed component AIC rating, including rating with upstream fuse, if applicable
 - f. Calculated fault current at each node and labeled on the single-line diagram.
2. Short circuit summary & analysis shall include complete fault calculations as specified herein for each proposed and ultimate source combination including: utility, generator and parallel or closed-transition with motor contribution, as applicable. Include fault contribution of all motors in the study. Motors with variable frequency drive controllers are equipped with bypass and shall be included.
 3. Selective coordination summary & analysis as required by Code including:
 - a. Coordination required for 0.1 second and longer.
 - b. Coordination where the service overcurrent protective device (OCPD) rating or setting is above 601 amps, such device shall be selectively coordinated with the next downstream OCPD.
 - c. Fire pump, elevator, emergency and legally required standby distribution.
 4. Arc flash hazard analysis shall calculate:
 - a. Listing of assumptions.
 - b. Incident energies at each equipment, protective device, bus, and feeder including transformers less than 125 kVA and where work could be performed on energized parts.
 - c. Incident energies at defined working distances.
 - d. Arc-flash protection boundary.
 - e. Required protective flame resistant clothing class for arc flash areas.
 - f. Recommendations for arc flash mitigation and reduction of personal protective equipment categories.
 5. Short circuit computer program results.
 6. Analysis of short circuit results including discussion of any problem areas.
 7. Recommended solutions for any identified problem areas.
 8. Branch & feeder composite computer generated time current curves (TCC) for equipment and protective devices in system.
 9. Time current curves including analysis of selective coordination results including discussion of any problem areas. TCC's shall include:
 - a. Individual devices in color with information labels to match single line diagram descriptions.
 - b. Inset containing single line diagram of components described in TCC.
 - c. Component damage curves & inrush points for conductors, motors & transformers.
 - d. Truncate curves at maximum available fault current.
 - e. Trip settings.
 10. When emergency generator is provided, include phase and ground coordination of the generator protective devices. Show the generator decrement curve and damage curve along with the operating characteristic of the protective devices. Obtain the information from the generator manufacturer and include the generator actual impedance value, time constants and current boost data in the study. Do not use typical values for the generator.
 11. Table of recommended settings of protective devices.
 12. Appendices with time current curves in color, UL listings, manufacturer's data, and supporting information used in study.
- C. Manufacturer shall document that overcurrent protection devices will perform in accordance with their U.L. listings and ANSI/IEEE Standard 242.
 - D. The short circuit, arc flash and coordination study shall be included with the submittals for equipment included in the study and as listed above. Failure to include the study with the equipment submittals will cause the equipment submittals to be rejected.
 - E. The Contractor #4 shall modify distribution equipment based on the results of the study.

- F. The Contractor #4 shall be responsible for final field adjustment of ground fault, overload and short circuit settings of adjustable circuit breakers and replacement of fused devices in compliance with the short circuit and coordination study recommendations.
- G. Provide labeling of equipment likely to require examination, adjustment, servicing or maintenance while energized to warn qualified persons of potential electric arc flash hazards in accordance with the results of the study and NFPA 70E.

1.13 LOSS CONTROL SERVICES THERMOGRAPHIC SURVEY REPORTS

- A. Perform thermographic survey and inspection of new and existing electrical equipment within one (1) year of installation to include: utility service end boxes, pad mount transformers and medium voltage switches, medium voltage cable terminations and splices, switchboards, sub-distribution switchboards and panelboards, branch circuit panelboards, disconnect switches, transfer switches, fuses and circuit breakers, busway, transformers, cable splices, and equipment terminals as shown on the drawings. Perform thermographic survey of other equipment as indicated on the drawings. Thermographic surveys shall be performed during periods of maximum loading using imaging equipment capable of detecting a minimum temperature difference of 0.1°C at 30°C. Loose connections shall be tightened and re-surveyed to confirm adequate repair. Upon completion of survey, submit a report to include the following:
 - 1. Complete description of equipment testing.
 - 2. Any discrepancies found.
 - 3. Temperature difference between the area of concern and the reference area.
 - 4. Probable cause of temperature difference.
 - 5. Areas inspected to include inaccessible and unused areas and equipment.
 - 6. Load conditions at time of inspection.
 - 7. Thermographs and photographs of the deficient area.
 - 8. Corrective action recommendations.
 - 9. Results submitted in formal bound report.

1.14 LEED BUILDING REQUIREMENTS

- A. General: The City of New York requires the Contractor #4 to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals, which may impact this area of work, are listed in the applicable paragraphs of this specification section. The Contractor #4 shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor #4 or their Sub-Contractors, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
- B. Performance Criteria: All field applied adhesives, sealants (used as fillers), prime painting, and finished painting shall comply with the low VOC requirements called out in Division 1, Section 018115 - Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, & Architectural Paint and Coatings.

1.15 LEED BUILDING SUBMITTAL REQUIREMENTS

- A. Provide for all field-applied adhesives, sealants (used as fillers), and paints: Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, paints and coatings applied on the interior of the building. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.16 EQUIPMENT AND SYSTEMS CRITERIA

- A. The criteria of design and performance to produce the required operation are based on equipment shown or scheduled.
- B. The equipment must conform to the structural design provisions for loads applied to the structure, to the dimensions established by drawings for equipment spaces and other clearances.
- C. The descriptions cover basic equipment and operation but not all the details of design and construction.
- D. The use of singular in descriptions does not limit the quantities of items to be furnished to provide the operation specified. Furnish equipment required to produce specified performance under installed conditions.
- E. Factory wiring, interconnections, raceways and connections shall conform to these specifications for the field work.
- F. Provide trim, enclosures and accessories required to make a complete installation.
- G. Finish equipment, motors, controls and similar apparatus with machinery enamel, prime coat and finish coat. Provide prime coat suitable for field painting and other protective treatments and coatings as specified.
- H. Acoustical performance of equipment and systems.

- 1. Noise levels from operation of equipment, transformers, ballasts, inverters, uninterruptible power supplies (ups's) and power conditioners, whether air-borne or structure-borne, and noise levels created by or within equipment and raceway shall not exceed sound pressure levels determined by the noise criterion curves in the ASHRAE Guide as follows:

Location Noise Criterion

Theater 1	NC 20	
Theater 2	NC 20	
Control Booths	NC 20	
Sound & Light Locks	NC 25	
Stage	NC 20	
Rehearsal Studios	NC 30	
Patron Lounge	NC 30	
Dressing Rooms	NC 30	
Green Room	NC 30	
Lobbies	NC 35	
Public Circulation Areas		NC 35
Offices	NC 30	
Conference Room	NC 25	

- 2. Octave band sound pressure levels will be obtained for ambient room conditions with equipment not operating and also with the installed equipment operating per plans and specifications.
- 3. For testing purposes, sound pressure levels will be measured 3'-0" above the floor.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Materials and equipment and systems shall be new, bear manufacturer's name and trademark, and comply with applicable standards specified.
- B. The UL label shall be borne on each piece of applicable material or equipment.
- C. Equipment shall be provided with required hardware for proper installation, assembly, and operation.
- D. The descriptions cover basic equipment and operation but not complete details of design and construction. The use of singular in descriptions does not limit the quantities of items to be furnished to provide the operation specified. Furnish equipment required to produce specified performance under installed conditions. Provide trim, enclosures and accessories required to make a complete installation.
- E. Follow manufacturers' directions in delivery, storage, protection and installation of equipment and materials. Notify Commissioner promptly, in writing, of any conflict between requirements of the contract documents and manufacturers' directions, and obtain Commissioner's written instructions before proceeding with work. Bear any costs to correct deficiencies arising from failure to comply with the manufacturers' directions and instructions.
- F. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements. Store items subject to moisture damage in dry, heated spaces. Tightly cover and protect equipment against dirt, water, chemical, and mechanical injury, and against theft.
- G. Equipment and materials of the same general type shall be of the same manufacturer, make and model throughout the work to provide uniform appearance, operation and maintenance.
- H. Where new products or components are indicated to be installed or connected to existing systems or equipment, verify compatibility and performance with the manufacturer of the existing systems or equipment prior to purchase and installation.

2.2 EQUIPMENT DEVIATIONS

- A. Where the Contractor #4 proposes to use an item of equipment other than that specified or detailed on the drawings, and which requires any additional utilities or redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical or electrical layouts, such redesign and new drawings required thereby, with approval of the

Commissioner, shall be prepared by the Contractor #4 without additional cost. Any changes in the project required to support alternates or substitutions shall be fully identified and submitted on the shop drawings for the substitute or alternate product. Such changes shall be reflected in the coordination drawings and shall be approved by the affected trades.

- B. Where such approved deviation requires a different quantity or arrangement of equipment from that specified or indicated on the drawings, the Contractor #4 shall provide any structural supports, controllers, motors, starters, wiring, conduit, and any other additional equipment required by the deviation, at no additional cost.
- C. It is the intent of these specifications that wherever a manufacturer of a product or a catalog number is specified, and terms "or equal" or "or approved equal" are used, a substituted item must conform to the specified item. Consideration will not be given to claims that a substituted item meets performance requirements with lesser construction. Performance as indicated in schedules and in specifications shall be interpreted as minimum acceptable performance.

2.3 ACCESS DOORS IN WALLS AND CEILINGS

- A. At each electrical component requiring access when located above ceiling or inside the wall not accessible by removal of grille, ceiling tile or from the air shafts, furnish access panels for installation by trades responsible for wall and ceiling construction as specified under Division 08 – Access Doors and Panels. Size panels sufficiently to access products requiring inspection, maintenance and adjustment, including but not limited to electrically operated valves, in-line controls, fire dampers, instruments and smoke or heat detectors.
 - 1. Minimum size for panels: 16 by 16 inches.
 - 2. Size panels located in masonry walls to match masonry coursing.
- B. Locations: Locate panels in walls and non-accessible ceilings of closets, storage rooms and other non-public spaces to the greatest extent possible. When access panels are required in corridors and public spaces, locate panels as directed by Commissioner.
- C. Panel type and materials: As specified under Division 08.

PART 3 - EXECUTION

3.1 SITE INVESTIGATION

- A. Examine drawings, specifications, and site, and be responsible for the nature and location of work and the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, electric power, roads, etc.

3.2 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of systems and work required. Do not scale the drawings. Consult the Mechanical and Architectural drawings and details for exact locations of equipment.
- B. Drawings shall be used in layout of work. Check reference drawings to verify spaces in which work will be installed, and maintain maximum headroom and space conditions. Where headroom, working clearance or space conditions appear inadequate, Commissioner shall be notified before proceeding with installation.

- C. If directed by the Commissioner, make minor modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

3.3 COORDINATION WITH OTHER TRADES

- A. Closely schedule the work so that the work will be installed at the proper time and without delaying the project's completion.
- B. Where the work of this Division is to be installed in close proximity to the work of other trades, or where there is evidence that the work will interfere with the work of other trades, assist in working out space conditions to make a satisfactory arrangement. If the work is installed before such coordination with other trades, make necessary changes in the work as directed by the Commissioner to correct any conflicts or interferences, without additional cost to the City of New York.

3.4 COORDINATION AND LAYOUT

- A. Study drawings and specifications to ensure completeness of work required. Include supplementary items normal to manufacturers' requirements or standard accepted trade practices as necessary to complete the work, even if not explicitly shown or specified.
- B. Verify measurements and conditions in field before starting work.
- C. Examine materials, surfaces, and structures to which work is to be applied and notify the Commissioner, in writing, of any conditions that are detrimental to proper and expeditious installation of work. Starting of work shall be construed as acceptance of conditions.
- D. Confer with other trades to install work to avoid interference with other trades. The necessary adjustments to conform to structural conditions and work of other trades, particularly ductwork and piping layouts, are included under this section. Assist other trades in the preparation of coordinated layout drawings.

3.5 CONNECTIONS TO EQUIPMENT FURNISHED UNDER OTHER DIVISIONS OR BY CITY OF NEW YORK

- A. Provide electrical connections to equipment and fixtures requiring such connections which are supplied by City of New York or under other Divisions.
- B. Provide conduit, wire, lugs, fittings, accessories, and trim for final connection of each item of equipment as required for complete assembly and specified operation.

3.6 WORKMANSHIP

- A. Perform work in practical, neat, and workmanlike manner, with electricians skilled in the work they are performing, and using the best generally recognized trade practices.
- B. No work shall be covered or hidden from view until it has been inspected and approved by the required Building Department personnel and the Commissioner.
- C. Workmanship or materials not meeting with requirements of the specifications or drawings, or the satisfaction of the Commissioner, shall be rejected and shall be immediately replaced in an acceptable manner without additional cost.

3.7 TESTS

- A. Testing on incoming services shall be in accordance with Local Power Company requirements. Tests shall be performed by an approved independent testing Company in the presence of the Commissioner, City of New York, and the local Utility.
- B. Notify Commissioner, in writing, at least one week prior to tests, of the proposed testing timetables. Perform tests with the approval of and in the presence of the Commissioner or his representative.
- C. Provide temporary connections, necessary testing equipment, labor and materials, required for the testing of the systems and equipment. Systems shall be prepared for testing and protected from damage. Measuring instruments shall be properly calibrated. The cost of tests shall be included in the contract price.
- D. Verify and correct as necessary the following: voltages, tap settings, trip settings, and phasing on equipment and devices furnished or installed. Secondary voltages shall be tested at the bus in the main switchboard, at panelboards, and at such other locations on the distribution systems as necessary. Secondary voltages shall be tested under no-load and full-load conditions.
- E. Electronic solid state trip units shall be set by a manufacturer's trained technician as follows:
 - 1. Circuit breakers with solid state trip units shall be initially pre-set to the equivalent LT, LTD, ST, STD setting of the thermal magnetic version of the same ampere rated circuit breaker.
 - 2. Instantaneous setting shall be not less than 4X.
- F. Provide a written report on testing and device settings. Include a copy in the Operation and Maintenance Manual.
- G. Adjust occupancy sensors for proper operation including time delay, field of view (masking), typed sensing and parallel operation.
- H. Test wiring, outlets, lighting fixtures, switches, controllers, starters, motors, etc., wired under this Division. Leave free from grounds, crosses, shorts, opens, etc., and leave materials and apparatus in proper and satisfactory working condition. Perform additional tests as listed in the other Division 260000 specification sections.
- I. Lighting fixtures shall be tested with specified lamps in place for not less than ten hours; the fixtures may be checked in sections.
- J. Test for proper operation of emergency lighting equipment under simulated emergency conditions.
- K. Test distribution equipment, motors, and three phase receptacles for proper phase connections and phase rotation.
- L. Test service entrance, switchboards, panelboards, feeders, branch circuits and receptacles for proper neutral and grounding connections.

- M. Prior to energizing, test insulation resistance of conductors and distribution equipment with a 500VDC megger, both phase-to-phase and phase-to-ground. Do not energize any circuits with a reading of less than one megohm (1 million ohms) for #6 AWG wire and smaller or 250,000 ohms for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor. Circuits under megger insulation test shall be connected to respective final terminals but with switches and breakers in the "OFF" position.
- N. After fixtures, devices, and equipment are installed and connections completed to each panel, the Contractor #4 shall disconnect the neutral feeder conductor from the neutral bar and the grounded enclosure and test insulation resistance. If this reading is less than 250,000 ohms, the Contractor #4 shall disconnect the branch circuit neutral wires from the neutral bar. He shall then test each branch circuit separately to the panel until the low readings are found. The Contractor #4 shall correct troubles, reconnect and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
- O. Prior to energizing, test for continuity and identification of each conductor. Identify both ends of each conductor.
- P. Perform additional tests required by City of New York, Commissioner or any other authorities having jurisdiction.
- Q. Correct or replace any circuit, material or equipment that is found to be defective by these tests. Correct defects, whether due to faulty workmanship or material furnished, in a manner acceptable to Commissioner without additional cost.

3.8 IDENTIFICATION

A. Equipment

1. Identify each item and the system or area it serves. Provide an engraved lamicoid nameplate in a visible location on each switchboard, panelboard, disconnect, switch, inverter, annunciator and similar equipment. Provide stencils on major equipment.
2. Switchboard devices, panels, cabinets, junction boxes, switches, controllers, motors, etc., shall be identified as to systems, voltage, phases, horsepower, fuse size, circuit breaker size, heater size, magnetic size, and feed location on their exteriors.
3. Provide printed labels for all equipment in the system from the project short circuit, coordination & arc flash study file. Assume three (3) labels per equipment/bus in your estimate using 4" x 6" labels or one (1) 6" x 8" label per equipment bus. The labels shall be UV resistant vinyl labels (white with orange warning strip and black letters) conforming to ANSI-Z535. The labels shall be printable directly from the power system software utilized for the study with a Duralabel, Brady PowerMark or GlobalMark printer.
4. Emergency systems and equipment: Identify all boxes and enclosures, including automatic transfer switches, emergency generators, and panelboards, for emergency circuits with permanent yellow color so that they are readily identified as components of an emergency circuit or system as required. Yellow paint and/or a permanently-affixed nameplate, yellow in color with black lettering, shall be acceptable.

B. Wiring

1. Provide vinyl cloth self-adhering labels for feeders and branch circuits in pull boxes, junction boxes, cabinets, and outlets to identify each feeder and circuit. Manufacturer: Panduit Pan-Code, Brady or approved equal.
 2. Cables and branch wiring shall be identified showing phasing, system designations, and items served. Identity is required in switchboards, panels, junction boxes, switches, controllers, cabinets, etc.
- C. Provide complete, accurate, typewritten panelboard and switchboard directories mounted securely to panelboard doors and switchboard faces. Directories to include for each circuit: room number or area served and load description.
- D. Label receptacle cover plates to indicate source panelboard and branch circuit breaker number at bottom of cover plate. Provide typewritten self-adhering labels with black text and clear background, Brady or approved equal.
- E. Label covers of pullboxes and junction boxes with readily visible lettering at least 1/4-inch high system, source panel, circuit number and voltage. Provide typewritten self-adhering labels with black text and clear background, Brady or approved equal.
- F. Install a permanently affixed sign at the service entrance equipment indicating the type and location of the on-site emergency power source. Install a sign on the main grounding box identifying all emergency and normal sources connected at that location.
- G. Provide a reduced size "as-built" single line diagrams, framed under glass, and mounted in a conspicuous place adjacent to the main switchboard.

3.9 CUTTING, ALTERING AND PATCHING

- A. Provide cutting, chasing, drilling, altering and rough patching required for the work of this division.
1. Including the restoring of existing work cut for or damaged by installation of new work, and where present work is removed.
 2. Materials and workmanship required in connection with cutting, altering and rough patching shall match the existing work in every respect.
- B. Do shoring, bracing, cutting, patching, piecing out, filling in, repairing and refinishing of present work as made necessary by the alteration and the installation of new work.
- C. Holes and openings occurring in the existing floors after equipment, partitions, floors, steel work, conduits are removed or installed shall be closed up with materials similar to the adjacent work.
- D. The size and location of items requiring an opening, chase or other provisions to receive it shall be given by the trade requiring same in ample time to avoid undue cutting of any new work to be installed. These provisions shall not relieve the Contractor #4 from keeping informed as to the required opening, chases, etc., nor from responsibility for the correctness thereof, nor for cutting and repairing after the new work is in place.
- E. Include cutting, repairing and patching in connection with the work that may be required to make the several parts come together properly and fit it to receive or be received by the work of other trades, as shown on the drawings and/or specified, or reasonably implied by the drawings and specifications.

- F. Repairing, patching, piecing-out, filling-in, restoring and refinishing shall be neatly done by mechanics skilled in their trade to leave same in condition satisfactory to the City of New York.
- G. Materials and their methods of application for patching shall comply with applicable requirements of the specifications.
 - 1. Materials and workmanship not covered by the specifications and items of work exposed to view adjoining existing work to remain shall conform to similar materials and workmanship existing in or adjacent to the spaces to be altered.
- H. Cutting, repairing and patching shall include items shown on the drawings, specified in the specifications or required by the installation of new work or the removal of existing work.
- I. Remove partitions, walls, suspended ceilings, etc., as necessary to perform the required alterations or new construction work. Avoid damage to construction and finishes that are to remain.
- J. Protect and be responsible for the existing building, facilities and improvements. Any disturbance or damage to the work, the existing building, and improvements, or any impairments of facilities resulting from the construction operations, shall be promptly rectified, with the disturbed, damaged, or impaired work, restored, repaired or replaced at no extra cost.
- K. Alterations which are not indicated on the drawings nor specified herein but necessary to make good existing work disturbed by reason of the work shall be restored to a condition satisfactory to the City of New York.
- L. Holes in masonry floors and walls are to be core drilled. Scan existing slabs and walls for concealed locations of equipment to include: conduits, piping, rebar and structural elements prior to being core drilled. Prior to core drilling, notify the building occupants of the potential for an unscheduled power outage. The Commissioner shall inspect core holes before installing conduits, sleeves, or poke-through devices. Conduits damaged during core drilling shall be restored immediately at the Contractor #4's expense.
- M. Disturbed concrete and /or cement floor areas shall be patched with approved type latex mortar. When cement mortar is used for patching, the surfaces shall be depressed a minimum depth of 1".
- N. Reinstall weather protection work in waterproof manner.
- O. Openings in roofs shall be kept properly plugged and caulked, except when being worked on, to preclude the possibility of flooding due to storms or other causes. After completion of work, openings shall be permanently sealed.
- P. Temporary openings cut in walls, floors or ceilings for conduit shall be closed off with non-combustible material except when mechanics are actually working at the particular opening.

3.10 SLEEVES AND SEALING

- A. Install sleeves of Schedule 40 galvanized steel pipe for conduits and cables penetrating above-grade floor slabs, and any concrete or masonry walls. Sleeves through walls shall terminate flush with wall surface on each side. Sleeves through floors shall terminate 2 inches above finished floor. Neatly and completely grout sleeves in place.

- B. Sleeves shall be adequately sized for the conduits and cables to be installed, with sufficient free space to install sealing caulk or putty.
- C. Sleeved conduits through slab-on-grade floors, below-grade foundation walls, shafts, and the like shall be provided with sealing bushings to seal against fluid and gas pressure and installed in accordance with UL and manufacturer's instructions.
- D. Where penetrating floor slabs and fire-rated partitions, pack the annular space between the sleeves and the conduits and cables with reusable fire-retardant modules, putty, sealant, or caulk. The sealant material shall be intumescent, asbestos free, and installed in accordance with UL and manufacturer's instructions. Sealant materials shall be easily removed and replaced for addition or deletion of cables.
 - 1. Penetrations with annular space greater than 1/2" shall be provided with approved backing material.
 - 2. Fire-retardant sealer and system shall be UL listed for the application and meet ASTM E-84, ASTM E-814, and UL-1479 requirements. Use Hilti Firestop Systems, CSD Sealing Systems, Nelson "FSP", Carborundum Co. "Fyre Putty", 3M "CP-25", IPC "Flamesafe", ROX System or approved equal.
- E. Where cable tray penetrates floor slabs, ceilings and rated partitions, the cable tray shall stop at the floor, ceiling or wall. Provide a fire-rated pathway through floor, wall or ceiling of equivalent size to the cable tray dimensions. The cable tray shall then be continued on the opposite side of the floor, ceiling or wall. The cable tray shall be grounded and bonded for electrical continuity. The Contractor #4 shall maintain the floor, ceiling and wall rating.
 - 1. Fire-rated pathway products: STI EZ-Path Series 22, 33 and 44 or approved equal by Wiremold or Hilti.
- F. Contractor #4 shall photographically document that proper sealing bushings, fire stopping, sleeving and pathway products have been provided before locations are hidden from view. Refer to Section 260500 for additional information.

3.11 SEISMIC ANALYSIS

- A. The following steps were used to determine the Seismic Design Category for this project.
 - 1. Based on 2008 New York City Building Code table 1604.5, the project is considered Occupancy Category III.
 - 2. Site Class D was selected as the default for unknown soil site conditions.
 - 3. The USGS web application determined the following based on the geographical location of the project building:
 - a. $S_s = 0.363g$
 - b. $S_1 = 0.070g$.
 - 4. 2008 New York City Building Code Tables 1615.1.2 (1) and 1615.1.2 (2) were used to determine the following:
 - a. $F_A = 1.51$
 - b. $F_V = 2.4$

5. 2008 New York City Building Code Equations 16-38 and 16-39 were used to determine the following:
 - a. $S_{MS} = F_A S_S = 1.51 \times 0.147 = 0.548g$
 - b. $S_{M1} = F_V S_1 = 2.4 \times 0.049 = 0.168g$
6. 2008 New York City Building Code Equations 16-40 and 16-41 were used to determine the following:
 - a. $S_{DS} = 2/3 \times S_{MS} = 2/3 \times 0.548g = 0.365g$
 - b. $S_{D1} = 2/3 \times S_{M1} = 2/3 \times 0.168g = 0.112g$
7. 2008 New York City Building Code Tables 1616.3 (1) and 1616.3 (2) were used to determine the following:
 - a. Seismic Design Category D based on Short-Period Response Accelerations table
 - b. Seismic Design Category C based on 1-Second Response Accelerations table
8. Based on the more severe of the seismic design categories listed above, the Seismic Design Category for this project has been determined as Seismic Design Category D.

3.12 SEISMIC RESTRAINT

- A. Provide seismic restraint of all mechanical, electrical, plumbing and fire protection systems as required per 2008 New York City Building Code Sections 1614, ASCE 7-05, and referenced sections and publications.
- B. Provide seismic analysis and calculations for all mechanical, electrical, plumbing and fire protection system components installed by this Contractor #4 except the following:
 1. Mechanical and electrical components where the component importance factor (Ip) is equal to 1.0 and either:
 - a. Flexible connections between the components and associated ductwork, piping and conduit are provided.
 - b. The components are mounted 4 ft or less above a floor level and weigh 400 lb or less.
 2. Mechanical and electrical components where the component importance factor (Ip) is equal to 1.0 and:
 - a. Flexible connections between the components and associated ductwork, piping and conduit are provided.
 - b. The components weigh 20 lb or less or, for distribution systems, weighing 5 lb/ft or less.
- C. Importance Factor (Ip) for this project shall be as follows:
 1. Mechanical, electrical, plumbing and fire protection systems installed by this Contractor #4 required to function as part of life-safety systems shall have Importance factor (Ip) equal to 1.5. Life-safety systems shall include: Theater 1 Smoke Exhaust, Emergency Lighting, Exit Signage, Fire Alarm and Fire Protection (sprinkler) systems.
 2. All mechanical, electrical, plumbing and fire protection systems installed by this Contractor #4 not required to function as part of life-safety systems shall have Importance Factor (Ip) equal to 1.0.

- D. Seismic restraint calculations shall be provided for all connections of components to the structure. Calculations must be stamped by a Professional Engineer licensed in New York State with at least three years' experience in seismic design experience.
- E. Analysis must indicate calculated dead loads, seismic static loads, capacity of materials utilized for connection to equipment and structure. Analysis shall detail anchoring methods, bolt diameter, embedment and/ or welded length. All seismic restraint devices shall be designed to accept without failure, the lateral forces acting through the center of gravity.

3.13 PLENUM APPLICATION

- A. Space above the hung ceilings shall not be used as a return air plenum (air transfer), except where specifically indicated on the mechanical drawings and/or other drawings. Material in spaces so noted shall be suitable for use in plenum application. In spaces so noted, no combustible materials shall be used. Wiring shall be in conduit, or shall be listed for the use, and shall comply with the requirements of NFPA 70, Section 300-22, as well as other applicable codes. Materials used in plenum spaces shall have flame spread/smoke developed ratings as required by code and/or authorities having jurisdiction.

3.14 TEMPORARY LIGHT AND POWER

- A. Contractor #4 shall furnish, install and maintain a temporary light and power system to provide the buildings, field offices, and project site with temporary light to provide safe working conditions throughout, interior and exterior, and to supply construction power as required on the job.
- B. The system shall be furnished, installed, and operating at the earliest possible date.
- C. Work for the system shall be in accordance with NEC Article 590 with NYC Amendments, the requirements of the Utility Company, and as approved by the City of New York and authorities having jurisdiction.
- D. The work shall include generally, but not be limited to, the following:
 - 1. Make arrangements with the utility company or the City of New York to furnish and install the temporary light and power service.
 - 2. Review and coordinate the electrical needs of other trades on a continuing basis, until permanent power and light is available and the temporary system is removed and no longer needed.
 - 3. Furnish, install, and maintain required temporary system equipment, devices, and wiring. Remove when no longer needed, or at the direction of the City of New York. Modify, add, or relocate equipment, devices, and wiring as required to suit job conditions.

3.15 WASTE MANAGEMENT

- A. Comply with the requirements established by the Contractor #4 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

SECTION 260013 – ELECTRICAL CONTRACTOR WORK
ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

1.01 SCOPE FOR ASBESTOS ABATEMENT WORK

- A. The "General Conditions" apply to the work of this Section.
- B. The Asbestos abatement contractor shall remove asbestos containing materials as needed to perform the other work of this Contract when discovered during the course of work. When required, the Asbestos abatement contractor shall replace the ACM with non-asbestos containing materials. An allowance of **\$5,000.00** for the **Electrical Contractor** is herein established for this incidental work when so ordered and authorized by the Commissioner.
- C. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE RULES AND REGULATIONS OF THE ASBESTOS CONTROL PROGRAM AS PROMULGATED BY TITLE 15 CHAPTER I OF RCNY AND NEW YORK STATE DEPARTMENT OF LABOR INDUSTRIAL CODE RULE 56 CITED AS 12 NYCRR, PART 56 WHICHEVER IS MORE STRINGENT AS PER LATEST AMENDMENTS TO THESE LAWS AND AS MODIFIED HEREIN BY THESE SPECIFICATIONS.
- D. ALL DISPOSAL OF ASBESTOS CONTAMINATED MATERIAL SHALL BE PER LOCAL LAW 70/85.
- E. THE ASBESTOS ABATEMENT CONTRACTOR'S ATTENTION IS DIRECTED TO THE FACT THAT CERTAIN METHODS OF ASBESTOS ABATEMENT ARE PROTECTED BY PATENTS. TO DATE, PATENTS HAVE BEEN ISSUED WITH RESPECT TO "NEGATIVE PRESSURE ENCLOSURE" OR "NEGATIVE-AIR" OR "REDUCED PRESSURE" AND "GLOVE BAG".
- F. THE ASBESTOS ABATEMENT CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR AND SHALL HOLD THE DEPARTMENT OF DESIGN AND CONSTRUCTION AND THE CITY HARMLESS FROM ANY AND ALL DAMAGES, LOSSES AND EXPENSES RESULTING FROM ANY INFRINGEMENT BY THE ASBESTOS ABATEMENT CONTRACTOR OF ANY PATENT, INCLUDING BUT NOT LIMITED TO THE PATENTS DESCRIBED ABOVE, USED BY THE ASBESTOS ABATEMENT CONTRACTOR DURING PERFORMANCE OF THIS AGREEMENT.
- G. "Asbestos" shall mean any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumingtonite-grunerite), crocidolite (riebeckite), tremolite, anthrophyllite and actinolite.

- H. Prior to starting, the Asbestos abatement contractor must notify the Commissioner of the Department of Design and Construction if he/she anticipates any difficulty in performing the Work as required by these Specifications. The Asbestos abatement contractor is responsible to prepare and submit all filings, notifications, etc. required by all City, State and Federal regulatory agencies having jurisdiction.

The Asbestos abatement contractor is responsible for submitting the Asbestos Project Notification Form (ACP-7 Form) to the Department of Environmental Protection, Asbestos Control Program, as per Title 15, Chapter I of RCNY and to the NYSDOL as per Industrial Code Rule 56.

The Asbestos abatement contractor is responsible for preparing, and submitting Asbestos Variance Application (ACP-9). If a Variance is required, the Asbestos abatement contractor is responsible to retain a NYSDOL Asbestos Project Designer, as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required variance.

The Electrical contractor is responsible for preparing and submitting an Asbestos Abatement Permit and/or Work Place Safety Plans (WPSP) that may be required for the completion of the Contract or incidental work. If such plans are required, the Asbestos abatement contractor is responsible to retain a NYSDOL Licensed Design Professional as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required plans.

The Asbestos abatement contractor is responsible for the submission of all required documents to the NYCDEP to acquire the appropriate Asbestos Project Conditional Closeout (ACP-20) and/or Asbestos Project Completion Forms (ACP-21) on a timely basis for the completion of the incidental work encountered under this contract.

The Asbestos abatement contractor will be required to attend an on-site job meeting with the Construction Project Manager prior to the start of work to examine conditions and plan the sequence of operations, etc.

The Asbestos abatement contractor shall have a NYSDOL/NYCDEP Asbestos Supervisor onsite to oversee the work and conduct a final visual inspection as required by both Title 15, Chapter 1 of the RCNY and NYSDOL Industrial Code Rule 56.

- I. All work shall be done during regular working hours unless the Asbestos abatement contractor requests authorization to work in other than regular working hours and such authorization is granted by the Commissioner. (Regular work hours are those hours during which any given facility, in which work is to be done, is customarily open and functioning, normally between the hours of 8:00 A.M. and 4:00 P.M. Monday - Friday.) If such work schedule is authorized by the Commissioner, the work shall be done at no additional cost to the City.

- J. The Commissioner may order that work be done in other than regular working hours as herein by defined and this order may require the Asbestos abatement contractor to pay premium or overtime wages to complete the work. If the Commissioner orders work in other than regular working hours, the Asbestos abatement contractor shall multiply the unit price for that portion of the work requiring premium wages by 1.50 when computing payment in accordance with Paragraph 1.09. All requests for premium payment must be supported by certified payroll sheets and field sheets approved by the Construction Project Manager.

1.02 QUALIFICATIONS OF ASBESTOS ABATEMENT CONTRACTOR

- A. Requirements: The asbestos abatement contractor must demonstrate compliance with the special experience requirements set forth in subparagraphs (1) through (5) below. The asbestos abatement contractor must, submit documentation demonstrating compliance with all listed requirements. Such documentation shall include without limitation, all required licenses, certificates, and documentation.
1. The asbestos abatement contractor must, whether an individual, corporation, partnership, joint venture or other legal entity, must demonstrate for the three year period prior to the work, that it has been licensed by the New York State Department of Labor, as an "Asbestos abatement contractor".
 2. The asbestos abatement contractor must, for the three year period prior to the work, have been in the business of providing asbestos abatement services as a routine part of its daily operations.
 3. The asbestos abatement contractor proposing to do asbestos abatement work must be thoroughly experienced in such work and must provide evidence of having successfully performed and completed in a timely fashion at least five (5) asbestos abatement projects of similar size and complexity. The aggregate cost of these projects must be at least \$250,000.00 in each of the three years.
 4. For each project submitted to meet the experience requirements set forth above, the asbestos abatement contractor must submit the following information for the project; name and location of the project; name title and telephone number of the owner or the owner's representative who is familiar with the asbestos abatement contractor's work, brief description of the work completed as a prime or sub-asbestos abatement contractor; amount of contract or subcontract and the date of completion.
 5. The asbestos abatement contractor must demonstrate that it has the financial resources, supervisory personnel and equipment necessary to carry out the work and to comply with the required performance schedule, taking into consideration other business commitments. The asbestos

ELECTRICAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

abatement contractor must submit such documentation as may be required by the Department of Design and Construction to demonstrate that it has the requisite capacity to perform the required services of this contract.

- B. Insurance Requirements: The asbestos abatement contractor must provide asbestos liability insurance in the following amount: 1 million dollars per occurrence, 2 million dollars aggregate (combined single limit). The City of New York shall be named as an additional insured on such insurance policy.
- C. Throughout the specifications, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics thereof.

1.03 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITIES

The Asbestos abatement contractor will visit the subject location within one (1) working day of notification to ascertain actual work required. If the project is identified as being "urgent", then work shall commence no later than 48 hours from the time of notification. In this event, the asbestos abatement contractor shall immediately notify when applicable EPA NESHAPS Coordinator, NYSDOL Asbestos Control Bureau and NYCDEP Asbestos Control Program of start of the work and file the necessary Asbestos Notifications and any applicable Variance Applications with the regulatory agencies cited above..

In the event that the project is not classified as "urgent" the Asbestos abatement contractor shall notify the EPA NESHAPS Coordinator, NYSDOL and NYCDEP by submitting the requisite asbestos project notification forms, postmarked 10 days before activity begins if 260 linear feet or more and/or 160 square feet or more of asbestos containing material will be disturbed.

The following information must be included in the notification:

- A. Name and address of building City or operator;
- B. Project description:
 - 1. Size - square feet, number of linear feet, etc;
 - 2. Age - date of construction and renovations (if known);
 - 3. Use - i.e., office, school, industrial, etc.
 - 4. Scope - repair, demolition, cleaning, etc.
- C. Amount of asbestos involved in work and an explanation of techniques used to determine the amount;

ELECTRICAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- D. Building location/address, including Block and Lot numbers;
- E. Work schedule including the starting and completion dates;
- F. Abatement methods to be employed;
- G. Procedures for removal of asbestos-containing material;
- H. Name, title and authority of governmental representative sponsoring project.

1.04 WORK INCLUDED IN UNIT PRICE

The Asbestos abatement contractor will be paid a basic unit price of **\$25.00** per square feet for the removal and disposal of asbestos containing material and replacement of the same with non-asbestos containing materials.

Unit price shall include all costs necessary to do the work of this Contract, including but not limited to: labor, materials, equipment, utilities, disposal, insurance, overhead and profit.

1.05 AIR MONITORING – ASBESTOS ABATEMENT CONTRACTOR

- A. "Air Sampling" shall mean the process of measuring the fiber content of a known volume of air collected during a specific period of time. The procedure utilized for asbestos follows the NIOSH Standard Analytical Method 7400 or the provisional transmission electron microscopy methods developed by the USEPA and/or National Institute of Standard and Technology which are utilized for lower detectability and specific fiber identification.
- B. Air monitoring of Asbestos abatement contractor's personnel will be performed in conformance with OSHA requirements, (All costs associated with this work are deemed included in the unit price.).
- C. Qualifications of Testing Laboratory:

The industrial hygiene laboratory shall be a current proficient participant in the American Industrial Hygiene Association (AIHA) PAT Program. The laboratory identification number shall be submitted and approved by the City. The laboratory shall be accredited by the AIHA and New York State Department of Health Environmental Laboratory Approval Program (ELAP).

Note: Work area air testing and analysis before, during and upon completion of work (clearance testing) will be performed by a Third Party Air Monitor under separate Contract with the City.

1.06 THIRD PARTY MONITORING AND LABORATORY

- A. The NYCDDC, at its own expense, will employ the services of an independent Third Party Air Monitoring Firm and Laboratory. The Third Party Air Monitor will perform air sampling activities and project monitoring at the Work Site.
- B. The Laboratory will perform analysis of air samples utilizing Phase Contrast Microscopy (PCM) and/or Transmission Electron Microscopy (TEM).
- C. The Third Party Air Monitoring Firm and the designated Project Monitor shall have access to all areas of the asbestos removal project at all times and shall continuously inspect and monitor the performance of the Asbestos abatement contractor to verify that said performance complies with this Specification. The Third-Party Air Monitor shall be on site throughout the entire abatement operation.
- D. The NYCDDC will be responsible for costs incurred with the Third Party Air Monitoring Firm and laboratory work. Any subsequent additional testing required due to limits exceeded during initial testing shall be paid for by the Asbestos abatement contractor.

1.07 PAYMENT REQUEST DOCUMENTATION

- B. The following information shall be included for each payment request:
 - 1. Description of work performed.
 - 2. Linear footage and pipe sizes involved.
 - 3. Square footage for boiler & breaching insulation removed.
 - 4. Square footage of non pipe and boiler areas removed, patched, enclosed, sealed, or painted.
 - 5. Square footage of encapsulation, sealing, patching, and painting involved.
 - 6. Total cost associated with compliance with the assigned task.
 - 7. Architectural, Electrical, HVAC, Plumbing, etc. work incidental to the Asbestos Abatement Work.
 - 8. A certified copy (in form 4312-39) to the Comptroller or Financial Officer of the New York City to the effect that the financial statement is true.

ELECTRICAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

9. A signed copy (in form 6506q-6) of certificate of compliance with non-discriminatory provisions of the Contract.
 10. Attach a copy of valid workmen compensation insurance.
 11. Valid asbestos insurance per occurrence.
 12. General liability insurance when required.
- C. Each payment request shall include a grand total for all work completed that billing period, the landfill waste manifests and a copy of waste transporter permit. The Department of Design and Construction will inspect the work performed, review the cost and approve or disapprove requests for payment.
- D. EXPOSURE LOG: With this final payment, the Asbestos abatement contractor shall submit a listing of the names and social security numbers of all employees actively engaged in the abatement work of this Contract. This list shall include a summary showing each part of the abatement work in which the employee was engaged and the dates thereof.

1.08 QUANTITY CALCULATIONS

In order to determine the square footage involved for the various pipe sizes of pipe insulation that might be encountered, the following table is to be used.

<u>PIPE INSULATION SIZE O.D.</u>	<u>PIPE SIZE O.D.</u>	<u>SQUARE FOOTAGE PER LINEAR FOOT</u>
2-1/2"	1/2"	0.65
2-3/4"	3/4"	0.72
3"	1"	0.79
3-1/4"	1-1/4"	0.85
3-1/2"	1-1/2"	0.92
4"	2"	1.05
4-1/2"	2-1/2"	1.18
5"	3"	1.31
6"	3-1/4"	1.57
7"	3-1/2"	1.83
8"	4"	2.09
9"	5"	2.36
10"	6"	2.62
12"	8"	3.14
14"	10"	3.67
16"	12"	4.19
18"	14"	4.71

1.09 METHOD OF PAYMENT

Payment shall be made in accordance with Items A through R below. Payment shall be calculated based on the actual quantity of the item performed by the asbestos abatement contractor, times the unit price specified below. Credits may apply to certain times, as specified below.

- A. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING PIPE INSULATION:** Actual linear footage, multiplied by the square footage factor listed for the respective pipe size in Section 1.09, multiplied by the unit price in Section 1.05.

EXAMPLE: 100 lin.ft. of 1/2" pipe and 100 lin.ft. of 6" pipe, including elbows, tees. Flanges, etc.

$$100 \times 0.65 = 65 \text{ sq.ft.} \quad 65 \times \text{unit price} = \text{Payment}$$

$$100 \times 2.62 = 262 \text{ sq.ft.} \quad 262 \times \text{unit price} = \text{Payment}$$

- B. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER INSULATION:** (all types including Silicate Block and including the removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

EXAMPLE: Item B. removal and replacement of 1000 S.F. of boiler insulation (incl. Silicate block)

$$1000 \text{ S.F.} \times (1.5) \times \text{the Unit Price} = \text{Payment}$$

- C. **REMOVAL, DISPOSAL AND REPLACEMENT OF TANK INSULATION:** (all types including removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.
- D. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER UPTAKE, & BREACHING INSULATION:** (all types including stiffening angles and wire lath) Payment shall be made at 2.0 times the unit price per square foot.
- E. **REMOVAL, DISPOSAL AND REPLACEMENT OF DUCT INSULATION:** Payment shall be made at 1.0 times the unit price per square foot.
- F. **REMOVAL, DISPOSAL AND REPLACEMENT OF SOFT ASBESTOS CONTAINING MATERIAL:** (Including sprayed-on fire proofing and sound proofing) Payment shall be made at 1.0 times the unit price per square foot of surface area. Area of irregular surfaces must be calculated and confirmed with DDC representative.
- G. **ACOUSTIC PLASTER REPAIR AND/OR ENCAPSULATION:** Payment shall be made at 0.5 times the unit price per square foot.

ELECTRICAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- H. **PATCHING OR REPAIR** of items listed in A through F will be paid at 0.33 times the unit price per square foot.
- I. **REMOVAL, DISPOSAL AND REPLACEMENT OF WATERPROOFING ASBESTOS CONTAINING MATERIAL:** (including friable and non-friable waterproofing material from interior and exterior walls, floors, foundations, penetrations, louvers, vents and openings other than windows, doors and skylights) Payment shall be made at 0.5 times the unit price per square foot.
- J. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING ELECTRICAL WIRING INSULATION:** (including friable and non-friable wiring insulation) Payment shall be made at 0.33 times the unit price per square foot.
- K. **PAINTING:** Payment shall be made at 0.05 times the unit price per square foot.
- L. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING PLASTER:** from ceilings and walls, including any wire lath and disposal as asbestos containing waste. Payment shall be made at 0.80 times the unit price per square foot.
- M. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING FLOOR TILES, CEILING TILES, TRANSITE PANELS:** (including any adhesive, glue, mastic and/or underlayment) and disposal as asbestos containing waste. Payment shall be made at 0.40 times the unit price per square foot. If multiple layers are discovered, each additional layer shall be paid at 0.20 times the unit price per square foot.
- N. **ADDITIONAL CLEAN UP/HOUSEKEEPING OF WORK AREA:** (excluding pre-cleaning of work area required by regulations) HEPA vacuuming and wet cleaning of asbestos contaminated surface. Payment shall be made at 0.20 times the unit price per square foot. When GLOVE BAG is employed to remove ACM, cost of HEPA vacuuming and wet cleaning of floor area up to 3 feet on each side of glove-bag shall be included in unit price and no extra payment will be made.
- O. **REMOVAL, DISPOSAL OF ASBESTOS-CONTAINING ROOFING MATERIAL:** including mastic, flashing and sealant compound and provide temporary asbestos-free roof covering consisting of one layer of rolled roofing paper sealed with asphaltic roofing compound. Payment shall be made at 0.8 times the unit price per square foot. Credit at a rate of 0.33 times the unit price will be taken for each square foot of temporary roof covering which the Asbestos abatement contractor is directed not to install.
- P. **PICK-UP AND DISPOSAL OF GROSS DEBRIS:** (excluding any waste generated from abatement under Item A-R) at a rate of \$150 per cubic yard for asbestos contaminated waste and \$75 per cubic yard for non-asbestos

ELECTRICAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

contaminated waste. This cost includes all labor and material cost associated with work.

- Q. **REMOVAL OF ASBESTOS-CONTAINING BRICK, BLOCK, MORTAR, CEMENT OR CONCRETE:** along with all surfacing materials including wire lath and/or other supporting structures and disposal as ACM waste. Payment shall be made at a rate of \$25.00 per cubic foot of material removed.
- R. **REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING WINDOW/DOOR CAULKING:** including friable and non-friable caulking, weather-stripping, glazing, sealants or other waterproofing materials applied to windows, doors, skylights, etc. Payment shall be made at the rate of \$400.00 per opening regardless of size or configuration. This cost includes labor, consumable materials, set-up/breakdown, removal and disposal, as required.

Note 1: CREDIT: For items listed in A through F, a credit at a rate of 0.33 times the unit price, times the respective multiplier (for each item) will be taken for each square foot of insulation which the asbestos abatement contractor is not directed to reapply.

Note 2: MINIMUM PAYMENT: The minimum payment per call at any individual job sites or various job sites during the same day will be eight hundred dollars (\$800.00).

Note 3: All payments shall be made as described in paragraph 1.09 herein.

Note 4: WORKING HIGHER THAN 12 FEET ABOVE FLOOR LEVEL OR WORK REQUIRING COMPLEX SCAFFOLDING OR CONSTRUCTION WORK PLATFORMS: Provisions are made in this Contract to compensate the Asbestos abatement contractor for work performed in locations that are difficult to access due to work at elevations that are significantly higher than the normal work level. The unit price for these items will be paid at 1.20 times the unit price described in Paragraphs 1.09, A through R for those portions of the work that are more than twelve (12) feet above the grade for that would be judged as the normal working level.

1.10 GUARANTEE

- A. Work performed in compliance with each task shall be guaranteed for a period of one year from the date the completed work is accepted by the Department of Design and Construction.
- B. The Commissioner of The Department of Design and Construction will notify the Asbestos abatement contractor in writing regarding defects in work under the guarantee.

1.11 OCCUPANCY OF SITE NOT EXCLUSIVE

Attention is specifically drawn to the fact that contractors, performing the work of other Contracts, may be brought upon any of the work sites of this Contract. Therefore, the

ELECTRICAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

Asbestos abatement contractor shall not have exclusive rights to any site of his work and shall fully cooperate and coordinate his work with the work of other contractors who may be brought upon any site of the work of this Contract. This paragraph applies to those areas outside the regulated Work Area as defined by Title 15, Chapter I of RCNY.

1.12 SUBMITTALS

A. Pre-Construction Submittals:

1. Attend a pre-construction meeting scheduled by the City of New York Department of Design and Construction. This meeting shall also be attended by a designated representative of the City of New York third party air monitoring firm, facility manager and the Construction Project Manager. At this meeting, the Asbestos abatement contractor shall present three copies of the following items:
 - a. Asbestos abatement contractor's scope of work, work plan and schedule.
 - b. Asbestos project notifications, approved variances and plans to Government Agencies.
 - c. Copies of Permits, clearance and licenses if required.
 - d. Schedules: the Asbestos abatement contractor shall provide to the Construction Project Manager a copy of the following schedules for approval. Once approved, schedules shall be maintained and updated as received. Asbestos abatement contractor shall post a copy of all schedules at the site:
 - (1) A construction schedule stating critical dates of the project including, but not limited to, mobilization, Work Area preparation, demolition, gross removal, fine cleaning, encapsulation, inspections, clearance monitoring, and phase of refinishing and final inspections. The schedule shall be updated biweekly, at a minimum.
 - (2) A schedule of staffing stating number of workers per shift per activity, name and number of supervisor(s) per shift, shifts per day, and total days to be worked.
 - (3) Submit all changes in schedule or staffing to the Construction Project Manager prior to implementation.

- e. Written description of emergency procedures to be followed in case of injury or fire. This section must include evacuation procedures, source of medical assistance (name and telephone number to nearest hospital) and procedures to be used for access by medical personnel (examples: first aid squad and physician). NOTE: Necessary Emergency Procedures Shall Take Priority Over All Other Requirements of These Specifications.
- f. Material Safety Data Sheets (MSDS) for encapsulants, sealants, firestopping foam, cleaners/disinfectants, spray adhesive and any and all potentially hazardous materials that may be employed on the project. No work involving the aforementioned will be allowed to proceed until MSDS are reviewed.
- g. Worker Training and Medical Surveillance: The Asbestos abatement contractor shall submit a list of the persons who will be employed by him /her to perform the removal work. Present evidence that workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101.
- h. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.
 - (1) The Asbestos abatement contractor shall provide a permanently bound log book of minimum 8-1/2" x 11" size at the entrance to the Worker and Waste Decontamination enclosure system as hereinafter specified. Log book shall contain on title page the project name, name, address and phone number of the Asbestos abatement contractor; name, address and phone number of Asbestos abatement contractor and City's third party air monitoring firm; emergency numbers including, but not limited to local Fire/Rescue Department. Log book shall contain a list of personnel approved for entry into the Work Area.
 - (2) All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted. Any significant events occurring during the abatement project shall be entered into the log. Upon completion of the job, the Asbestos abatement contractor shall submit the logbook containing a day-to-day record of personnel log entries countersigned by the Construction Project Manager every day.

ELECTRICAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- i. Worker's Acknowledgments: Submit statements signed by each employee that the employee has received training in the proper handling of ACM, understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.
- B. During Construction Submittals:
 1. Security and safety logs showing names of person entering workspace, date and time of entry and exit, record of any accident, emergency evacuation, and any other safety and/or health incident.
 2. Progress logs showing the number of workers, supervisors, hours of work and tasks completed shall be submitted daily to the Construction Project Manager.
 3. Floor plans indicating Asbestos abatement contractor's current work progress shall be submitted for review by the Construction Project Manager.
 4. All Asbestos abatement contractors' air monitoring and inspection results.

C. Project Closeout Submittals:

Upon completion of the project and as a condition of acceptance, the Asbestos abatement contractor shall present two copies of the following items, bound and indexed:

1. Lien Waivers from Asbestos abatement contractor, Sub-Asbestos abatement contractors and Suppliers,
2. Daily OSHA air monitoring results,
3. All Waste Manifests (Asbestos and Construction Debris), seals and disposal logs,
4. Field Sign-In/Sign-Out Logs for every shift,
5. Copies of all Building Department Forms and Permits,
6. A Letter of Compliance stating that all the work on this project was performed in accordance with the Specifications and all applicable Federal, State and Local regulations,
7. All Warranties as stated in the Specifications,
 - a. Fully executed disposal certificates and transportation manifest.

8. Project Record: The Asbestos abatement contractor shall maintain a project record for all small and large asbestos projects. During the project, the project record shall be kept on site at all times. Upon completion of the project, the project record shall be maintained by the building owner. The project record shall be submitted to DDC as part of the close out documents. The project record shall consist of:
 - a. Copies of licenses of all asbestos abatement contractors involved in the project;
 - b. Copies of NYCDEP and NYSDOL supervisor and handler certificates for all workers engaged in the project;
 - c. Copies of all project notifications and reports filed with NYCDEP, NYSDOL and USEPA for the project, with any amendments or variances;
 - d. Copies of all asbestos abatement permits, including associated approved plans and work place safety plan;
 - e. A copy of the air sampling log and all air sampling results;
 - f. A copy of the abatement asbestos abatement contractor's daily log book;
 - g. Copies of all asbestos waste manifests;
 - h. A copy of all Project Monitor's Reports (ACP-15).
 - i. A copy of each ATR-1 Form completed for the asbestos project (if required).
 - j. A copy of each Asbestos Project Conditional Closeout Report (ACP-20) if required.
 - k. A copy of the Asbestos Project Completion Form (ACP-21).

1.13 PROTECTION OF FURNITURE AND EQUIPMENT

Cover all furniture and equipment that cannot be removed from Work Areas. Movable furniture and equipment will be removed from Work Areas by the Asbestos abatement contractor prior to start of work. At the conclusion of the work (after final air testing), the Asbestos abatement contractor will remove all plastic covering on walls, floors, furniture, equipment and reinstall furniture and equipment. He shall remove and store all sheaths, curtains and drapes, and reinstall same following final clean up.

1.14 UTILITIES

A. General:

All temporary facilities shall be subject to the approval of the Commissioner. Prior to starting work at any site, locations and/or sketches (if required) of temporary facilities must be submitted to the Construction Project Manager for the required approval.

B. Water:

The Department of Design and Construction will furnish all water needed for construction, at no cost to the Asbestos abatement contractor in buildings under their jurisdiction. However, it is the responsibility of the Asbestos abatement contractor to ensure that hot water is provided for showering in the decontamination unit. The Asbestos abatement contractor shall furnish, install and maintain any needed equipment to meet these requirements at his own expense.

C. Electricity:

The Department of Design and Construction will furnish all electricity needed for construction, at no cost to the Asbestos abatement contractor in a building, under their jurisdiction. The Asbestos abatement contractor is responsible for routing the electric power to the abatement Work Area.

All temporary lighting and temporary electrical service for Work Area shall be in weatherproof enclosures and be ground fault protected.

D. In leased spaces, arrangements for water supplies and electricity must be made with the landlord. However, all such arrangements must be made through and are subject to approval of the Department of Design and Construction. Utilities will be provided at no cost to the Asbestos abatement contractor. However, it is the Asbestos abatement contractor's (or the Electrical contractor's) responsibility to furnish and install a suitable distribution system to the Work Area. This system will be provided at no cost to the City.

1.15 FEES

The Asbestos abatement contractor shall be responsible for any and all fees or charges imposed by Local, State or Federal Law, Rule and Regulation applicable to the work specified herein, including fees or charges which may be imposed subsequent to the date of the Bid opening.

END OF SECTION

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SECTION 26 00 50

DEMOLITION AND REMOVALS FOR ELECTRIC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this Section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 REFERENCES

- A. Perform the work of this section in accordance with the requirements of Section 260000 General Provisions and Section 260500 Basic Materials.

1.3 SYSTEM INTERRUPTIONS

- A. The existing base building facility will be occupied and in operation during the performance of the Work.
 - 1. When necessary to temporarily disconnect any existing feeder or branch circuit supplying occupied facilities, confer with the Commissioner and schedule a mutually agreeable period of interruption.
 - 2. Where replacement, relocation or modification of existing equipment is indicated, provide and maintain temporary feeders, connections, circuit protection, and any other materials and appurtenances required to maintain services to occupied areas.
- B. No work shall be left incomplete, nor any hazardous situation created, which will affect the life or safety of the public and/or building occupants. At no time shall the work interfere with or cut off any of the existing services without the Commissioner's prior written permission. Do not tamper with fire protection devices including covering smoke detectors or turning off sprinkler valves. Work that may cause a trouble or alarm condition on the fire alarm system or sprinkler system (dust, sprinkler flow, heat, electrical work, etc.) shall be performed only after temporarily shutting down the respective life safety system. Shut downs shall be arranged and scheduled at least 24 hours in advance and coordinated with the Commissioner and the Office of the Fire Marshal.
- C. The City of New York reserves the right to operate existing electrical and mechanical equipment not included in this work, and to perform required servicing and repairs to same, at all times.
- D. The work indicated and/or specified shall be carried out with a minimum of interference to the established operations of the Building.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Products and materials furnished for the work of this section shall comply with Section 260500 BASIC MATERIALS.

PART 3 - EXECUTION

3.1 EXISTING ELECTRIC WORK AND REMOVALS

- A. It is the intent of these specifications to remove or modify existing wiring in the existing tenant space and grounds and replace with new. Existing conduit shall be reused in place only where indicated on the drawings or with specific approval of the Engineer.
- B. Remove, reroute or relocate any conduit, wiring, lighting fixtures, outlets, and other electrical items that are laid bare in the course of, or interfere with, the alterations. Remove exposed outlets, conduit and branch circuit work which interfere with the alterations.
- C. It is the intention of these specifications to provide for the continuance of electrical services including: power, lighting, telephone, data, fire alarm, and security as presently installed in renovated areas until the replacement services are complete. Provide conduit, wiring, and devices necessary to maintain services to these areas.
- D. Compare the plans with the existing conditions to determine the amount of work affected. Remove unused exposed circuit work, outlets, fixtures and the like not required by the alterations.
- E. Materials to be removed and not reinstalled under this Division of the Work, unless otherwise indicated, shall become the property of the Contractor #4 and shall be removed from the site.
- F. Feeders and branch circuits to be removed: conductors and cables shall be completely removed back to their source. Exposed or accessible conduits shall be removed completely; conduits embedded in concrete or masonry shall be cut off flush and the surface patched smooth and level.
- G. All existing low voltage wiring, telecommunications and/or data systems wiring, fire alarm wiring, and security system wiring not scheduled to be reused shall be removed in its entirety as required by NEC Articles 640, 645, 725, 760, 770, 800, 820, and 830. Wiring shall not be abandoned and left in place.

3.2 DISPOSAL OF REMOVED MATERIALS

- A. Removed materials shall be disposed of using licensed carting service.
- B. Hazardous materials including polychlorinated biphenyl (PCB) substances as found in transformers, switchgear, lighting ballasts, mercury contaminated materials as found in fluorescent lamps, and the like shall be disposed of by an EPA approved, licensed disposal service. Contractor #4 shall obtain and have on file, waste disposal manifest and receipts stating how and where the waste was disposed of or converted as follows:
 - 1. Fluorescent light ballasts shall be collected and disposed of as hazardous waste containing PCB's unless expressly labeled "No PCB's".
 - 2. Fluorescent lamps shall be collected and disposed of as hazardous waste containing mercury
 - 3. Room temperature controlling thermostats that contain mercury switches shall be collected and disposed of as hazardous waste containing mercury.
- C. The work specified under this contract specifically excludes the removal, sealing and/or patching of "hazardous materials." This includes but is not limited to asbestos, PCBs and/or any other material having been designated by the Environmental Protection Agency as a hazardous material. If Contractor #4 finds anything which is suspected of being a hazardous material, it should be immediately brought to the Commissioner's attention.

END OF SECTION

SECTION 26 05 00

BASIC MATERIALS FOR ELECTRIC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this section as shown on the drawings, as specified herein, and as required by job conditions.

1.2 REFERENCES

- A. Perform the work of this section in accordance with the requirements of Section 260000 General Provisions.
- B. See other Division 26 sections for requirements of specific electrical equipment and systems not included herein.

1.3 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to state and local codes and laws.
- B. The criteria of design and performance to produce the required operation are based on equipment of the named manufacturers. Equipment of other manufacturers will be considered, subject to acceptability in the Engineer's judgment and opinion. The equipment must conform to the dimensions established by the drawings for mechanical spaces and other clearances.
- C. Materials and products provided shall be suitable for, and where applicable UL listed and labeled for, the intended use or application.

1.4 SUBMITTALS

- A. Submit manufacturers' catalog data for the following basic materials:
 - 1. Surface raceways and fittings.
 - 2. Wireway, trough, and fittings.
 - 3. Flexible cable tray and fittings.
 - 4. Cable hangers.
 - 5. Wire and Cables (MC).
 - 6. Wiring devices and wallplates.
 - 7. Floor boxes and fittings.
 - 8. Disconnect switches and fuses.
 - 9. Circuit breakers.
 - 10. Surge Protection Devices (SPD).
 - 11. Submetering.
 - 12. Company switches.
 - 13. Switch bypass devices.
 - 14. Low voltage lighting power supply.
- B. Submit scaled and dimensioned shop drawings for the following:
 - 1. Custom-fabricated pull, junction boxes, and terminal boxes.
 - 2. Exposed raceway installations in architecturally finished spaces.

- C. Submit samples of the following:
1. Wiring device wall plates.
 2. Wiring devices.

PART 2 - PRODUCTS

2.1 WIRING & RACEWAY SCHEDULE

- A. Except where specialty wiring methods are called for, use wiring methods selected in accordance with the following list. Use threaded rigid steel conduit with wire installed as the wiring method for purposes and in locations not covered by the following list and where the listed wiring methods are excluded.

<u>RACEWAY & WIRE</u>	<u>APPLICATION</u>
Threaded Rigid Steel Conduit (RSC)	<ol style="list-style-type: none"> 1. All exposed work. 2. Underground conduits in contact with earth. 3. Smoke exhaust fan feeders, and associated control circuits. 4. Penetrations through concrete slabs or equipment pads. 5. Refer to Fire Alarm (Section 283100) for additional requirements.
Electrical Metallic Conduit (EMT)	<ol style="list-style-type: none"> 1. Limited to hung ceilings and dry wall partitions. 2. Fire alarm (Section 283100). 3. Telecommunications (Section 270528). 4. Theatrical Sound & Video (Section 265561). 5. Security (Security specifications).
Flexible Metal Conduit (FMC)	<ol style="list-style-type: none"> 1. Final connections minimum 18 inches and less than six (6) feet only for lighting and appliance branch circuitry in accessible voids of suspended ceilings 2. Final connections minimum 18 inches and less than three (3) feet to motors in mechanical rooms 3. Other interior dry locations, or where located in plenums or other spaces used for environmental air. 4. Provide grounding conductor.
Liquidtight Flexible Metal Conduit(LFMC)	<ol style="list-style-type: none"> 1. Final connections minimum 18 inches and less than three (3) feet only for lighting and appliance and motor branch circuitry in exposed wet or damp locations. 2. Do not use in plenums or other spaces used for environmental air. 3. Provide grounding conductor.
Metal Clad Cable (MC)	<ol style="list-style-type: none"> 1. Limited to six (6) foot fixture whips.
Optical Fiber/Communications Cable Raceway	<ol style="list-style-type: none"> 1. Inner duct for communications applications in conduit or ductbank.

- Surface Metal Raceway
1. Exposed work in finished areas only where specifically indicated on drawings or approved by the Commissioner.
 2. Exclude in concealed locations.

- Flexible Cable Tray
1. Low voltage, voice, data and video systems in exposed locations and above accessible ceilings.

- B. Minimum raceway size: 3/4-inch.
- C. Provide equipment ground conductor per 3.04.

2.2 RACEWAYS

- A. Provide raceways of the types and sizes indicated and specified, or as required to comply with codes and job conditions where not so indicated or specified.
- B. Metallic Conduit, Tubing, and Fittings
1. Rigid steel conduit shall be hot-dip galvanized, conforming to ANSI C80.1, UL 6, and NEC Article 344. Fittings and couplings shall be threaded. For outdoor locations provide raintight conduit hubs with insulated throat and bonding screw equal to O.Z. Gedney Type CHM-T. Die-cast fittings are not acceptable.
 2. Electrical metallic tubing (EMT) shall be galvanized steel, conforming to ANSI C80.3, UL 797, and NEC Article 358. Provide with galvanized steel compression type fittings, couplings, and connectors. Set screw type fittings, couplings, and connectors are not acceptable. Die-cast fittings are not acceptable.
 3. Liquidtight flexible metal conduit shall have an interlocked flexible galvanized steel core with a permanently bonded polyvinylchloride (PVC) jacket, conforming to UL 360 and NEC Article 352. Die-cast fittings are not acceptable.
- C. Flexible metal conduit shall be interlocked flexible galvanized steel conforming to UL 1 and NEC Article 348. Provide malleable iron fittings, UL 514B. Die-cast fittings are not acceptable.
- D. Connectors for metal conduit shall be insulated throat type. Provide galvanized steel grounding bushings or locknuts at metallic raceway connections to sheet steel boxes and enclosures. Die-cast fittings are not acceptable.
- E. Connectors for metal conduits which contain BOTH normal ground AND isolated-ground conductors, where the conduit is NOT being used as the equipment grounding conductor, shall be phenolic insulating types. O-Z Gedney Type ICC or approved equal. (For conduits containing only a normal ground conductor or only an isolated ground conductor, where the conduit is also used as the equipment grounding conductor, provide galvanized couplings and connectors as specified above.) Die-cast fittings are not acceptable.
- F. Expansion fittings for metal conduit shall be as follows:
1. Rigid metal conduit in air: Provide 4-inches conduit expansion and contraction allowance; O.Z. Gedney Type AX or approved equal.
 2. Rigid metal conduit in concrete or wet locations: O.Z. Gedney Type DX or approved equal.

3. EMT conduit in air: Provide 4-inches conduit expansion and contraction allowance; O.Z. Gedney Type TX or approved equal.
- G. Optical Fiber/Communications Cable raceway and fittings in reel lengths manufactured of high density polyethylene (HDPE). Comply with UL 2024; flexible type, listed for plenum, riser or general purpose. Include factory installed polyester tape. Fittings, cement and accessories shall be from one manufacturer; Lamson & Sessions Carlon Corrugated HDPE or approved equal.
- H. Surface Metal Raceway
1. Provide two-piece surface metal raceway of the types, sizes, and configurations indicated, complete with fittings, boxes, devices, covers, plates, mounting straps, etc. as required for a finished installation, in conformance to UL 5 and NEC Article 386. Use for exposed work in finished areas only where specifically indicated on drawings and approved by the Commissioner. Not permitted in concealed locations.
 2. Provide fittings for flush feed-in unless otherwise indicated or required.
 3. For multi-service power/telecommunications surface raceways, provide continuous metal divider between compartments.
 4. For fiber optic cable: provide minimum 2-inch bend radius fittings.
 5. Surface metal raceway and components shall be Wiremold/Legrand or approved equal by Mono-Systems, Inc, sizes as indicated on drawings and customgray or ivory color selected by Commissioner:
 - a. V500, 17/32"D x 3/4"H, galvanized steel with powder coat finish.
 - b. V700, 21/32"D x 3/4"H, galvanized steel with powder coat finish.
 - c. G3000, 1-15/32"D x 2-3/4"H, galvanized steel with powder coat finish.
 - d. G2000, 3/4"D x 1-9/32"H, galvanized steel with powder coat finish.
 - e. G4000, 1-3/4"D x 4-3/4"H, galvanized steel with powder coat finish.
 - f. G6000, 3-9/16"D x 4-3/4"H, galvanized steel with powder coat finish.
 - g. S3000, 1-15/32"D x 2-3/4"H, stainless steel.
 - h. S4000, 1-3/4"D x 4-3/4"H, stainless steel.
 - i. S6000, 3-9/16"D x 4-3/4"H, stainless steel.
 - j. AL3300, 1-7/8"D x 2-7/8"H, anodizedpainted aluminum.
 - k. AL4000, 2"D x 5-1/2"H, anodizedpainted aluminum.
 - l. DS4000 Designer Series, 2"D x 5-1/2"H, anodizedpainted aluminum.
 6. Provide metal raceways with factory installed conductors and attachment plug receptacles per NEC Article 380. Receptacles shall be specification grade, 15 ampere, 125 volt mounted 18 inches on center. Do not attempt field installation of additional conductors except where product is so marked.
- I. Wireways and Troughs
1. Provide factory-fabricated sheet metal wireways and troughs of the types, sizes, and configurations indicated, or as required to suit job conditions, complete with fittings, connectors, end plates, hangers, etc. as required for a finished installation. Products shall be galvanized steel with ANSI 61 gray acrylic electrocoat finish. Fittings and components shall conform to UL 870 and NEC Article 376.

2. Wireways, troughs, and components shall be as manufactured by Square D, Hoffman Engineering Co., Wiegmann & Co., or approved equal.

J. Flexible Cable Tray

1. Provide flexible cable trays for low voltage, voice, data, and video wiring, of the sizes and configurations indicated, complete with fittings, connectors, hangers, etc. as required for a finished installation to Category 6A UTP standards.
2. Unless otherwise indicated, flexible cable trays shall be welded wire mesh permitting continuous ventilation of cables. Provide straight sections in 118-inch lengths suitable for field bending and fitting to cable pathway contours. Minimum tray width shall be 12-inch by 6-inch depth unless otherwise indicated.
3. Finish: Wire to be welded, bend and surface treated after manufacture. Surface finish to be hot dip galvanizing in molten zinc bath providing an average coating thickness of 2.4 mils to 3.2 mils, where used outdoors; electro-plated zinc galvanizing where used indoors.
4. Fittings: Cable management fittings to be field manufactured from straight sections through the use of hardware and instructions supplied by the manufacturer. Fasteners and hardware shall be stainless steel.
5. Installation: Cable management system to be installed using splice connectors and support components as supplied by the manufacturer.
6. Where cable tray penetrates floor slabs, ceilings and rated partitions, the cable tray shall stop at the floor, ceiling or wall. Provide a fire-rated pathway through floor, wall or ceiling of equivalent size to the cable tray dimensions. The cable tray shall then be continued on the opposite side of the floor, ceiling or wall. The cable tray shall be grounded and bonded for electrical continuity. The Contractor #4 shall maintain the floor, ceiling and wall rating.
 - a. Fire-rated pathway products: STI EZ-Path Series 22, 33 and 44 or approved equal by Wiremold or Hilti.
7. Loading: Flexible cable trays shall be designed to support a load of 100lbs./ft. across a 12" span with a maximum deflection of 1.5 inches. In addition, the tray shall be capable of supporting a 200lb. concentrated load at mid-span without damage or permanent deformation.
8. Flexible cable tray shall be sized for 30% fill based on the installed cable load.
9. Flexible cable trays shall be as manufactured by B-Line, G.S. Metals Flextray, Cablofil Inc. EZ Tray, Cope Cat-Tray or approved equal.

K. Cable Hangers

1. Provide non-compressing, non-continuous cable supports for low voltage, voice, data, and video wiring and fiber optic cable, of the sizes and configurations indicated, complete with fasteners, anchors, cable pulling protection and as required for a finished installation to Category 6A UTP standards.
2. Finish: A653 G60-Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip process.
3. Manufacturers: Caddy CableCat, Panduit J-Pro or approved equal.

4. Installation: Installation and configuration shall conform to the requirements of the current revision levels of ANSI/ EIA/TIA Standards 568 & 569, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.
 - a. Install cables using techniques, practices, and methods that are consistent with Category 6A UTP or higher requirements and that supports Category 6A UTP or higher performance of completed and linked signal paths, end to end.
 - b. Install cables without damaging conductors, shield, or jacket.
 - c. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer.
 - d. Pull cables without exceeding cable manufacturer's recommended pulling tensions. Use pulling means that will not damage media.
 - e. Do not exceed load ratings specified by manufacturer.
 - f. Adjustable non-continuous support sling shall have a static load capacity of 100 lbs.
 - g. Cable hangers shall be sized for 30% fill based on the installed cable load.

2.3 600 VOLT WIRE AND CABLE

- A. Wire and cable for secondary power and lighting circuits and for NEC Class 1 control circuits shall be fabricated of annealed 98% conductivity copper conductors with 600 volt, 90°C-rated, thermoplastic or cross-linked polymer insulation, manufactured in strict accordance with applicable requirements of UL, NEMA, ICEA and ASTM.
- B. Copper conductors No. 10, 12, and 14 AWG shall be solid or concentric stranded Type THHN/THWN-2; No. 8 AWG through No. 1 AWG shall be concentric stranded Type THHN/THWN-2; No. 1/0 AWG and larger shall be concentric stranded Type XHHW-2.
- C. Type MC metal-clad cable minimum requirements:
 1. Conform to UL 1569 and NEC Article 330.
 2. Acceptable sizes limited to: No. 12 AWG through No.8 AWG copper conductors with THHN insulation.
 3. Green-colored insulated ground conductor.
 4. Galvanized steel interlocked armor sheath. Aluminum armor sheath is not acceptable on this project due to electrical noise mitigation considerations.
 5. Listed and labeled Type MC steel fittings per UL 514B. Type AC fittings are not acceptable. Die-cast fittings are not acceptable.
 6. Multi-wire homeruns shall contain a single, oversized neutral conductor, sized to accommodate non-linear loads. Provide AFC "Super Neutral Cable", or approved equal.
 7. Color coded conductors per Section 3.03.
 8. Manufacturers: AFC Cable Systems or approved equals Southwire, United Copper Industries.
- D. Bare grounding conductors: See paragraph 2.7 Grounding Materials.

2.4 TERMINATIONS

A. Terminations, splices and taps under 600 volts:

1. Copper conductors No. 10 and smaller: Provide with copper compression type or twist-on spring-loaded connectors and nylon insulating covering. Connectors for outdoor conductors shall be suitable for direct burial installation.
2. Copper conductors No. 8 and larger: Provide hydraulic copper compression type using manufacturer's recommended tooling, Burndy or approved equal; or mechanical bolted pressure type, IlSCO ClearTap or Cytolok spring compression terminator or approved equal. Exception: Wiring terminations rated 100,000 amperes short circuit current and greater shall be provided with compression type lugs.
3. Cable lugs and connectors: Provide compression type of tin-plated copper. Provide to match cable, pre-filled with antioxidant compound, UL486B listed, with marking indicating size and type. Where oversized feeders are installed to reduce voltage drop and the equipment terminations are not sufficient to accept the larger feeders, provide the proper equipment terminations or provide Burndy Type YE-series or approved equivalent compression adapters.
4. Lug connections to bus bars: Provide with tin plated lugs and Belleville compression washers. Use anti-seize compound on threads. Provide 2-hole type for ground lugs.

2.5 ELECTRICAL BOXES

A. Provide outlet, junction, pull, and floor boxes, complete with associated fittings and accessories, as indicated and specified, as required by codes, to suit job conditions, and compatible with the associated wiring methods and devices.

B. Interior Outlet Boxes

1. Provide galvanized pressed steel boxes of appropriate size and type. Provide each with appropriate plaster ring to suite wall construction.
2. Unless otherwise indicated, or required by job conditions, provide boxes as follows:
 - a. Flush wall power outlets in hollow partitions - 4" square, 1-1/2" deep, with 1- or 2-gang device cover; provide gang boxes for 3 or more adjacent outlets.
 - b. Flush wall power outlets in masonry walls - 3-1/2" deep masonry boxes, with number of gangs as required.
 - c. Recessed switches - 3" x 2" x 3-1/2" deep, gangable.
 - d. Surface mounted power devices - 4" square, 1-1/2" deep, with rounded corners and appropriate raised cover.
 - e. Flush or surface telecom outlets - 4" square, 2-1/8" deep, where 1" knockouts are required; 4-11/16" square, 2-1/8" deep, where 1-1/4" knockouts are required.

- f. Refer to "Floor Box" product descriptions for specific floor box dimensions.

C. Pull and Junction Boxes

1. Provide galvanized and baked enamel painted code-gauge sheet steel boxes with welded seams, hinged covers with stainless steel padlockable spring latch as manufactured by Hoffman Engineering Co. or approved equal. Provide sizes and configurations as indicated, or to suit job conditions and codes.

D. Telecommunications Terminal, Outlet and Pullboxes

1. Outlet boxes shall be galvanized sheet steel as described elsewhere in this Section with exceptions as noted hereafter. Desk type telephone and computer data outlet boxes shall be minimum size 4 11/16" square, 2-1/8" deep box with double gang faceplate and plaster ring. Outdoors: Cast boxes, NEMA FB1, Type FD, aluminum. Provide gasketed cover by box manufacturer and threaded hubs.

E. Floor Boxes

1. Provide floor boxes as indicated, suitable for the application, complete with compatible accessories including, but not limited to: trim rings, device plates, service fittings, tile or carpet flanges and protective rings for mechanical and wet mop protection.
2. Floor box fittings shall be equipped with gasketing and shall be constructed to meet or exceed UL scrub water exclusion requirements and be so listed.
3. Poke-through fittings shall be UL listed to maintain fire rating of floor construction. Do not use in new slabs unless specifically noted.
4. Floor boxes shall be cast iron for installation in slab-on-grade floors or wet floors, formed sheet steel for above-grade installations. Coordinate box depth with slab thickness and other job conditions. Boxes shall be adjustable before and after pour.
5. All floor boxes, regardless of whether poured-in-place or poke-thru types, shall be ADA-approved with regard to height above finished floor and surface slope ratio.
6. Where new floor boxes are indicated in existing floors, provide required saw-cutting and patching of existing floors as required for flush installation.
7. Coordinate specific non-power connectivity requirements with the City of New York.
8. Poured-in-place and wood floor boxes shall be provided in types as follows:

<u>Label</u>	<u>Shape</u>	<u>Trim/Cover</u>	<u>Outlets</u>	<u>Description</u>
Type 1	Square w/Square Cover	Provide FloorPort Series cutout or blank cover, flanged or flangeless, for: carpet, tile, or furniture feed with finish per Commission er as follows: Nickel Brass Black Bronze Gray	Two duplex receptacles, data & A-V.	Multi-service four compartment box for installation in new concrete floors above grade. Accepts 3/4" to 1-1/4" conduit. 12-3/4"L x 10"W x 3-7/16" deep. Legrand Wiremold Resource RFB4 for above grade. RFB4-CI-1 for on grade or wet locations. Accepts 1" to 1-1/4" conduit. 14-1/2"L x 11-7/8"W x 3-7/16" deep. RFB4-SS series for shallow floors (2-7/16" deep) above grade. Accepts 3/4" to 1" conduit. 13-5/8"L x 10"W x 2-7/16" deep. Include barrier kits, extensions, tile shims & accessories.
Type 2	Square w/6" Round Cover	Provide Evolution Series cutout or blank cover, flanged or flangeless, for carpet, tile, or furniture feed with finish per Commission er as follows: Nickel Brass Black Bronze Gray	Four duplex outlets, data & A-V.	Multi-service four compartment box for installation in new concrete floors. Accepts 3/4" to 1-1/4" conduit. 14-5/8"L x 14"W x 4" deep. Legrand Wiremold Resource RFB6E for above grade. RFB6E-OG for on grade or wet locations. Dimensions & knock-outs similar to RFB6E. Include barrier kits, extensions, tile shims & accessories.
Type 3	Round	Brass Aluminum Plastic	Duplex receptacle with #895 flip lid or #895SP screw-out cover plate	Single-gang box for wood floors. Aluminum body for installation in 4" hole. Wiremold/Walker Series 861. (4-1/4" round x 3-1/4"D) max.

Type 4	Round	Brass For tile & carpet.	Single power outlet or data with screw plug cover.	Small single-gang box for concrete floors. Accepts 3/4" conduit. Legrand Wiremold Series 800. 800LCK stamped steel, for above grade, 4-3/16" x 3"H. 800CILCK cast iron, for on grade or wet locations, 4-3/16" x 3-3/8"H.
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9. Floor boxes for combination audio/visual and power work shall be provided in types as specified by the Commissioner.

F. Where different voltage systems are indicated to occupy a common box, provide internal metal barriers or dividers between systems.

2.6 WIRING DEVICES

A. Provide switches, receptacles, connectors, and other wiring devices complete with associated hardware and wall plates, as indicated and specified. Devices of one type (such as switches and receptacles) shall be made by one manufacturer. Basis of Design manufacturer: Hubbell or approved equal by Legrand or Leviton.

B. Verify device colors and plate materials and finishes with the Commissioner. Unless otherwise noted, receptacles connected to emergency or standby power shall be "red"; isolated ground receptacles shall be factory embossed with an "orange" triangle.

C. Wiring devices shall comply with applicable UL and NEMA requirements and shall be UL labeled for the appropriate NEMA-classified document.

D. Local Wall Switches (line voltage type).

1. Provide premium specification grade, Decorator-style, quiet operating AC switches, rated 20 amperes at 120 volts. Switches shall be verified by UL to meet Federal Specification W-S-896E.

2. Provide single pole, double pole, 3-way, or 4-way operation as indicated or required.

3. Switches shall be Hubbell Specification Grade Commercial Series (CS) or approved equal.

4. Colors (except as required by Commissioner): Provide gray with metallic cover plate at wood and concrete walls; white with white nylon plate at sheetrock walls; black with black nylon plate in T1 and T2 except at concrete walls.

E. Pilot Light Switches, 20 A, Single pole, with neon-lighted handle, illuminated when switch is "ON": Hubbell; HPL1221PL for 120 V and 277 V or approved equal.

F. Key-Operated Switches, 120/277 V, 20 A, Single pole, with factory-supplied key in lieu of switch handle: Hubbell; HBL1221L or approved equal.

G. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors: Hubbell; HBL1557 or approved equal.

H. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle: Hubbell; HBL1557L or approved equal.

- I. Key-Operated Switches, 120/277 V, 20 A, Single pole, 3-position, maintained contact with factory-supplied key in lieu of switch handle: Leviton 1285-L or approved equal.
- J. Duplex Convenience Receptacles
 1. Receptacles shall be standard NEMA 5-20R, Decorator-style configuration.
 2. Receptacles shall be two-pole, three-wire grounding type, with molded nylon body and face, premium specification grade, rated 20 amps at 125 volts. Receptacles shall meet Federal Specification W-C-596F.
 3. Receptacles shall be Hubbell Inc. Commercial Specification Grade (DR) series or approved equal.
 4. Colors (except as required by Commissioner): Provide gray with metallic cover plate at wood and concrete walls; white with white nylon plate at sheetrock walls; black with black nylon plate in T1 and T2 except at concrete walls.
 5. Provide weather-resistant (WR) receptacles for damp and wet locations.
 6. Weatherproof lockable and flush covers for public outdoor, wet or damp location outlets shall be specification grade enclosures with neoprene gasket seals and mortar tabs for positive holding means and retains weatherproof feature with or without plug inserted. Provide Pass & Seymour heavy duty cast aluminum cover No. 4600 series or approved equal.
 7. Weatherproof non-locking and flush covers for non-public outdoor, wet or damp location outlets shall be specification grade enclosures with neoprene gasket seals and retains weatherproof feature with or without plug inserted. Provide Arlington Products In Box Series or Taymac MX-3200 Series.
 8. Install receptacles with ground up or to the left when looking at receptacle.
- K. Special Purpose Receptacles and Switches
 1. Ground fault circuit interrupter (GFCI) receptacles shall comply with UL 2006 and shall be rated 20 amps with 20 amp feed-through rating, 125 volt duplex, NEMA 5-20R, Hubbell #GF20LA series, or approved equal.
 2. Transient voltage surge suppression receptacles shall have integral metal oxide varistors rated: 150 volt rms, 80 joules energy absorption and 6,500 amperes current handling capacity minimum to suppress transients equally in all modes; 20 amp, 125 volt, NEMA 5-20R, LED indicator, Leviton #5380, Hubbell Circuit Guard #HBL 5360-SA series or Pass & Seymour SpecGuard #6362-SP series or approved equal. Receptacles shall be factory embossed with an "orange" triangle and LED indicator to assure protection is in place.
 3. Isolated ground receptacles with integral surge suppression shall have an insulating barrier between the grounding screw and the mounting strap, and a triangle marking on the face to indicate isolated grounding type. The surge suppression unit shall have a light to indicate that the protection is active, and an audible alarm to indicate damage. The receptacles shall be NEMA 5-20R duplex, Leviton #5380-IG, Hubbell #IG-5362-SA series, P&S #IG6362-SP series or approved equal. Receptacles shall be factory embossed with an "orange" triangle.

4. Isolated ground receptacles without integral surge suppression shall have an insulating barrier between the grounding screw and the mounting strap and an orange triangle marking on the face to indicate isolated grounding type. The receptacles shall be NEMA 5-20R duplex, Hubbell #IG-5362 series, P&S IG6300 series or approved equal.
5. Clock hanger receptacles shall have a stainless steel plate and heavy duty 15 amp, 125 volt, grounding type receptacle, NEMA 5-15R, and shall be Hubbell Inc. HBL5235, P&S S3733-SS or approved equal.
6. Weatherproof switches shall be 20 amp, 120 or 277 volts, tap action with waterproof neoprene plate, specification grade, self-grounding, Cooper #2991 with #2881 plate or approved equal.
7. Push button emergency power off (EPO) switches shall be 2.375 inch mushroom head, non-illuminated, momentary push contact, labeled "Emergency Stop" in red, GE #CR104P Series or approved equal.
8. Door switches shall be push button type, 6 amps at 125 volts, flush mounted in hinged side of door where indicated on plans, switch closed when door open, Arrow Hart #4029, P&S #1200 or approved equal.
9. Lighted handle switches shall be illuminated when load is off, clear toggle, single or double poles or three-way, as indicated on plans, Hubbell Inc. HBL1221IL and HBL1223IL, P&S 20AC1-CPL and 20AC3-CPL series or approved equal.
10. Dressing room switched-receptacle remote pilot lights shall be wired to interior room switch for light "on" when load is "on". Lights shall be red round Lexan, 125 volts, to fit in a single receptacle plate, and shall be engraved "dressing room counter receptacles". Gang lights together for rooms with multiple switches/lights. Arrow Hart #87-Red or approved equal.
11. Wallbox dimmers
 - a. Provide wallbox dimmers rated for loads and voltages to be controlled. Do not gang-mount (mount side-by-side) dimmers in same box or remove side sections so that dimmers may be used up to full rating. Provide separate wall boxes unless otherwise specifically noted on plans.
 - b. Dimmers shall be "3-way" capable, using "smart remotes" which allow dimming control from each switch location.
 - c. Provide 1000-watt-rated Lutron Ariadni series dimmers with screwless cover plates where used in the vicinity of Decora-style wiring devices and switches. Provide 1000-watt-rated Leviton Toggle Touch series dimmers or Cooper Trace series with screwed cover plates where used in the vicinity of "standard" wiring devices and switches or approved equal.
 - d. Provide Lutron remote Power Boosters and Hi-Power 2•4•6 Dimming Modules as required to increase wattage capacity of specified wallbox dimmers and to provide compatibility between specified dimmer style and loads to be controlled. Power boosters and Hi-Power 2•4•6 Dimming Modules shall be suitable for incandescent, fluorescent, magnetic low voltage, electronic low voltage or neon/cold cathode lamp sources. Provide sizes as indicated on the drawings, or as required to control loads indicated or approved equal.
 - e. Provide dimming ballasts as required per Section 265000.

12. Occupancy/Vacancy Sensors – Refer to Section 260943 for Digital Lighting Control Sensors.

13. Standalone Occupancy/Vacancy Sensors

- a. Sensors shall be automatic on (occupancy) or manual on (vacancy) as indicated on the drawings. Sensor operation shall incorporate dual technology digital passive infrared (PIR) detection to detect occupant motion and microphonic to detect occupant sound. Provide integral photocell to prevent lights from turning on if adequate daylight is available. Include a minimum on timer set at 15 minutes to preserve lamp life by eliminating short lamp cycles and a timer adjustable between 30 seconds and 20 minutes, and set at 10 minutes, to turn off if no occupancy is detected.
- b. Ceiling mounted occupancy or vacancy sensor switches for single or multiple sensor operation with separately mounted auxiliary power and control unit. Sensor receives control power from the auxiliary power and control unit, and operates power switching contacts in that unit. Provide Sensor Switch CM-PDT 10 ceiling sensor with PP-20 series auxiliary power and control unit for each switched circuit and sPOD/sPOD-2P series low voltage wall switch for Manual On operation, or Wattstopper DT-300 with BZ-Series power pack and DCC2 low voltage momentary wall switch with green LED for Manual On operation, or Cooper Greengate OMC-DT with switch pack and Model AML wall switch for Manual On operation. Provide additional relay/power packs as required for larger or multiple loads controlled by single sensor switches. Provide auxiliary power packs for HVAC control where indicated on the drawings.
- c. Wall mounted occupancy or vacancy sensor switches for control of single circuit lighting loads shall be intelligent self-adjusting multi-technology types with integral manual "on" and "off" switch. Unit receives power directly from switch leg of the 120- or 277-V ac circuit it controls and operates integral power switching contacts rated 800 W at 120-V ac, and 1000 W at 277-V ac, minimum. Provide relay/power packs as required for larger or multiple loads controlled by single sensor switches. Provide Sensor Switch WSD-PDT VA rated 120/277 volts, 800/1200 watts, Wattstopper DW-100, or Cooper Greengate ONW-D-1001-DMV NeoSwitch, or Hubbell AD1277x1N (for NYC where manual override button is not allowed by Local Law No. 48).
- d. Wall mounted occupancy or vacancy sensor switches for control of two circuit lighting loads (inboard/outboard lamp switching) or light and small fan loads shall be two pole intelligent self-adjusting types with integral manual override OFF switch. Provide relay/power packs as required for larger or multiple loads controlled by single sensor switches. Provide Sensor Switch WSD-2P (first pole auto on/second pole manual on) rated 120/277 volts, 800/1200 watts, Wattstopper DW-200, or Hubbell AD1277x2N (for NYC where manual override button is not allowed by Local Law No. 48).

L. Telecommunications Faceplates & Port Devices—Refer to Section 270528.

- M. Cable Television Outlets – Refer to Section 270528.
- N. Cover Plates
 - 1. Provide screwless/snap-on style compatible wall plate for each outlet and switch installed, except as otherwise noted. Plates shall be .040" Type 302/304 stainless steel with brushed finish specification-grade and high-impact smooth nylon as noted in device descriptions. Color and finish to be as noted in device descriptions and as selected by Commissioner. Refer to architectural/lighting plans for engraving requirements. Submit sample to Commissioner and obtain acceptance prior to installation.
 - 2. Replace existing wall plates in renovated areas to match new device wall plates.
 - 3. Where two or more switches or devices are indicated at one location, mount under common plate.
 - 4. Screws shall be metallic, with countersunk heads, finish same as plate, tamperproof where indicated.
 - 5. Telecommunication outlets shall have cover plates to match area wiring device type and accommodate port configuration in each wall or floor box. Refer to other Sections for exact types.
- O. See other Division 26 sections for wallbox dimmers, low voltage switches, and other special-purpose devices.

2.7 GROUNDING MATERIALS

- A. Provide a complete continuous grounding system to effectively ground the non-current carrying metal parts of every piece of installed equipment, and to provide a low impedance fault return to source.
- B. Grounding materials shall be copper, bronze and/or brass construction with stainless steel or bronze threaded materials, listed and approved for the use. Cadmium or zinc-plated threaded materials are not acceptable.
- C. Insulated grounding conductors shall be copper with green colored insulation, or black insulation totally covered with green vinyl tape at all taps and terminations, as permitted by NEC.
- D. Connectors, clamps, straps, terminals, etc. shall be as manufactured by Burndy, Dossert, IlSCO or approved equal. Provide two-hole compression grounding lugs; one-hole lugs are not acceptable.
- E. Use exothermic welding, Harger UltraShot or approved equivalent, for underground system connections and connections to structural steel.
- F. Ground bus or grounding bars shall be bare annealed copper of rectangular cross-section, 2" wide x 1/4" thick unless otherwise indicated, complete with appropriate mounting hardware, clamps, and connectors. Hardware used with copper bar shall be silicon bronze.

G. Ground bars for the main telecommunications closet and satellite telecommunications closet grounding shall be tinned copper, with 304 stainless steel mounting brackets and hardware with 2-inch insulators and pre-drilled holes, as specified in ANSI J-STD-607-A. Manufacturer: Erico Eritech series or approved equal by Harger or Panduit.

1. Telecommunications main grounding busbar (TMGB) shall be 4" high x 1/4" deep x minimum 24" long. One TMGB shall be installed in the main telecommunications closet, or room.
2. Telecommunications grounding busbars (TGB's) shall be 2" high x 1/4" deep x minimum 18" long. TGB's shall be installed in each satellite telecommunications closet.

2.8 DISCONNECT SWITCHES

A. Provide safety switches where shown and required to comply with requirements of codes and enforcing agencies. Refer to Divisions 14 and 23 for additional information and requirements. See other Division 26 sections for panelboard applications.

B. Disconnect switches indicated by symbol of box with slash on drawings, for two and three-pole loads greater than 1/2 horsepower, shall be heavy duty NEMA Type HD with quick-make/quick-break blades, rejection fuse holders, and equipment grounding kit; enclosures shall be NEMA Type 1 (interior dry locations), Type 4 (exterior or wet locations) and as shown on drawings. Disconnect switches shall have a listed interrupting capacity of no less than the interrupting capacity of the installed fuses, where applicable, and minimum of 100,000 amperes, unless otherwise noted.

1. Enclosures shall have hinged door with interlock to prevent unauthorized door opening when switch is in "on" position, or closing of switch with door open.
2. Ampere ratings, voltage ratings, fusing and poles shall be as indicated or required. Provide non-fused type unless otherwise noted.
3. Provision shall be made for padlocking in "off" position.
4. Wheelchair Lift disconnect switches shall include auxiliary contact kit with normally open/closed contacts for safety interlock to lift controller. Provide fusible disconnect switches as follows or required by the lift manufacturer:
 - a. Square D Model H221N w/contact kit #ELK031
 - b. Siemens Model HF221N w/contact kit #HA161234
 - c. General Electric Model TH3221 w/contact kit #THAUX21D
 - d. Cutler-Hammer Model DH221NGK w/contact kit #THAUX21D
5. Where fusing is indicated, and unless otherwise specified, provide as follows:
 - a. Main service and feeder switches 0 - 600 amperes: Class RK1; specification grade, Bussmann Low-Peak, dual element, time-delay, 200 kA, Type LPN-RK (250 volt) or LPS-RK (600 volt) or approved equal by Ferraz Shawmut.
 - b. Main service and feeder switches 601 - 6000 amperes: Class L; Bussmann Low-Peak, Type KRP-CSP, 600 volt, time-delay, 300 kA, or approved equal by Gould - Shawmut.

- c. Motor and transformer branch circuits 0 - 600 amperes: Class RK5; Bussmann Fusetron, Type FRN-R (250 volt) or FRS-R (600 volt), time delay, 200 kA, or approved equal by Ferraz Shawmut.
 - d. Non-motor branch circuits 0 - 600 amperes: Class J; Bussmann Low-Peak Type LPJ, 600 volt, dual element, time-delay, 200 kA, or approved equal by Ferraz Shawmut.
- 6. Fuses shall be of the same manufacturer.
- 7. Provide three (3) spare fuses of each type and size installed, in manufacturer's original packaging.
- C. Disconnect switches indicated by symbol SM on drawings, for single-phase, one or two-pole loads, 1/2 horsepower and less, shall be toggle-type, AC manual motor starting switches with thermal overload protection to match the motor served. Switches shall be U.L. 508 Listed.
 - 1. Single-pole switches shall be rated 30 amperes at 120-240 VAC, 2 HP at 120 volts, 3 HP at 240 volts, with standard toggle with brown handle. Provide key-type or pilot light types where specifically indicated. Mount with appropriate backbox and coverplate per Section 2.02; NEMA 1 where indoors; NEMA 4 where outdoors. Square D Type FO1 or approved equal.
 - 2. Two-pole switches shall be rated 30 amperes at 240 VAC (3 HP at 120 volts, 7.5 HP at 240 volts). Provide manufacturer's standard NEMA 1 enclosure where indoors; NEMA 4 enclosure where outdoors enclosure for each unless otherwise noted. Square D Type FO2 or approved equal.
- D. Provide accessory dry contacts in disconnect switches:
 - 1. For motors controlled by an electronic variable frequency drive unit. Provide interlock wiring from auxiliary contacts to drive "Run-Permit" circuit to prevent drive from attempting to start motor with remote disconnect open.
- E. Mount disconnect switches 4'-6" above finished floor to center of operating handle.
- F. Fire alarm control panel disconnect switches shall be lockable in the on and off positions with red identification.
- G. Company switches: NEMA 1 enclosure, finished blue, adjustable cable strain relief bar; outlets color coded and protected with snap back covers; UL listed; 65 KAIC minimum. Provide ratings as indicated below for locations shown on drawings:
 - 1. CO-TL-1: 200A – Union Connector PBS-M2020W-C/SP or Lex Products CS-200F-C6DS1, both with double neutral option.
 - 2. CO-TL-2, CO-TL-4, CO-TL-5, CO-TL-6: 60A – Hubbell HBL560MI9W receptacle and HBL560P9W plug or equivalents by Leviton.
 - 3. CO-TL-3: 100A – Hubbell HBL5100MI9W receptacle and HBL560P9W plug or equivalents by Leviton.

4. CO-AV-1: 120/208V, 60A, 3-Phase: Hubbell HBL560MI9W receptacle and HBL560P9W plug or equivalents by Leviton. Note: Audio switches shall be labeled "Audio Only – Technical Power" and provided with oversized lugs (to accept #4/0 cable) and an isolated ground bus with oversized lugs.

2.9 CIRCUIT BREAKERS

- A. Circuit breakers shall be molded case type, operable in any position, with quick-make and quick-break toggle. Mechanism shall be trip free on overload or short circuit. The handle shall automatically assume a tripped position between the manual off and on positions.
- B. Provide circuit breakers with the required number of trip elements, with frame, trip, voltage, and interrupting capacity ratings as indicated, or to suit the application.
- C. Breakers shall be designed to carry 80% of trip rating continuously at 40 degrees C ambient temperature, to have inverse time delay tripping above 100% of trip rating, and to trip instantaneously at approximately 10 times trip rating.
- D. Provide enclosures, shunt trip (ST) devices, ground-fault circuit-interrupting (GFCI or GFI) devices, arc-fault circuit-interrupting (AFCI) devices, and other circuit breaker accessories as indicated, or to suit the application. See other Division 26 sections for panelboard applications.
- E. Where circuit breakers are used to protect multi-wire branch circuits, they must be multi-pole breakers – not single-pole types.
- F. Circuit breakers shall be of the same manufacturer.

2.10 SPD – SURGE PROTECTION DEVICES

- A. Provide surge suppression devices where indicated on the drawings. Equipment shall be manufactured by a single manufacturer and listed to the following standards:
 1. UL 1449, 3rd Edition updates effective September 29, 2009 "Surge Protective Devices".
 2. UL 1283 "Electromagnetic Interference Filters".
 3. IEEE C62.41.1, IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits.
 4. IEEE C62.41.2, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
 5. IEEE C62.45, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits.
 6. National Electrical Code: Article 285.
 7. SPD shall be UL labeled with 20kA nominal rating (I-n) (verifiable at UL.com) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.
- B. SPD manufacturer shall have at least three (3) years experience in manufacturing surge protection devices and shall be ISO 9001 or 9002 certified.
- C. Surge protection devices shall be connected on the load side of utility metering compartment and shall comply with local utility requirements.
- D. SPD shall provide Standard 7 Mode Protection paths for modes of protection as follows:
 1. Wye systems: Normal mode suppression line-to-line, line-to-neutral, common mode suppression line-to-ground and neutral-to-ground.

2. Delta and impedance grounded wye systems: Line-to-line and line-to-ground.

E. Submittals shall include information describing each unit and as a minimum establish compliance with the following criteria:

1. UL listed and labeled as Type 1 intended for Type 1 or Type 2 applications as follows:
 - a. Service entrance: 300 kA per phase and 200 kA short circuit current rating (SCCR).
 - b. Distribution: 100 kA per phase and 200 kA short circuit current rating (SCCR).
 - c. Branch: 100 kA per phase and 65 kA short circuit current rating (SCCR).
2. Voltage Protection Ratings shall not exceed the following:

<u>VOLTAGE</u>	<u>L-N</u>	<u>L-G</u>	<u>N-G</u>	<u>L-L</u>	<u>MCOV</u>
208Y/120	800V	800V	800V	1200V	150V
480Y/277	1200V	1200V	1200V	2000V	320V

3. Maximum Continuous Operating Voltage (MCOV):

<u>System Voltage</u>	<u>Allowable System Voltage Fluctuation (%)</u>	<u>MCOV</u>
208Y/120	25%	150V
480Y/277	15%	320V

4. Suppression components shall be heavy duty metal oxide varistors and shall be field replaceable module(s) (service entrance only).
5. Audible noise: 35db or less @ 3 feet from unit.
6. Response time less than or equal to 1/2 nanosecond.
7. UL 1283 listed EMI/RFI filter with noise attenuation: -50dB or greater at 100 kHz.
8. Fusing: 200 kA symmetrical fault current interrupting capacity @ 600V.
9. Phase and operational status indicator LED indicator lights for power and protection status.
10. Surge counter (service entrance only).
11. NEMA 1 enclosure with safety interlocked entry door.
12. Integral circuit breaker or fused disconnect switch (service entrance only).
13. Dual set of Form C dry contacts for remote monitoring.
14. Audible alarm & alarm disable.

F. Approved manufacturers: Current Technology, Liebert, Siemens Industry, Inc. or Advanced Protection Technologies.

2.11 CABLE SUPPORTS & CONDUIT VENTILATORS

- A. Provide cable supports for supporting electrical cables in vertical conduit risers per NEC Article 300-19.
- B. Cable supports shall be clamping device type with ventilating capability suitable for non-armored cables, 600 volts or less, O.Z. Gedney Type S or approved equal.
- C. Provide conduit ventilators to allow movement of air through the vertical conduit riser where shown on the drawings; O.Z. Gedney Type KVM or KVF or approved equal.

2.12 CONDUIT AND CABLE SEALING BUSHINGS

- A. Conduit sealing bushings for sealing conduit penetrations against fluid and air pressure shall be as follows as manufactured by O.Z. Gedney, Thunderline Corporation, Bumdy or Thomas & Betts.
1. For walls which have or will have membrane waterproofing:
 - a. Cast-In-Place Installations: OZ/Gedney Co.'s Type FSK thru wall seal and Type FSKA membrane clamp adapter.
 - b. Core drilled or Sleeved Installations: OZ/Gedney Co.'s type CSM and type CSMC with membrane clamp adapter.
 2. For walls which will not have membrane waterproofing:
 - a. Cast-In-Place Installations: OZ/Gedney Co.'s Type FSK.
 - b. Core Drilled or Sleeved Installations: OZ/Gedney Co.'s Type CSM or Thunderline Corporation Link-Seal CS-316.
 3. Provide abandonment plates for unused openings.
- B. Cable sealing bushings for sealing power cables in conduit shall be Type CSB, by O.Z. Gedney, Bumdy or Thomas & Betts.
- C. Cable seals for low voltage and signal cables shall be reusable simplex, duplex or triplex split design as required by Tyco Electronics or approved equal. Empty/spare conduit closed end caps shall be low temperature shrink Type LTCP by Tyco Electronics Raychem or approved equal.

2.13 SUBMETERING

- A. Provide UL listed Amps/Volts/kW/kW peak/power factor/kWh/KVARh/Demand submetering equipment where indicated on the drawings. Data for two channels shall be stored in 15-minute intervals for 36 days or 5-minute intervals for 12 days. Metering shall be 1% accurate, fully electronic with LCD display for kilowatt hour and demand readings with low and high user selectable set points and mounted in a lockable NEMA 1 enclosure. Provide voltage and split core type current sensors that shall be capable of remote mounting up to 500 feet from meter and suitable for installation in panelboards, switchboards or remotely mounted in separate enclosures as indicated without interrupting circuit continuity. Each meter shall be capable of reading up to (3) sets of current sensors for cumulative (totalizing) readings of 120/208V or 277/480V, and three phase, 3-wire and 4-wire systems. Provide the following communications accessories including software for Ethernet personal computer monitoring: Ethernet, ModBus or load control alarm relay with high and low threshold adjustment] via 4-conductor 24 AWG cable up to 4000 feet. Submetering equipment shall be E-MON Corporation Class 3200 Advanced Series with E-MON Energy software or approved equal.

2.14 AUDIO-VIDEO SYSTEM – Refer to Theater documents.

2.15 TELECOMMUNICATION SYSTEM– Refer to Section 270528

2.16 CABLE TELEVISION (CATV) SYSTEM – Refer to Section 270528.

2.17 POINT OF SALE (POS) SYSTEM

- A. Electrical Contractor #4 shall furnish and install dedicated empty raceway and cable pathway system for the Point of Sale (POS) System. Equipment and cable installation are provided by the City of New York's POS System vendor.

2.18 LOW VOLTAGE LIGHTING POWER SUPPLIES

- A. Provide toroidal transformer low voltage power supplies designed with manual taps to achieve 12, 13, 14, and 15 volts for 12 volt operation and 24, 26, 28, and 30 volts for 24 volt operation as indicated on drawings. Proper transformer wattage shall equal or exceed total lamping wattage without derating as indicated on drawings. 250 volt primary and 12 volt or 24 volt secondary voltage compartments shall be separate. Power supply shall be inherently protected and include primary and secondary overcurrent circuit protection. Size power supply overcurrent protection according to manufacturer's recommendations.
- B. Indoor housing shall be suitable for recessed or surface mounting for both walls and ceilings with zero clearance to combustible materials with damp locations label. Outdoor housing shall be UL listed for wet label direct burial. Provide 304 stainless steel diamond plate or bead blasted bronze covers with stainless steel hardware as required for application.
- C. Products shall be QT (indoor) and QSET & QVAULT (exterior) Series by Q-Tran, Inc., or approved equals by Semper Fi, Inc.

2.19 SWITCH BYPASS DEVICES

- A. Provide switch bypass devices (SBD) to power egress lighting regardless of fixture switch position where indicated on the drawings. The device shall be capable of bypassing the local control including switch, dimmer, occupancy sensor or relay when normal utility power has been lost. An un-switched source of power on the same branch circuit as the AC ballast is required. The device shall not affect normal fixture operation when wired to a direct, un-switched connection to a generator-supplied or central inverter-supplied lighting circuit. Warranty: Five years from date of purchase.
- B. Individual Fixtures: Provide one SBD per fluorescent lighting fixture. The devices shall consist of relay switching circuitry and fusing contained in one 8"x1.18"x1.18" (204mm x 30mm x 30mm) enclosure. Rating: 120 or 277 VAC, 50/60 Hz, 3 amps of fluorescent lighting load, sensing load - 280 mA/1.6 watts. The device shall be UL Listed for indoor, damp location field installation inside, on top of or remote from fixtures. Manufacturer: Bodine GTD or approved equal.
- C. Multiple Fixtures: Provide one SBD per lighting circuit. The devices shall consist of relay switching circuitry, a test switch, a normal power indicator and an emergency power indicator light contained in one 9"x6"x3.5" (229mm x152mm x89mm) enclosure. Rating: 120 or 277 VAC, 50/60 Hz, 20 amps of fluorescent, incandescent or HID lighting load, sensing load - 45 mA and 3.5 watts. The device shall be UL Listed for indoor, damp location field installation adjacent to panelboards, above suspended ceilings and as indicated on the drawings. Manufacturer: Bodine GTD20A or approved equal.
- D. Refer to details on drawings for bypass device types and control configurations.

PART 3 - EXECUTION

3.1 WIRING & RACEWAY - GENERAL

- A. The drawings show the general layout and typical details. Provide complete systems. Drawings are based on the specified equipment. Raceway layouts, boxes, and wiring of the systems are subject to approved shop drawings.
- B. Ensure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections, and provide such sizes and shapes of equipment that final installation shall satisfy the intent of the drawings and specifications.
- C. Locations of outlets, switches, appliances, etc. as shown on Electrical plans are approximate; coordinate with Architectural and Mechanical plans and details, and with job conditions. Install switches with "OFF" position down and on the strike side of doors, unless otherwise noted. Install receptacles with grounding pole in the up position for vertical mounting and at left for horizontal mounting.
- D. Locate and install electrical equipment, junction and pull boxes, panelboards, switches, controls, and other apparatus requiring maintenance, inspection, and operation so as to be readily accessible. For finished locations, provide a suitable marked, hinged access panel only where approved by the Commissioner.
- E. All feeder conduit must be routed away from low voltage AV conduits per the spacing identified in specification section 265561.

3.2 RACEWAY INSTALLATION

- A. Install conduit in accordance with the NECA "Standard of Installation".
 - 1. In architecturally finished spaces, conduits and cables shall be run concealed in hung or furred ceilings, slabs, masonry, and partitions unless otherwise indicated. In unfinished spaces, raceways may be run exposed.
 - 2. Raceway installation at existing slabs, existing masonry walls and existing furred partitions in finished areas shall be as indicated in the raceway schedule listed in paragraph 2.1, saw-cut or chopped into existing floor or partition and patched, unless otherwise specifically noted. Surface raceways shall only be used where specifically indicated or permitted by the Commissioner.
 - 3. Submit shop drawings for exposed conduits or raceways indicated on drawings in architecturally finished spaces.
 - 4. Shop drawings shall demonstrate coordination with related trades and the ability to provide a neat and workmanlike installation.
- B. Unless otherwise indicated, exact routing of raceways shall be determined by the Contractor #4 to suit project requirements and field conditions.
- C. Where raceways cross expansion or seismic joints, provide approved expansion fittings, or combinations of fittings, which allow deflection in all directions equal to twice the movement allowed in the structural design. For conduits 1-1/4" trade size or smaller, a 24" length of flexible metal conduit, with bonding jumper, slack mounted, may be used.

- D. Provide sealing bushings on the ends of underground conduits that terminate at indoor equipment, or interior conduits where subject to different temperatures or where condensation is known to be a problem as in cold storage areas. Install appropriate sealant after installation and testing of cables.
- E. Raceways and cables shall be neatly arranged on hangers and supports, with fittings designed for the purpose, and shall be installed parallel and perpendicular to walls, floors, structure and ceilings in a neat and workmanlike manner. Group related raceways; provide space for 25 percent additional raceways.
- F. Raceways installed in close proximity to pipes of other trades shall be arranged to allow proper clearance for servicing, headroom and the like. Maintain minimum 6 inch clearance from steam, hot water, and flue piping.
- G. Conduit ends shall be reamed smooth and interiors shall be wiped clean and dry.
- H. Use of running threads is not permitted; use conduit unions or split couplings in areas where threaded conduit cannot be turned.
- I. Conduits passing through roof construction shall be flashed watertight.
- J. Raceways shall be supported at intervals less than or equal to code with seismic bracing as described in this section.
- K. Locate pull boxes, junction boxes, pull fittings, etc. to comply with code and to prevent recommended values of wire and cable tensions and side wall pressures from being exceeded.
- L. Conduit in concrete or masonry shall be securely held in place during pouring and construction operations. Change from non-metallic conduit to rigid steel conduit before rising above the floor or emerging from concrete.
- M. Where conduits are embedded in concrete above metal decking or suspended below metal decking, provide spacers for 1-1/2 inch minimum gap between conduit and deck to avoid penetration of conduit by fasteners.
- N. Direct buried conduit and conduit below concrete slabs: Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively used. Backfill using fine material no less than 6 inches above the top of the conduit placed in 6-inch lifts and thoroughly tamped.
- O. Provide a suitable pullstring in each empty conduit except sleeves and nipples less than 24 inches.
- P. Use suitable caps to protect empty conduit against entry of dirt and moisture.
- Q. Conduits and/or sleeves shall not be placed in concrete slabs or walls without prior approval of the Commissioner. Prepare a submittal detailing the number, size, spacing and layout of the proposed conduit and/or sleeves including material specifications. Adhere to the following limits in planning the conduit embedments:
 - 1. Maximum outside diameter of embedded conduit or sleeve: $\frac{1}{4}$ the thickness of the slab or wall.

2. Minimum center-to-center conduit spacing: Six (6) times the outside diameter of the conduit.
 3. Conduits shall be firmly supported at the mid-thickness of the slab or wall and shall be wired into place.
 4. Conduits shall not be placed in contact with the concrete reinforcement.
 5. Use of aluminum conduit or sleeves for embedment in concrete is not permitted.
 6. Conduit or sleeves shall not be placed in columns or beams.
- R. Close ends of conduits immediately after being placed to keep out foreign matter. The entire conduit system shall be tested for obstructions, omissions and smooth joints by fishwire, and thoroughly swabbed out and made dry before pulling any wire.
- S. Install covers on boxes and raceway fittings. Plug unused open knockouts and hubs.
- T. Do not install outlet boxes back-to-back in walls. The use of thru-wall boxes is strictly prohibited.
- U. Provide phenolic insulating connectors for metal conduits containing BOTH normal ground AND isolated-ground conductors, where the conduit is NOT being used as the equipment grounding conductor. (For conduits containing only a normal ground conductor or only an isolated ground conductor, where the conduit is also used as the equipment grounding conductor, provide galvanized couplings and connectors.)
- V. Provide separate raceways, junction boxes, pull boxes and wireways for emergency system wiring.
- W. Optical Fiber/Communications Cable Raceway and fittings shall not be run exposed, in concrete slabs or direct buried in earth except as shown on drawings. Color code: ORANGE for communications.

3.3 WIRING INSTALLATION

- A. Do not use wire smaller than No. 12 AWG for any power or lighting circuit. Use larger sizes where indicated, as required by codes, and as follows:
1.

30 ampere circuit:	No. 10
40 ampere circuit:	No. 8
50 ampere circuit:	No. 6
60 ampere circuit:	No. 6
 2. Minimum homerun and branch circuit wiring sizes and maximum homerun conduit fill for 120 Volt, 20 ampere circuits shall be as follows:

Length	Circuit Wire Size	Home Run Wire Size	Conduit Size (9 current-carrying conds.+ G)
0' to 50'	#12	#12	3/4"
51' to 100'	#12	#10	3/4"
101' to 200'	#10	#8	1" (1-1/4" for 9 #8 AWG +G)

Greater than 200' - Request Direction from Commissioner.

Note: Provide derating per Code when installing more than 3 current-carrying conductors in conduit.

- B. Do not use wire smaller than No. 14 AWG for control circuits unless otherwise recommended by the equipment or system manufacturer on wiring shop drawings, and so approved by the Commissioner.

- C. Where greater than three (3) current-carrying conductors are installed in any one conduit or cable, conductors must be derated and sizes increased, if needed, to accommodate conductor derating as required by NEC Article 310.15(B)(2)(a) Allowable Ampacities of Insulated Conductors Rated 0-2000 volts. Do not install more than nine (9) current-carrying conductors in conduit or raceway without approval from the Engineer.
- D. Where conductors in conduits supported above roofs are exposed to sunlight, apply ambient temperature ampacity adjustment factors per Table 310.15(B)(2)(c) according to distance above roof from bottom of conduit.
- E. Make splices only at outlets or accessible junction boxes. Make splices No. 10 AWG and smaller with Buchanan B-Cap wire-nuts or equivalent insulated solderless twist-on connectors. Make joints, taps, and splices in wires No. 8 AWG and larger with solderless mechanical connectors enclosed in molded covers. Splices shall be UL listed for the environment.
- F. When pulling conductors through conduits, care shall be taken not to exceed manufacturer's maximum tension and side wall pressures.
- G. Wire shall not be installed until work which may cause injury to wiring has been completed, and conduits are cleaned and dry.
- H. Conductors shall be completely installed and connected. Provide terminals, lugs, and connectors to suit the application, and in compliance with equipment manufacturers' recommendations.
- I. Branch circuit wiring for lighting and other single phase applications shall be multi-wire, utilizing common neutrals, except dimmer circuits shall have separate neutrals, and as otherwise indicated.
 - 1. Under no circumstances shall any switch or circuit breaker break a neutral conductor.
 - 2. The circuit numbers indicated on the drawings are intended as a guide for proper connection of circuits at panels. However, it shall be the responsibility of the Contractor #4 to ensure that the final circuiting work fulfills the following conditions:
 - a. Loads on panel busses shall be phase-balanced as evenly as possible.
 - b. No neutral conductor shall be common to more than one circuit conductor of the same phase leg.
 - 3. Receptacle, fluorescent lighting, and electronic low voltage lighting (track or fixed) branch circuits shall be considered non-linear loads and shall be provided with individual dedicated 100% neutral wires.
 - 4. Provide multi-pole circuit breakers for multi-wire circuits and circuits that supply devices or equipment on the same yoke or strap.
- J. Wire lubricant shall be used to ease the pulling of cables and conductors in conduits. The lubricant used shall be fully compatible with the wire insulation or cable jacket material.

K. Secondary Service, Feeder, and Branch-Circuit Conductors: Color-code throughout the secondary electrical system.

1. Color-code 208Y/120-V system as follows:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White.
 - e. Ground: Green.

3.4 GROUNDING & BONDING INSTALLATION

A. Install a complete building, equipment, and system grounding and bonding network as indicated and specified, and to meet or exceed the requirements of NEC Article 250 and the local utility.

B. Grounding Electrode System

1. Bond structural steel and interior metal piping at accessible points to the grounding electrode system. Size bonding conductors per NEC. Interior metal piping to bond includes: water, fire protection, gas, waste, drain, vent, pneumatic, oxygen, air and vacuum systems.
2. After completion of installation, test earth ground resistance by fall-of-potential or other approved method. If test result is greater than 3 ohms, drive two (2) additional ground rods and bond to system. Provide a certified report of the test methods and results, including any corrective actions taken. Do not use salt or other chemical means to reduce earth resistance, unless so directed by the Commissioner.

C. Equipment Grounding

1. Install an insulated ground conductor, run in the raceway with the phase conductors; for each feeder serving: panelboards, lighting dimmer boards, motors, equipment and appliances unless otherwise noted.
2. Include an insulated ground conductor in conduit runs containing sections of flexible conduit unless otherwise noted.
3. Include an insulated ground conductor in branch circuit raceways or cables unless otherwise noted.
4. Note: Addition of equipment grounding conductor to AC circuits run in metallic enclosures does not lessen the requirement for conductor enclosure continuity, since part of total ground fault current will flow through the raceway and enclosure system. Therefore, the continuity of this system shall be maintained.
5. Provide bonding bushings and bonding conductors for boxes with concentric, eccentric or over-sized knockouts. The bonding conductor shall be sized per NEC Table 250-122 and lugged to the box.
6. Grounded service conductor (neutral) of distribution system shall be grounded at only one point: service neutral connection to the ground bus. Under no circumstances shall system neutral be grounded at any other point. As part of final inspection procedures, demonstrate purity of system neutral.

7. Bond each separately derived system transformer. Bond grounded conductor (X0) to the transformer case, to the nearest available interior metal water piping, to nearest grounded building steel, and to other metal piping in accordance with requirements of NEC Article 250. If building steel does not exist (i.e., concrete structures), the transformer shall be grounded to main service ground bus. Size conductors per NEC, but use no smaller than No. 4 AWG copper unless otherwise shown on the drawings. The transformer primary feeder ground is supplemental and shall be sized for primary feeder protection. Refer to contract drawings for additional bonding requirements.
8. Install a common grounding electrode conductor serving each separately derived system. The common ground electrode conductor size shall be #3/0 ASW bare tinned copper. Taps to each separately derived system shall be sized per NEC Table 250.66 and minimum #6 AWG bare copper.

D. Low Voltage Telecommunications Grounding & Bonding

1. Provide a proper grounding and bonding infrastructure serving low voltage telecommunications systems including voice, data, video, audio, fire alarm, security and environmental control per ANSI-J-STD-607-A as indicated on the drawings and as follows:
 - a. Provide a Telecommunications Bonding Backbone (TBB), minimum size #3/0 AWG in 1-inch conduit from the main service grounding electrode system to the Telecommunications Main Grounding Busbar (TMGB) and to each Telecommunications Closet Busbar (TGB). The intent of the TBB is to reduce or equalize potential differences between telecommunications systems.
 - b. Where two or more vertical Telecommunications Bonding Backbones (TBB) are used in a multi-story building, provide a #3/0 AWG horizontal grounding equalizer (GE) to each TBB at the top floor, bottom floor and every third floor.
 - c. Metallic raceways for low voltage telecommunications systems copper or fiber optic cabling shall be made electrically continuous for grounding purposes and bonded to the TGB or TMGB. Provide connections from each item to the ground bus or if bonded in series provide a connection at each end for continuity.
 - d. Bonds shall be hollow braided copper jumpers minimum 60A ampacity. Each bond terminal shall be irreversible compression type with NEMA two-hole bolted connections to ground bus or exothermic weld connection.
 - e. Provide additional #4 AWG ground cable connections from each TMGB and TGB to the closest building steel and to the ground bus in the electric panel serving the outlets and equipment in the associated telecommunications room/closet.
 - f. Ground each low voltage system to the TMGB or TGB with a #4 AWG conductor.
 - g. Grounding and bonding conductors shall be installed without splices. Exception: Irreversible compression-type connectors or exothermic welds.
 - h. Conductors may be insulated; if insulated the insulation shall meet the fire ratings of its pathway.

2. Grounding or bonding conductors installed for Telecommunications Systems shall be labeled near their termination points. Labels shall be non-metallic and include the following:
 - a. "WARNING if this connector or cable is loose or must be removed, please call the Building Telecommunications Manager."
 - b. Labels and installation shall meet the requirements of ANSI/TIA/EIA 606 and 607.

E. Specialty Grounding

1. Provide ground connections for anti-static floor covering materials according to manufacturer's installation instructions.
2. Audio Isolated Ground Test - Verify the integrity of the audio isolated ground system, as specified by the Commissioner and as follows:
 - a. Confirm that continuity is measured between each isolated ground receptacle/outlet neutral conductor and the grounding electrode connection at the audio isolation transformer.
 - b. Disconnect the neutral bonding link at each audio isolation transformer and confirm that the neutral buss is isolated from the building ground. Locate and remove connections between the neutral buss and the building ground other than the main bonding jumper. Reconnect the neutral bonding link.
 - c. Confirm that continuity is measured between each isolated ground receptacle/outlet ground conductor and the grounding electrode at the audio isolation transformer.
 - d. Disconnect the isolated ground bonding link at each audio isolation transformer and confirm that the isolated ground buss is isolated from the building ground. Locate and remove connections between the isolated ground buss and the building ground other than the main bonding jumper. Reconnect the isolated ground bonding link.
 - e. Confirm that each isolated ground receptacle/outlet is wired with correct polarity.

3.5 RACEWAYS & CABLE PATHWAYS FOR TELECOMMUNICATION SYSTEM

- A. Provide empty conduit raceway and cable pathway systems as described here and shown on the drawings for telecommunication work, complete with flexible cable tray and non-compressing cable hangers, conduit, pull boxes, and outlet boxes, as indicated on the drawings and to Category 6A UTP standards.
- B. Accessible ceilings: Provide cable pathways via 1-1/4 inch EMT conduit in finished walls and from outlet boxes to accessible ceiling space. Provide cable pathways above accessible ceilings via flexible cable tray and non-compressing cable hangers to each local telecommunications room backboard. Cable hangers shall be 4-inch capacity minimum, galvanized steel, suitable for Category 6A UTP, optical fiber/communications cable raceway, and low voltage cabling with UL listing for structured cabling systems; B-Line or approved equivalent. Flexible cable tray shall be as specified previously in this Section.

- C. In-accessible ceilings: Provide cable pathways via 1-1/4 inch EMT conduit in finished walls and from outlet boxes to each local telecommunication room backboard.
- D. Vertical: Provide cable pathways via empty EMT conduit between telecommunication room backboards at each level. Outside telecommunication rooms: Use conduit for exposed runs through floors to height of 8' above floor and in shaftways. Conduit sizes as shown on the drawings.
- E. Refer to other paragraphs in this Section for raceway installation with the following supplemental information or exceptions:
 - 1. Conduit fill shall not exceed 40 percent fill based on the installed cable load.
 - 2. Flexible cable tray and cable hangers shall be sized for 30% fill based on the installed cable load.
 - 3. Provide non-compressing cable hangers (j-hooks & rings) only for pathways to single work area outlets.
 - 4. Mount outlet boxes vertically at 16" centered above finished floor.
 - 5. Wall mounted telephone outlets shall be 54" centered above finished floor.
 - 6. Provide metal pullbox in conduit runs as follows:
 - a. Length over 100 feet.
 - b. More than two (2) 90-degree bends.
 - c. After every reverse bend.
 - 7. A third bend is acceptable in a pull section without derating the conduit capacity if one of the following is true:
 - a. The total run is not longer than 33 feet.
 - b. The conduit is increased to the next trade size.
 - c. One of the bends is located with 12 inches of the cable feed end such that the cable can be pushed around the first bend.
 - 8. Condulet fittings are not acceptable.
 - 9. Provide minimum inside bending radius for telecommunications conduit as follows:
 - a. 2-inch or less: Six (6) times the internal conduit diameter.
 - b. Larger than 2-inch: Ten (10) times the internal conduit diameter.
 - 10. Provide cable hangers at minimum intervals of three (3) feet and seismically braced. Provide additional hangers if cable sag exceeds 12 inches.
 - 11. Provide a drag line in each run and terminate in a bushed elbow.
- F. When completed the conduit systems shall be ready for the installation of wiring and equipment.
- G. Cable installation shall comply with the following minimum criteria:
- H. Maintain minimum 6 inches separation from power distribution cables unless in conduit.

- I. Power and communications cables shall cross perpendicularly where crossings are needed.
 - J. Maintain minimum 12 inches separation between communications cables and fluorescent light ballasts.
 - K. Cable bend radii shall be a minimum of eight (8) times the outside cable diameter.
 - L. Fiber optic cable bend radii shall be a minimum of ten (10) times the outside cable diameter.
- 3.6 RACEWAYS FOR AUDIO-VIDEO/THEATER SYSTEMS – Refer to Theater documents Section 265561.
- 3.7 RACEWAYS & CABLE PATHWAYS FOR POINT OF SALE (POS) SYSTEM
- A. Provide empty conduit raceway and cable pathway systems as described here and shown on the drawings for POS work, complete with flexible cable tray and non-compressing cable hangers, conduit, pull boxes, and outlet boxes, as indicated on the drawings and to Category 6A UTP standards. Refer to raceways and cable pathways for Telecommunication System for additional requirements.
- 3.8 MECHANICAL EQUIPMENT WIRING
- A. Unless otherwise indicated or specified herein, motors, motor starters, motor controllers, variable speed/frequency drives, and associated control devices are furnished by other Divisions and installed by this Division. Coordinate installation and locations with other Division contractors.
 - B. Power wiring from the indicated source to the starter/controller/drive unit, and from the starter/controller/drive unit to the motor, including any local disconnect switches provided and installed by this Division, and associated lugs, terminals, and connections, is the work of this Division.
 - C. Verify correct voltage, phase rotation and protection for equipment prior to start-up. Correct deficiencies before energizing equipment.
 - D. Control circuit wiring is generally furnished and installed under other Divisions, except that any such wiring shown on Electrical drawings is work of this Division.
 - E. Provide 120 volt power to temperature control panels (TCP's) supplied and installed by Division 23. Use emergency power sources when available. Coordinate power requirements and panel locations with Division 23 Temperature Controls Contractor #3.
 - F. Cooperate and coordinate with the other trades in the installation, connection, and testing of mechanical equipment. Perform work of this section in accordance with equipment manufacturers' instructions.
- 3.9 SUPPORTS AND HANGERS
- A. Provide metal framing, supports and braces for equipment installed. Provide floor mounted or free standing supports for equipment not mounted to concrete or block walls. Support panelboards, pull boxes and outlet boxes independently of the conduit.
 - B. Support single conduit runs by individual hangers.

- C. Support multiple conduit runs on trapeze hangers. Do not support conduit on hangers provided for mechanical runs.
- D. Provide listed raceway roof support blocks. Wooden support blocks are not acceptable.
- E. Securely fasten electrical items including lighting fixtures and their supports to the building structure, unless otherwise indicated. Do not use the ceiling-support wires or ceiling grid to support raceways and cables. Provide independent support wires, secured at both ends.
- F. Do not support electrical items including disconnect switches, motor controllers, variable frequency drives, or conduit from the equipment or supports of other divisions.
- G. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Do not support electrical items from the equipment or supports of other divisions.
- H. Hanger rods shall be threaded galvanized steel, 3/8" minimum with galvanized double nuts, securely attached to the building structure. Provide sizes, quantities, and connections to safely support imposed loads.
- I. Support horizontal and vertical conduits per code and to prevent visible deflections. Conduit shall be firmly fastened within 3 feet of each outlet box, junction box, cabinet or fitting.
- J. Provide galvanized steel channel or angle as required for conduit and equipment supports. Provide independent support for items weighing 100 pounds, or more, mounted on gypsum board partitions.
- K. Connect rod hangers to the building structure as follows:
 - 1. In formed concrete slabs provide anchors by means of cast-in-place inserts.
 - 2. To structural steel provide anchors secured to the structure with beam clamps. Clip type (Caddy) conduit supports shall be used only for armored cable.
 - 3. To existing work provide expansion bolts if structural steel is not available.
 - 4. Powder propelled inserts are not acceptable for this project.
- L. Support MC cable independent of supports for other mechanical or ceiling support systems.
 - 1. Supports shall consist of "Caddy clips" attached to 1/2" threaded rods, steel studs, and beams, and shall be installed in accordance with their listing and loading capacity.
 - 2. To existing work provide expansion bolts if structural steel is not available.
 - 3. Beam clamps shall be bolt-on C-clamp types, NOT push-on friction-hold Caddy types.
 - 4. Do not use "drop wire" or "pencil rod" for supports. Do not use tie-wraps for attachment.

5. "Bridle ring" type supports may be used for support of up to six cables, as listed by the manufacturer, where supported by bolt-on C-clamps. Adjust ampacity for more than three current carrying conductors in a cable or for more than twenty bundled cables and ensure compliance with NEC Article 310.15(B)(2)(a) Exception No. 5.
6. MC cable shall be routed in a neat and workmanlike manner, parallel, and perpendicular to walls, floors, ceilings, and structure.

3.10 HOUSEKEEPING PADS AND RUBBER MATS

- A. Corrdinate concrete housekeeping pads under floor mounted electrical equipment with general contractor.
- B. Pads shall be 4 inches high, and 4 inches wider than the equipment in both directions.

3.11 SEISMIC REQUIREMENTS - Refer to Sections 260000 and 260548.

3.12 LOW VOLTAGE LIGHTING POWER SUPPLIES

- A. Install according to manufacturer's instructions.
- B. Mount where indicated on plans and install in a manner that prevents transmission of vibration into the structure. Refer to Section 260548 for further information.

3.13 OCCUPANCY/VACANCY SENSORS

- A. Upon completion of the installation, the system shall be adjusted by the manufacturer's factory authorized technician or the electrician who will verify all adjustments and sensor placement to ensure a trouble-free occupancy-based lighting control system.
- B. Upon completion of the system adjustment the factory authorized technician shall provide the proper instruction to the City of New York's personnel in the adjustment and maintenance of the sensors.

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SECTION 26 05 48

ELECTRICAL VIBRATION & NOISE CONTROL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Install electrical equipment in a manner that prevents transmission of objectionable vibration into the structure. This isolation includes, but is not limited to, resilient mounting of transformers, dimmer racks, conduit, UPS's, motor starters, remote fluorescent fixture ballast cabinets, automatic transfer switches and variable frequency motor controllers. The vibration isolation manufacturer shall provide supervision to ensure proper application, installation and adjustment of the isolators. Upon completion of the installation and after the system is put into operation, the manufacturer shall make a final inspection and report. Contractor #4 shall submit this report to the Commissioner, in writing, certifying the proper performance of the installation. Refer to Section 260000 for additional information.

1.2 SUBMITTALS

- A. Submit NEMA sound power ratings for transformers, dimmer racks, UPS's, motor starters, remote fluorescent fixture ballasts, and variable frequency motor controllers.
- B. Submit shop drawings for conduit passing through isolated block-outs in structure.
- C. Submit shop drawings for resilient penetration sleeve/seals field fabricated or prefabricated.
- D. Submittals shall show required efficiency, designed deflection and outside diameter of springs, when pertinent, and installation guidelines.
- E. Submit shop drawings for neoprene mounts clearly marked to show equipment tag and weight, mount type and size, actual isolator deflection and maximum rated load for every mount. Submittals based on static load are not acceptable.
- F. Indicate materials and show designs and calculations signed and sealed by a Professional Engineer licensed in New York State.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATIONS - GENERAL

- A. Electrical equipment shall be mounted in accordance with the specifications below and with the specific requirements shown in the equipment schedules. The vibration isolation manufacturer shall provide supervision to ensure proper application, installation and adjustment of the isolators. Upon completion of the installation and after the system is put into operation, the manufacturer shall make a final inspection and report. The Contractor #4 shall submit this report to the Commissioner, in writing, certifying the proper performance of the installation.
- B. The isolation manufacturer shall supply unit isolators, complete rails, where required, and shall be responsible for the selection of vibration eliminators and shall guarantee to meet the requirements of this specification.

- C. Vibration isolators shall be designed or treated for resistance to corrosion. Steel components shall be PVC coated, or phosphate primed and finish painted with rust-resistant enamel. Nuts, bolts and washers shall be zinc-electroplated. Structural steel bases shall be thoroughly cleaned of welding slag and primed with metal etching primer and painted with rust-resistant enamel. Isolators exposed to the weather shall have steel parts hot-dipped galvanized. Nuts, bolts and washers shall be cadmium plated. Spring components shall be cadmium plated and neoprene coated.
- D. Vibration isolators shall have either known undeflected heights or calibration markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.
- E. Isolators shall operate in the linear portion of their load versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer, and must be linear over a deflection range of not less than 50% above the design deflection.
- F. The ratio of lateral to vertical stiffness shall be not less than 0.9 nor greater than 1.5.
- G. The theoretical vertical natural frequency for each support point based upon load per isolator and isolator stiffness shall not differ from the design objectives for the equipment as a whole by more than + 10%.
- H. Neoprene mountings shall have a shore hardness of 40 to 65, after minimum aging of 20 days or corresponding oven-aging.

2.2 MOUNTINGS

- A. Type A, Seismic, Floor Mount - horizontal and vertical rated in tension, compression and shear, consisting of bridge-bearing neoprene, ductile iron housing, top 'N' cap screw with washer, and minimum four bottom anchor holes. Mountings shall have a minimum static deflection of 0.5 inch. Include structural steel channel rails with leveling bolts for rigid connection to the equipment. Basis of design: Mason Industries Type BR and Type DNR rails or approved equal by Kinetics Noise Control, Amber Booth or Korfund.
- B. Type B, Seismic, Spring Mount - not used.
- C. Type C, Seismic, Suspension Mount - horizontal and vertical rated in tension, compression and shear, consisting of bridge-bearing neoprene, steel housing, top 'CS' cap screw with washer, and minimum six bottom anchor holes. Mountings shall have a minimum static deflection of 0.5 inch. Include structural steel channel rails with leveling bolts for rigid connection to the equipment. Basis of design: Mason Industries Type RBA or approved equal by Kinetics Noise Control, or Vibration Mountings.
- D. Type D, Seismic, Wall Mount - bridge neoprene and electro-galvanized steel sleeve and washer type isolator with seismic anchor stud. Basis of design: Mason Industries Type PB or approved equal by Kinetics Noise Control, Amber Booth or Korfund.
- E. Flexible Connectors
 - 1. Penetrations of sound-rated walls, floors, and ceilings in sound-critical spaces shall be specially sealed in accordance with the requirements as outlined on the drawings.

2. Provide isolation couplings with molded neoprene sleeve, bonding jumper and hot-dip galvanized finish ductile iron end fittings for rigid metal conduit and intermediate metal conduit; Appleton Type CF-1, OZ Gedney Type DX or approved equal.

2.3 ISOLATION SCHEDULE

EQUIPMENT TYPE	ISOLATION TYPE
----------------	----------------

Floor Mounted Transformers	C
Floor Mounted Dimming Panels	C
Floor Mounted Unit Power Conditioners	A
Floor Mounted UPS's	A
Suspended Transformers	C
Wall Mounted Equipment *	D

* wall mounted equipment shall include dimmer panels, transformers, and all controls/control panels with transformers, contactors, relays, fans, and/or moving parts

2.4 RESILIENT PENETRATION SLEEVE/SEAL

- A. Resilient penetration sleeve/seals shall be field fabricated from a pipe or sheet metal section that is 1/2-inch to 3/4-inch larger than the penetrating element in all directions around the element and shall form a sleeve through the construction penetrated. Refer to drawing detail. Prefabricated sleeves shall be submitted for review prior to installation.

2.5 OUTLET BOX PAD

- A. Outlet box pads shall be field installed to acoustically isolate spaces. Refer to drawing details and manufacturer's instructions. Box pad manufacturer shall be Harry A. Lowry & Associates, Inc., Sun Valley, CA 818-768-4661 or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. See Section 260500 Basic Materials and Methods.

3.2 INSTALLATION

- A. Install vibration isolation devices and systems in accordance with the manufacturer's instructions.
- B. Floor Mounted Equipment to include:
 1. 4-inch thick concrete housekeeping pads over entire floor area of supported equipment.
 2. Supporting vibration isolation devices and bases.
 3. Keying with hairpins as required to be integral with the structural slab.
 4. Incorporating approved seismic restraint anchor plates flush with the top of the housekeeping pad.
- C. Concrete per specification Division 3 describing requirements.
- D. Verify installed isolators and mounting systems permit equipment motion in all directions.

- E. Adjust or provide additional resilient restraints to limit startup equipment lateral motion to 1/4-inch.
- F. Prior to startup, clean out foreign matter between bases and equipment. Verify that there are no isolation short circuits in the base or isolators.
- G. No rigid connections between equipment and building structure shall be made that degrades the vibration isolation system herein specified.
- H. Do not install any equipment, piping or conduit that makes rigid contact with the "building" unless permitted in this specification. "Building" includes, but is not limited to slabs, beams, columns, studs and walls. Use flexible conduit for connections to equipment vibration isolated with springs or neoprene (transformers, dimmers, pumps, fans, chillers, boilers, etc.). Flexible conduit shall be minimum of 25% greater length than the separation between the isolated equipment and the termination of rigid conduit. Install flexible conduit to be slack and not to exceed the manufacturer's minimum recommended bending radius. For conduit sizes greater than 2" diameter, use pre-manufactured flexible conduit connectors instead of flexible conduit.
- I. Use flexible conduit or a flexible conduit connector at every location where conduit crosses a building expansion or isolation joint.
- J. Resiliently mount to structure conduit connected to vibration isolated electrical equipment for a distance equal to 200 conduit diameters and for any additional extent indicated on the Drawings. Wrap conduit with 1" Armaflex, or approved equal, prior to restraining with wall-mounted clamp.
- K. Provide steel sleeve, grouted rigidly in place for conduit penetrations through walls, floors, and ceilings of mechanical equipment rooms, machine rooms, electrical equipment rooms and elevator equipment rooms. Make inside dimension of sleeve 1/2-inch to 3/4-inch greater than outside dimension of penetrating item on all sides. The sleeve shall extend 1-inch beyond the penetrated construction on each side. The penetrating element shall pass through the sleeve without contacting the sleeve. Pack annular space to full depth of penetration with intumescent fire-rated sealant to form an airtight seal. Refer to Section 260000 and drawing details.
- L. Coordinate work with other trades to avoid rigid contact with the "building". Inform other trades following, such as plastering, drywall, electrical or sheet metal, to avoid any contact that would reduce the vibration isolation.
- M. Bring to the Commissioner's attention, prior to installation, any conflicts with other trades which will result in unavoidable rigid contact with equipment or piping as described herein, due to inadequate space or other unforeseen conditions. Corrective work necessitated by conflicts after installation shall be at the Contractor #4's expense.
- N. Correct, at no additional cost, installations that are deemed defective in workmanship or material as a result of project completion inspection or subsequent inspections due to Commissioner complaints within a period of one year following acceptance.
- O. Position isolators:
 - 1. Close to building structure.
 - 2. Between building structure and supplementary steel if required.
 - 3. Not to contact acoustic rated walls.
- P. Suspend isolators from rigid and massive support points.

Q. Adjust isolators to eliminate contact of the isolated rod with the hanger rod box retainer or short circuiting of the spring.

R. Provide outlet box pads for electrical, telecommunications, fire alarm, security boxes and the like where indicated on the drawings.

1. There shall be a separation of 24" between centerlines of outlet boxes or receptacles set into opposite sides of the wall. Conduit connecting such boxes shall be flexible and shall provide 6" slack per 24" of run.

2. In a double wall, boxes in opposite sides of the wall shall be located 24" on center, minimum. Effectively, this means that boxes on the same side of the wall will be 48" apart if there is a box between them on the other side of the wall.

3. The boxes shall be treated to reduce sound transmission. Unused knock-out holes shall be plugged with knock-out caps or spot welded closed. The openings or cutouts in the walls to receive the boxes/receptacles shall be made no more than 1/4" oversize to allow a 1/8" gap all around. The flanges shall be perimeter sealed with acoustical caulking, prior to the boxes/receptacles being inserted.

4. Outlets installed in gypsum board only partitions (no CMU in construction) in noise critical spaces will require that the outlet be wrapped on five sides with an acoustical pad. The pad is a polybutadiene-butyl material with a self-adhesive backing. Adhere pads to boxes before mounting box or attaching conduit according to manufacturer's instructions. Install plaster rings and tightly secure before completely wrapping pad around gypsum board face of box. Fill any remaining voids between gypsum board and box with non-hardening acoustical sealant.

S. General Equipment Isolation and Seismic Restraint:

1. Provide 2-inch operating clearance between concrete inertia bases and housekeeping pad and 1-inch clearance between equipment or structural bases and housekeeping pad.

2. Isolation mounting deflection (minimum) as specified or scheduled on manufacturer's certified drawings.

3. Position equipment, structural base and concrete bases on blocks or wedges at proper operating height.

4. Electrical conduit connections to isolated equipment shall be looped or installed with flexible conduit to allow free motion of isolated equipment.

5. Install equipment directly on isolation system. Support rails between the equipment and isolators should not be used.

6. Position corner or side seismic restraints with equipment operation for operating clearance and weld or bolt seismic restraint to seismic anchor plates in housekeeping pad.

3.3 SEISMIC REQUIREMENTS

A. Adequately anchor floor mounted equipment to floor slab or housekeeping pad to resist 0.5g (minimum) horizontal accelerations. Where necessary, also provide U-channel bracing to structural steel or slab above.

- B. Wall mounted enclosures and equipment on stud partitions or non-reinforced block walls shall be mounted via two (2) slab-to-slab steel U-channels anchored to the wall every 24 inches O.C., and anchored to the floor and ceiling slabs.
- C. Where possible, conduit, cable tray & raceway hangers shall be less than 12 inches long. Where hangers are 12 inches or more in length, and conduit size is 2-1/2 inches or more and for cable tray, provide longitudinal and transverse sway bracing. Seismic restraints spacing shall be in accordance with hanger spacing.
- D. Provide sway bracing for those conduit runs containing emergency and critical power and lighting, fire alarm circuits, other life safety systems regardless of conduit size.
- E. Recessed lighting fixtures shall be independently supported from the structure above unless the suspended ceiling is seismic-rated and the fixtures are provided with earthquake clips.

END OF SECTION

SECTION 26 08 00

COMMISSIONING OF ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes commissioning process requirements for Electrical systems, assemblies, and equipment.
- B. Related Sections:
 - 1. Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.3 DESCRIPTION

- A. Commissioning: Commissioning is a systematic process of ensuring that all building systems, including the mechanical and electrical systems, have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The Commissioning Agent (CxA) shall provide the Owner with an unbiased, objective view of the system's installation, operation and performance. This process does not eliminate or reduce the responsibility of each system designer to provide a complete design or installing subcontractors to provide a finished product. Commissioning is intended to enhance the quality of each system installation, startup and transfer to beneficial use by the Owner.
- B. Commissioning during the construction phase is intended to achieve the following specific objectives, according to the Contract Documents:
 - 1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 - 2. Verify and document proper performance of equipment and systems.
 - 3. Verify that Operation & Maintenance documentation is complete and transferred to Owner.
 - 4. Verify that the Owner's operating personnel are adequately trained.
 - 5. Verify a contract is in place for a post occupancy review with O&M staff within 10 months after Substantial Completion.
- C. The Commissioning process shall be a team effort and encompass, as well as coordinate, the traditionally separate functions of system documentation, system installation, equipment startup, control system calibration, testing, balancing and verification and performance checkouts.

- D. The CxA will work closely with the construction team, cooperating on and coordinating all Cx activities with the Commissioner, Owner's representative, Trade Contractors, subcontractors, manufacturers and equipment suppliers.
- E. The Cx process shall not reduce the responsibility of the CM to comply with the Contract Documents.

1.4 DEFINITIONS

- A. Refer to Division 01 Section and "General Commissioning Requirements" for definitions.

1.5 SUBMITTALS

- A. Refer to Division 01 Section and "General Commissioning Requirements" for CxA's role.
- B. Refer to Division 01 Section "Submittals" for specific requirements. In addition, provide the following:
- C. In addition, provide the following:
 - 1. Certificates of readiness
 - 2. Certificates of completion of installation, prestart, and startup activities.
 - 3. O&M manuals
 - 4. Test reports

1.6 QUALITY ASSURANCE

- A. Test Equipment Calibration Requirements: Contractors will comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.7 COORDINATION

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to coordination during the commissioning process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. All standard testing equipment required to perform startup, initial checkout and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the electrical contractor of Division 26 shall ultimately be responsible for all standard testing equipment for the electrical systems and controls systems in Division 26. A sufficient quantity of two-way radios shall be provided by each contractor.

- B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.
- C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.
- D. Data logging equipment and software required to test equipment will be provided by the CxA, but shall not become the property of the Owner.
- E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 - EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS

- A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems
- B. Red-lined Drawings:
 1. The contractor will verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings.
 2. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.
 3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
 4. The contracted party, as defined in the Contract Documents will create the as-built drawings.
- C. Operation and Maintenance Data:
 1. Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
 2. The CxA will review the O&M literature once for conformance to project requirements.
 3. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.
- D. Demonstration and Instruction:
 1. Contractor will provide demonstration and instruction as required by the specifications.
 2. A complete instruction plan and schedule must be submitted by the Contractor to the CxA four weeks (4) prior to any instruction.

3. An instruction agenda for each training session must be submitted to the CxA one (1) week prior the training session.
4. The CxA shall be notified at least 72 hours in advance of scheduled tests so that testing may be observed by the CxA and Owner's representative. A copy of the test record shall be provided to the CxA, Owner, and Architect.
5. Engage a Factory-authorized service representative to instruct Owner's maintenance personnel to adjust, operate, and maintain specific equipment.
6. Instruct Owner's maintenance personnel on procedures and schedules for starting and stopping, trouble shooting, servicing, and maintaining equipment.
7. Review data in O&M Manuals.

3.2 CONTRACTOR'S RESPONSIBILITIES

- A. Perform commissioning tests as per the written procedure and at the direction of the CxA.
- B. Attend construction phase controls coordination meetings.
- C. Participate in Electrical systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
- D. Provide information requested by the CxA for final commissioning documentation.
- E. Prepare preliminary schedule for Electrical system orientations and inspections, operation and maintenance manual submissions, training sessions, equipment start-up and task completion for owner. Distribute preliminary schedule to commissioning team members.
- F. Update schedule as required throughout the construction period.
- G. During the startup and initial checkout process, execute the related portions of the prefunctional checklists for all commissioned equipment.
- H. Perform all verification and functional performance tests in the presence of the CxA as required.
- I. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.
- J. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA 45 days after submittal acceptance.
- K. Coordinate with the CxA to provide 72-hour advance notice so that the witnessing of equipment and system start-up and testing can begin.
- L. Notify the CxA a minimum of two weeks in advance for start of the testing work.
- M. Participate in, and schedule vendors and contractors to participate in the instruction sessions.
- N. Provide written notification to the CM/GCC and CxA that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.

1. Electrical equipment including switchgear, panel boards, motor control centers, lighting, receptacles, and all other equipment furnished under this Division.
 2. Fire alarm system
 3. Lighting System
- O. The equipment supplier shall document the performance of his equipment.
- P. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.
- Q. Provide instruction of the Owner's operating staff using expert qualified personnel, as specified.
- R. Equipment Suppliers
1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner, to keep warranties in force.
 2. Assist in equipment testing per agreements with contractors.
 3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
- S. Refer to Division 01 Section "General Commissioning Requirements" for additional Contractor responsibilities.

3.3 OWNER'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for Owner's Responsibilities.

3.4 DESIGN PROFESSIONAL'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for Commissioner's Responsibilities.

3.5 CxA'S RESPONSIBILITIES

- A. Refer to Division 01 Section "General Commissioning Requirements" for CxA's Responsibilities.

3.6 TESTING PREPARATION

- A. Certify in writing to the CxA that Electrical systems, subsystems, and equipment have been installed, megerred, calibrated, and started and are operating according to the Contract Documents.
- B. Certify in writing to the CxA that Electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- C. Certify in writing that testing procedures have been completed and that testing reports have been submitted, discrepancies corrected, and corrective work approved.

- D. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- E. Inspect and verify the position of each device and interlock identified on checklists.
- F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.7 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
- B. Scope of Electrical testing shall include the entire Electrical installation, from the incoming power equipment throughout the distribution system. Testing shall include measuring, but not limited to resistance, voltage, and amperage of system(s) and devices.
- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- D. The Electrical contractor and other contracted subcontractors, including the fire alarm Subcontractor shall prepare detailed testing plans, procedures, and checklists for Electrical systems, subsystems, and equipment with guidance from CxA.
- E. Tests will be performed using design conditions whenever possible.
- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. The CxA may direct that set points be altered when simulating conditions is not practical.
- H. If tests cannot be completed because of a deficiency outside the scope of the Electrical system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- I. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.8 ELECTRICAL SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 26 sections. Provide submittals, test data, inspector record, infrared camera and certifications to the CxA.

- B. Electrical Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 26. Assist the CxA with preparation of testing plans.
- C. Fire Detection and Alarm System Testing: Provide technicians, instrumentation, tools and equipment to test performance of designated systems and devices at the direction of the CxA. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.
- D. Electrical Distribution System Testing: Provide technicians, load banks, infrared cameras, instrumentation, tools and equipment to test performance of designated systems and devices at the direction of the CxA. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested
- E. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The scope of commissioning work shall include but not limited to the following equipment and systems :
 - 1. Lighting Controls
 - 2. Dry Type Transformers
 - 3. Power Distribution System

3.9 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.

3.10 APPROVAL

- A. Refer to Division 01 Section "General Commissioning Requirements" for approval procedures.

3.11 DEFERRED TESTING

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to deferred testing.

3.12 OPERATION AND MAINTENANCE MANUALS

- A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.
- B. Refer to Division 01 Section "General Commissioning Requirements" for the AE and CxA roles in the Operation and Maintenance Manual contribution, review and approval process.

3.13 TRAINING OF OWNER PERSONNEL

- A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to instruction.

- B. Electrical Contractor. The electrical contractor shall have the following instruction responsibilities:
1. Provide the CxA with a instruction plan four weeks before the planned training.
 2. Provide designated Owner's personnel with comprehensive instruction in the understanding of the systems and the operation and maintenance of each major piece of commissioned electrical equipment or system.
 3. Instruction shall be recorded by the CxA and start with classroom sessions, if necessary, 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.
 4. 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 will be repaired or adjusted as necessary and the demonstration repeated.
 5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the instruction.
 6. The instruction sessions shall 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.
 7. Instruction shall include:
 - a. Use the printed installation, operation and maintenance instruction material included in the O&M manuals.
 - b. Include 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 instruction shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
 - c. Discuss relevant health and safety issues and concerns.
 - d. Discuss warranties and guarantees.
 - e. Cover common troubleshooting problems and solutions.
 - f. Explain information included in the O&M manuals and the location of all plans and manuals in the facility.
 - g. Discuss any peculiarities of equipment installation or operation.
 8. Hands-on instruction shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance of all pieces of equipment.
 9. The electrical contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
 10. Instruction shall occur after functional testing is complete, unless approved otherwise by the Owner's.

END OF SECTION

SECTION 26 09 43

ARCHITECTURAL DIMMING SYSTEMS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Division shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this Division as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 REFERENCES

- A. Perform the work of this contract in accordance with the requirements of Section 26000 General Provisions and Section 260500 Basic Materials.
- B. Refer to 265510 for requirements not included herein.

1.3 WORK INCLUDED

- A. The work under this Section shall include labor, material, equipment, plant, services and administrative tasks required to complete and make operable the electrical work related to architectural dimming systems for the areas as shown on the drawings and specified herein.
- B. The Contractor #4 shall furnish and install architectural dimming control systems and components as necessary to provide a complete operational installation, including but not limited to:
 - 1. Pre-wired dimming cabinets.
 - 2. Multi-zone, multi-scene preset controllers.
 - 3. A/V, BMS and timeclock interface circuitry.
 - 4. Remote control stations.
 - 5. Emergency "Full-On" components and circuitry.
- C. Submit project-specific riser and wiring diagrams indicating and specifying field wiring and connections required for the project.

1.4 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to state and local codes and laws.
- B. The criteria of design and performance to produce the required operation is based on equipment of the named manufacturers. Equipment of other manufacturers shall be considered, subject to its acceptability in the Professional Engineer licensed in New York State's judgment and opinion. The equipment must conform to the dimensions established by the drawings for mechanical spaces and other clearances.
- C. Design and performance criteria are based on products manufactured by Lutron Electronics Company, "Grafik 4000" Series GP or LP dimmer panelboards as indicated on the drawings.

1.5 SHOP DRAWINGS

- A. Submit manufacturer's standard catalog data including application, wiring, and installation information on components and sub-systems.

- B. Provide test data and/or samples as required to demonstrate conformance with PART 2 of this specification.
- C. Submit the following shop drawings:
 - 1. Control equipment physical and performance data.
 - 2. Zone and module schedules.
 - 3. Dimmer panels.
 - 4. Remote control stations, engraving, and finishes.
 - 5. Wiring and installation diagrams and instructions.
- D. Submit the following samples:
 - 1. Preset System Control coverplate.
 - 2. Wallbox coverplate.

1.6 QUALITY ASSURANCE

- A. Manufacturer shall have a minimum of 3 years continuous experience in manufacturing architectural lighting control products.
- B. Devices shall be U.L. and CSA Listed specifically for the required loads (i.e., Incandescent, fluorescent, magnetic low voltage transformer). Manufacturer shall provide file card upon request. Universal-type dimmers shall not be acceptable.

1.7 ACCEPTABLE MANUFACTURERS

- A. Electronic Theater Controls (ETC) or equal.
- B. The listing of a manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the electrical Contractor #4 to ensure that any submittals made are for devices that meet or exceed the specifications included herein.
- C. Equipment described here are products of Lutron Electronics Company, to set a standard of quality and performance. Products of the other manufacturer will be considered, subject to the standards of quality and system design intent described herein and on the drawings.

PART 2 - PRODUCTS

2.1 INTEGRAL DIMMING

- A. Preset dimming control shall be capable of operating at rated capacity without adversely affecting design lifetime and shall mount individually in standard 2,3, or 4 gang U.S. switchboxes.
- B. Preset dimming control shall operate in an ambient temperature range of 0°C (32°F) to 40°C (104°F).
- C. Preset dimming control shall meet IEC 801-2, tested to withstand 15 kV electrostatic discharge without damage or loss of memory, ANSI/IEEE Std. C62.41-1980, tested to withstand voltage surges of up to 6000V and current surges of up to 200A without damage, and U.L. 20 limited short circuit test requirement for snap switches.
- D. Preset dimming control shall be voltage regulated so that a ±10% variation in line voltage shall cause no more than a ±5% variation in load voltage when dimmer is operating at 40V (5% light output).

- E. Preset dimming control shall utilize an LC filtering network to minimize interference with properly installed radio, audio, and video equipment.
- F. Preset dimming control shall operate (dim or non-dim) the following sources/load type with a smooth and continuous Square Law dimming curve. Universal type dimmers shall not be acceptable.
- G. Incandescent, Tungsten and Magnetic Low Voltage Transformer Dimming
 - 1. Dimmer shall contain circuitry specifically designed to control and provide a symmetrical AC waveform to the input of magnetic low voltage transformers.
 - 2. Dimmer shall not cause a magnetic low voltage transformer to operate above the transformer's rated operating current and temperature.
 - 3. Dimmer shall contain circuitry to control dioded lamps.
- H. Fluorescent Electronic Dimming Ballasts
 - 1. Dimmer shall be rated to control T-12, T-12 high output, T-8, T-5 and T-5 high output lamps at 120 VAC with the use of an interface. Lamps on the same circuit must have the same current rating (i.e., T-8), but may be different lengths (i.e., 3', 4').
 - 2. Ballasts for fluorescent fixtures shall be Lutron Hi-Lume "FDB" series for 1% dimming, Lutron "Compact SE" series for 5% dimming, and Lutron "ECO-10" series for 10% dimming or approved equal. See lighting designer's fixture schedule, sections 265100 and/or dimming schedule for specific ballast model numbers.
- I. The dimming performance shall be as follows:
 - 1. Dimming range down to 1% light output (5% for compact T-5 twin tube lamps).
 - 2. One- and two-lamp ballasts track evenly, with no perceptible difference in light levels for the same type lamps.
 - 3. Different lamp lengths on the same circuit shall track evenly, with no perceptible difference in light levels for the same type lamps.
 - 4. Ballasts shall be inaudible with no apparent humming or buzzing at any point in the dimming range.
 - 5. Ballasts shall have: a power factor greater than .95, ballast factor equal to .93, total harmonic distortion less than 10%, and lamp current crest factor less than or equal to 1.6.
 - 6. Ballasts shall be inaudible in a 27dB ambient throughout the dimming range.
 - 7. Ballasts shall be capable of striking lamps at any light level without first flashing to full light.
 - 8. Ballasts must comply with FCC Part 18 regulations and shall not interfere with other properly installed electrical equipment.
 - 9. Ballasts shall have a minimum starting temperature of 10°C and shall be free of polychlorinated biphenyls (PCB's).

2.2 DIMMING PANELS

- A. Panels shall be wall mounted NEMA grade, constructed of sheet steel plates not less than #16 U.S. gauge. Contractor #4 shall reinforce wall as required for wall-mounted panels and provide vibration isolation as recommended by the manufacturer.
- B. Panels shall be completely pre-wired by the manufacturer. The Contractor #4 shall be required to provide input feed wiring, load wiring, and control wiring. No other wiring or assembly by the Contractor #4 shall be permitted.
- C. Unless otherwise indicated, panels shall contain branch circuit protection for each dimming module. Branch circuit breakers shall have the following performance characteristics:
 - 1. U.L. listed under U.L. 489 as a molded case circuit breaker for use on lighting circuits.
 - 2. Contain a visual trip indicator and shall be rated at 22,000 AIC (120/208/240V) or 25,000 AIC (277/480V), unless otherwise approved based on results of the short circuit study (Section 260000). Note: Dimming panel short circuit rating shall be as indicated on the drawings.
 - 3. Circuit breakers shall be rated 20 amperes.
 - 4. Thermal-magnetic in construction for both overload and dead short protection. The use of fully magnetic breakers shall not be acceptable, even when used in conjunction with individual dimmer thermal cut-outs.
 - 5. Switching duty (SWD) rated so that the loads can be switched off via the breakers.
- D. Panels shall be shipped with each dimmer in a BYPASS position via a jumper bar inserted between the input and load terminals. These jumpers shall carry the complete load current and shall be reusable at any time.
- E. Panels shall be cooled via free-convection, unaided by fans, and capable of continuous operation in an ambient temperature range of 0°C (32°F) to 40°C (104°F). To provide the utmost in reliability, panels that normally use cooling fans must have the panel capacity derated by 50%. A lesser derating will be allowed providing that the manufacturer can substantiate via an independent test laboratory that with no fans operating, and at full-rated dimmer capacity, the temperatures of the main semiconductors are at least 20°C below maximum temperature rating and the temperatures of the filter chokes are within the maximum allowable temperatures of these components at an ambient temperature of 40°C.
- F. Dimming panels shall have the following additional performance characteristics:
 - 1. Designed to prevent any foreign objects from coming in contact with any part of the panel that would be at an elevated temperature, such as the dimmer extrusions or heat fins.
 - 2. Designed to provide airflow across the heat sink areas and through the dimmer chassis. Panel sections that provide airflow only across heat sinks shall not be mounted one above another in order to allow for adequate heat dissipation.
 - 3. Panel shall provide capability to electronically assign each circuit to any zone in the dimming system. Panels using mechanical switches, rewiring, or EPROMS shall not be acceptable.
 - 4. Multiple panels shall be capable of operating in one system, up to a maximum of 32 panels and 768 dimmers.

2.3 EMERGENCY "FULL-ON" SYSTEM ELECTRONICS

- A. Circuits listed as emergency shall be connected to their respective circuit breakers in the emergency dimming panels (EDP's) as shown on the drawings. They shall be controlled simultaneously with other lighting circuits within that control zone during the presence of normal utility power.
- B. Upon loss of normal power and the subsequent presence of emergency power, the circuits listed as emergency shall immediately go to a full-on condition. Local control stations shall be inoperable during this period.
- C. Once normal power is restored, lighting zones shall revert back to their status prior to the emergency condition (restoration to some other "default" level is not acceptable).
- D. Upon fire alarm condition or signal from the BMS circuits shall immediately go to a full-on condition. Once the fire alarm or BMS signal is removed, lighting zones shall revert back to their status prior to the signal condition (restoration to some other "default" level is not acceptable). See 2.05(d) "Accessory Control Options".

2.4 DIMMING MODULES

- A. Quantities of dimmer modules shall be provided to control each type of load shown on the load schedule and/or the drawings.
- B. Dimmers shall be voltage regulated so that a nominal change in line voltage shall not cause a perceptible change in output voltage.
- C. Under full-load conditions in a 40°C environment, silicon thyristors shall operate at a minimum 20°C safety margin below the component temperature rating. The maximum allowable asymmetry in the load waveform shall be ± 1 VDC.
- D. Each dimmer shall incorporate an electronic "soft-start" default at initial turn-on that smoothly ramps the lights up to the appropriate levels within 0.5 seconds.
- E. Once installed as part of a complete system, the silicon thyristors used to control the power furnished to the loads shall be both designed and tested to withstand surges, without impairment to performance, of 6000V, 3000A (equivalent to a near lightning strike) as specified by ANSI/IEEE std. C62.41. Upon request the manufacturer shall provide a means to demonstrate conformance to this specification using the appropriate surge-generation equipment.
- F. Filtering shall be provided in each dimmer so that current rise time shall be at least 350 μ sec at 50% rated dimmer capacity as measured from 10-90% of the load current waveform at a 90° conduction angle, and at no point rise faster than 30mA/ μ sec. Manufacturers should note that additional filters may be required to meet this specification. These filters need not be integral to the dimming module, but shall be integral to the dimming cabinet.
- G. Dimmer output voltage shall be a minimum 95% of input voltage at maximum intensity setting.

- H. Dimmers shall operate the following sources/load types with a smooth continuous Square Law dimming curve. Dimmers shall also be capable of operating these sources on a non-dim basis. Universal-type dimmers that do not adjust the dimming curve shall not be acceptable.
- I. Incandescent, Tungsten and Magnetic Low Voltage Transformer Dimming
 - 1. Dimmers shall not cause a magnetic low voltage transformer to operate above the transformer's rated operating current and temperature under any load condition on the transformer secondary.
 - 2. Dimmers shall contain circuitry to control dioded lamps.
- J. Electronic Low Voltage Transformer Dimming
 - 1. No flicker or interaction shall occur at any point in the dimming range.
- K. Fluorescent Electronic Dimming Ballasts
 - 1. Dimmer shall be rated to control T-12, T-12 high output, T-8, and T-5 lamps. Lamps on the same circuit must have the same current rating (i.e., T-8), but may be different lengths (i.e., 3' and 4'). Ballasts for fluorescent fixtures shall be Lutron Hi-lume "FDB" series (1% min. dimming level) or Lutron "Compact SE" series (5% minimum dimming level) for Lutron "ECO-10" series (10% minimum dimming level) or approved equal. See fixture schedules for specific ballast model numbers.
- L. Neon & Cold Cathode
 - 1. Dimmer shall provide the ability to dim lamps down to 1% of full light output when used with normal (low) power factor transformers without flicker or striations.
- M. Non-Dim Controls
 - 1. Non-dim controls shall be rated to switch 16A of resistive, tungsten, inductive, or capacitive loads. Non-dim controls shall incorporate an air gap relay to open circuit when load is off.
- N. Minimum light levels shall be user adjustable for each dimmer in order to compensate for different loading of each dimmer.
- O. Maximum light levels shall be user adjustable for each dimmer to predetermine energy and potential lamp life savings.

2.5 CONTROL

A. General

- 1. Definitions: A "scene" or "preset" is a specific look or mood created by different lighting zones set at different intensities. A "zone" is one or more lighting circuits which are controlled together as a group.
- 2. Preset dimming control shall provide power failure memory. Should power be interrupted and subsequently returned, the lights will come back on to the same levels set prior to the power interruption. Restoration to some other default level is not acceptable, unless specifically noted elsewhere.
- 3. Faceplate shall attach using no visible means of attachment. Faceplates shall have

brushed metallic finish as selected by Commissioner. Plastic faceplates shall not be acceptable.

4. Wiring from dimming panel to preset dimming control and accessory controls shall be low voltage type Class 2 wiring, daisy-chain style, wire type and connections as recommended by panel manufacturer.
5. Panel processor shall:
 - a. Electronically assign each circuit to any zone in the system.
 - b. Determine Normal/Emergency function of panel and set emergency lighting states.
 - c. Operate each circuit in the system.
 - d. Maintain switched outputs at current state (ON or OFF) in the event of control failure. Systems that fail to a set state (OFF or ON) during a control failure are not acceptable.
 - e. React to changes from the control in no more than 20 milliseconds.

B. Four Scene Preset Control

1. Where indicated on the drawings, control shall provide 4 preset lighting scenes and off for up to 8 control zones. Control shall be capable of storing an additional 12 preset lighting scenes. Up to 8 controls may be tied together for more than 8 zones. Controls shall incorporate built-in wide angle infrared receiver, providing control via a separate wireless remote control transmitter from up to 50 feet away. Preset shall be set via easy-to-use raise/lower switches, one raise and lower switch per zone. The intensity for each zone shall be indicated via an illuminated barograph, one barograph per zone. More than one zone may be proportionately raised or lowered at the same time.
2. Additionally, one or more zones may be temporarily overridden without altering the scene values which are stored in memory. Lighting levels shall fade smoothly between scenes at time intervals of 0-59 seconds or 1 to 60 minutes. The fade time shall be separately selectable for each scene and shall be indicated by a digital display for the current scene.
3. Pressing a scene select button will also light the corresponding scene LED and simultaneously begin changing the barograph levels to reflect the currently selected scene. In the event that a preset scene with a fade time greater than 5 seconds is initially selected from an OFF condition, the programmed fade time shall be temporarily overridden, unless otherwise noted, and the lights shall fade up to that scene over a five-second time span.

C. LCD Wallstation

1. The LCD wallstation shall access and display every area, scene and zone within the lighting control processor. The LCD wallstation shall allow the user to:
 - a. View and modify the scene status of an area.
 - b. Temporarily modify zone intensities in an area.
 - c. View timeclock status for each area.
 - d. Enable or disable timeclock for an area.
 - e. Permanently modify zone intensities, delay times and fade times.

D. Accessory Control Options

1. Provide the following controls for use with the preset control(s) as shown on the drawings:
 - a. Two Scene Entrance Control(s) shall be capable of recalling Scene One plus Off.
 - b. Four Scene Control(s) shall be capable of recalling any one of four scenes, master raise/lower and Off. Control shall provide access up to 16 scenes.
 - c. Fine Tuning Control(s) shall allow the temporary override of a particular zone or zones from the preset light level.
 - d. Special Function Control(s) shall provide the following functions:
2. Sequencing shall allow the user to set up and operate a sequence of 4 or 12 steps. A sequence shall be defined as a series of steps, while a step shall be defined as the recall of a scene. Each step interval is adjustable from 1 second to 60 minutes.
3. Zone lockout shall allow temporary changes without altering the light levels preset for each scene.
4. Scene lockout shall lockout the control, maintaining current scene and disabling buttons on the preset dimming control.
5. Fade override shall set fade times to zero.
6. Infrared control: Provide wireless remote control capable of recalling preset light levels that shall operate up to 50 feet within line of sight of receiver. Ceiling mounted receiver shall provide 360° reception range.
7. Daylighting: Provide astronomic timeclock interface to determine the times during which direct sunlight is incident on the façade being controlled using a single interior photocell to control shade positions and intensity of lighting. Include manual override controls for both lights and shades.
8. Equipment Interface(s), fire alarm, BMS, etc., shall allow access to preset dimming control(s) via isolated momentary/maintained dry contact closures. Where indicated on the drawings, each interface shall provide isolated maintained contact closures rated at 200mA at 30VDC for pilot light status feedback.

E. Control Interfaces

1. Provide ability for the centralized lighting system controls to interface and communicate with the following:
 - a. Contact closure: Interface with dry contact closures devices such as timeclock inputs, BMS, fire alarm system, security system, and occupancy sensors.
 - b. RS232: Communicate via RS232 serial communication to a user supplied PC or digital audio visual equipment.
 - c. BACnet: Communicate via BACnet IP or BACnet Ethernet from a user supplied 10BaseT Ethernet network.
 - d. LonWorks: Communicate via LonWorks FTT-10.
 - e. DMX512: Convert 32 control intensities to 32 continuous DMX512 outputs.

- f. Daylighting: Automatically select light levels in response to ambient daylight via four thresholds for selection of light levels. Include photocell calibration, averaging for up to three photosensors.
- g. Room assignor control panel(s): Accept up to 32 contact closure inputs including the following functions: scene selection, panic mode, occupancy response, sequencing, zone and scene lockouts, and partitioning. Include visual status.

2.6 DIMMING SYSTEM DESCRIPTIONS

A. General

- 1. Dimming for the areas of work shall be accomplished by a series of systems which are controlled locally within the area(s) served and remotely from the area(s) shown - Refer to Lighting Design Documents.

B. Preset Scene Dimming Systems - Refer to Lighting Design Documents

2.7 QUALITY CONTROL

- A. Components shall be inspected following U.S. military standard 105D or equivalent. Equipment shall be fully tested for proper operation prior to shipment from the factory.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Equipment shall be installed utilizing manufacturer's shop drawings and in accordance with these specifications.
- B. Surface-mounted dimmer panels shall be mounted on 3/4-inch plywood backboard or 3/4-inch galvanized steel channel secured to wall. Do not use plywood backboard in wet or damp locations. Where required provide galvanized steel channel to stand panels six inches off wall to allow routing conduit or cable behind panels.
- C. The Electrical Contractor #4 shall run separate neutrals for branch load circuits.
- D. Where a dimming panel is indicated and upon completion of the installation and prior to removal of the bypass jumpers, the electrical Contractor #4 shall completely test line voltage power and low voltage control wiring for continuity and accuracy of connections. The jumpers shall remain in place until loads have been fully tested and found to be free of miswires, short circuits, or other wiring defects.
- E. Manufacturer shall provide access to qualified personnel able to address problems with the dimming system 24 hours per day, 365 days per year through the warranty period.

3.2 SYSTEM COMMISSIONING

- A. Upon completion of the installation, the system shall be completely commissioned by a factory-trained engineer. The commissioning will be performed upon notification by the electrical Contractor #4 that the system installation is complete and that loads have been tested live for continuity and freedom from defects and that control wiring has been connected and checked for proper continuity. The electrical Contractor #4 shall provide both the manufacturer and the Commissioner with ten working days notice of the scheduled commissioning date.

- B. New fluorescent lamps shall be seasoned for dimming applications by operating at full intensity for their first 100 hours. Leave lamps at full intensity for 100 continuous hours to achieve good dimming performance and normal lamp life.
- C. Upon completion of the system check-out, Contractor #4 shall demonstrate the operation of the system to the Commissioner.

3.3 WARRANTY AND WARRANTY SERVICE

- A. Unless otherwise noted, Manufacturer shall provide a two year warranty on the complete system for systems with factory commissioning. Warranty shall cover 100% of the cost of the manufacturer's services and any replacement parts required over the first two years which are directly attributable to the manufacturer.
- B. Warranty coverage shall begin from date of final system commissioning or three months from date of delivery, whichever is the earlier. Commissioning and warranty service shall be performed by a factory-trained engineer.

END OF SECTION

SECTION 26 09 62

BRANCH CIRCUIT TRANSFER SYSTEMS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 REFERENCES

- A. Perform the work of this Section in accordance with the requirements of Section 260000 General Provisions and Section 260500 Basic Materials and Methods.
- B. See other Division 26 Sections for requirements of emergency system panelboards and other electrical distribution equipment not included herein.

1.3 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to state and local codes and laws.
- B. The criteria of design and performance to produce the required operation is based on equipment of the named manufacturers. Equipment of other manufacturers will be considered, subject to acceptability in the Engineer's judgment and opinion. The equipment must conform to the dimensions established by the drawings for mechanical spaces and other clearances.
- C. Materials and products provided shall be suitable for, and where applicable UL listed and labeled for, the intended use or application.

1.4 SUBMITTALS

- A. Submit manufacturers' technical data for automatic transfer equipment and components, including construction details, performance specifications, and furnished options and features.
- B. Submit project-specific shop drawings, including complete wiring diagrams for system components.
- C. Submit certified field test report upon completion of work.
- D. Submit complete operating and maintenance manual.
- E. Submit short circuit, arc flash and overcurrent protection coordination study as described in Section 260500. Study shall accompany equipment submittals. Failure to include the study with the equipment submittals will cause the equipment submittals to be rejected.

PART 2 - PRODUCTS

2.1 BRANCH CIRCUIT TRANSFER SYSTEMS (BTS)

A. General

1. Provide branch circuit automatic transfer systems with the number of poles, voltage, and current ratings as indicated on the drawings. The system shall consist of power transfer switches and a control module interconnected so as to provide complete automatic protection.
2. The system shall comply with the following safety standards:
 - a. ANSI/UL1008
 - b. ANSI/NFPA 70
 - c. ANSI/NFPA 110, Level 1 Emergency Systems
3. The function of the BTS's shall be to transfer critical lighting load branch circuits from dimmer panels to an emergency power source (inverter) in the event of a power failure, fire alarm condition, or panic condition.
4. Transfer poles shall be provided for the phase and neutral legs of each branch circuit load.
5. Remote control stations for the system shall be provided as shown on the drawings.

B. Enclosure

1. The branch circuit transfer devices (BTS's) shall be mounted in a hinged door, NEMA 1 type enclosure. Material shall be no less than 14 gauge steel.
2. The enclosures shall be separate and independent of other equipment. In no instance shall the BTS be enclosed in an enclosure containing other equipment.
3. The systems shall be provided with an approved nameplate mounted on the front of the enclosure, stating; "FOR USE ON EMERGENCY AND STANDBY SYSTEMS". The enclosure shall also be provided with an approved nameplate indicating that the system is UL1008 Listed.
4. The BTS's shall contain a recessed local control station in the enclosure door. This station shall include a key switch and two transfer position indicator LEDs.

C. Remote Stations

1. Each remote control station shall contain a three-position key switch. The left and right positions of the switch shall be momentary and the switch shall always return to the center position.
2. The station faceplate shall be engraved; "NORMAL", "EMERGENCY", and "AUTO" adjacent to the corresponding switch positions, and shall contain two LED's for transfer switch position confirmation.
3. Each station shall mount in a standard 2-gang wall box (4" x 4" x 2 1/8").
4. Wiring to remote stations shall be by 5-conductor Class 2 wiring (24VDC). A terminal strip shall be provided for wiring.

D. 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, noise, and heat generation.
2. 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.
3. The switch shall be mechanically interlocked to ensure only one of two possible positions - Normal or Emergency.
4. Switch main contacts shall be silver plated.
5. Inspection of contacts shall be possible from the front of the switch without disassembly of operating linkages or power conductors.
6. Provide a manual operating handle for backup operation and maintenance purposes. The handle shall permit the operator to stop the contact at any point through the entire travel of the contact.
7. Overload and endurance testing of the transfer switch shall comply with UL1008 Tables 25.1, 25.2, 27.1, and 27.2 for mixed loads.
8. The transfer switch shall be rated to withstand the RMS symmetrical short circuit current with the type of overcurrent protection shown, without welding of the contacts.
9. Switch contacts shall withstand transfer without welding, with 180° phase displacement between Normal and Emergency power sources, both sources energized and 100% load.
10. Transfer switch contacts shall be rated for mixed loads, including: motors, electric discharge lamps, and tungsten filament lamps.

E. Logic Control Module

1. The control module shall direct the operation of the transfer switch.
2. The module's sensing and logic shall be controlled by a build-in microprocessor for maximum reliability and minimum maintenance.
3. The control module shall be connected to the transfer switch by an interconnecting wire harness. The harness shall include a keyed disconnect plug to enable the control module to be disconnected from the transfer switch for routine maintenance.
4. The module shall be completely enclosed with a protective cover and be mounted separately from the transfer switch unit for safety and ease of maintenance.
5. Sensing and control logic shall be provided on plug-in printed circuit boards, for maximum reliability.
6. Interfacing relays shall be industrial control grade plug-in type, with dust covers.

7. The control panel shall meet the voltage surge withstand capability in accordance with IEEE Standard 472-1978 (ANSI C37.90A-1978).
8. The control panel shall meet the impulse withstand voltage test in accordance with the proposed NEMA Standard ICS 1-109.

F. Operation

1. The voltage of each phase of the normal source(s) shall be monitored, with pickup adjustable from 85 to 100% and dropout adjustable from 75 to 98% of pickup setting. These settings shall be adjustable in increments of 1%. Repetitive accuracy of settings shall be 2% or better over a temperature range of -20°C to 70°C. Factory set to pickup a 90% and dropout at 85%.
2. 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. Frequency sensing shall be provided with pickup adjustable from 90 to 100% and dropout fixed at 87 to 89% of pickup. Repetitive accuracy of settings shall be 2% or better over a temperature range of -20°C to 70°C. Factory set to pick up a 90% voltage and 95% frequency.
3. The control module shall include four time delays that are 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 transfer switch and engine starting signals, Adjustable from 0 to 60 sec. Factory set a 1 sec.
 - b. Transfer to Emergency time delay. Adjustable from 1 to 5 min. Factory set at 0 min.
 - c. Retransfer to Normal time delay. Time delay is automatically bypassed of Emergency source fails and Normal source if acceptable. Adjustable from 0 to 30 min. Factory set at 5 min.
4. Control power for logic and transfer functions shall always seek the acceptable power source. This shall prevent the system from locking up in one position if either of the power sources is available, regardless of the sequence of failure events.
5. A key-operated double-throw, momentary test switch shall be provided to manually control the BTS. Automatic functions shall override this control. Two indicator lights shall be provided to show the position of the transfer switch.
6. Automatic functions shall override remote control functions. Any combination of open or shorted wiring to remote stations shall not affect automatic functions, or disable the local switch.
7. Provide a self-supervising isolated signal input for connection to the facility fire alarm. The BTS shall automatically transfer loads to the Emergency power source when the tenant fire alarm is activated.

G. Approved Manufacturers

1. Union Connection Model UC700
2. Electronic Theater Control (ETC) Model ELTS
3. Lex Products Corporation PowerGate Model ELTS

H. Accessories

1. Provide #UC700-RCS-1A Manual Remote Control Stations or approved equivalent, quantity and locations as indicated on the drawings.

PART 3 - EXECUTION

3.1 GENERAL

- A. See Section 260500 BASIC MATERIALS AND METHODS.

3.2 INSTALLATION

- A. Install and connect branch circuit transfer system switches and accessories where indicated, in strict compliance with manufacturer's instructions.
- B. Provide power, control, and signal wiring and connections as required for specified operation. Assure proper phasing of transfer switch normal and emergency source power connections.
- C. Provide CT/PT's as required for monitoring of normal and emergency power sources by BTS control logic.

3.3 FIELD ACCEPTANCE TESTING

- A. After completion of the transfer switch installation, perform a complete on site performance test of the emergency power system per NFPA 110, Paragraph 7.13.
- B. Testing shall be conducted by authorized representatives of the equipment manufacturer(s), and witnessed by the Commissioner and any interested local authorities.
- C. Provide necessary calibrated test equipment, temporary cabling and connections, etc. as required to perform the testing in an approved manner.
- D. A certified report of test procedures, results, and any corrective measures taken shall be provided to the Commissioner.
- E. Demonstrate operating procedures to Commissioner's personnel and provide written operating and maintenance instructions.

END OF SECTION

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SECTION 26 22 12

COMPUTER-GRADE ISOLATION TRANSFORMERS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 REFERENCES

- A. Perform the work of this section in accordance with the requirements of Section 260000 General Provisions and Section 260500 Basic Materials.
- B. See other Division 26 sections for requirements of general-purpose transformers, panelboards, and other electrical distribution equipment not included herein.

1.3 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to state and local codes and laws.
- B. The criteria of design and performance to produce the required operation is based on equipment of the named manufacturers. Equipment of other manufacturers may be considered, subject to acceptability in the Engineer's judgment and opinion. The equipment must conform to the dimensions established by the drawings for mechanical spaces and other clearances.
- C. Materials and products provided shall be suitable for, and where applicable UL listed and labeled for, the intended use or application.

1.4 SUBMITTALS

- A. Submit manufacturer's technical product data and performance specifications for computer-grade isolation transformers and components, including the following information:
 - 1. Ratings, including % impedance.
 - 2. Enclosure type and dimensions.
 - 3. Tap ratings and quantities.
 - 4. UL, ANSI, and NEMA compliances.
 - 5. Noise attenuation.
 - 6. Transient voltage suppression system ratings.
- B. Submit short circuit, arc flash and overcurrent protection coordination study as described in Section 260000. Study shall accompany equipment submittals. Failure to include the study with the equipment submittals will cause the equipment submittals to be rejected.

PART 2 - PRODUCTS

2.1 TRANSFORMER CONSTRUCTION

- A. Provide ventilated dry-type computer-grade isolation transformers, 3 phase, delta primary, grounded wye secondary, U.L. listed and labeled, of the indicated ratings and voltages.
- B. Transformers shall comply with NEMA standard TP1 for optimum energy efficiency at 35% load. Transformers shall be labeled for EPA Energy Star program. Provide 80°C rise transformers for all transformers indicated on the drawings, unless specifically otherwise noted. Efficiencies shall be tested in accord with NEMA TP2, in minimums as follows:

Single Phase		Three Phase	
kVA	Efficiency	kVA	Efficiency
15	97.7%	15	97.0%
25	98.0%	30	97.5%
37.5	98.2%	45	97.7%
50	98.3%	75	98.0%
75	98.5%	112.5	98.2%
100	98.6%	150	98.3%
167	98.7%	225	98.5%
250	98.8%	300	98.6%
333	98.9%	500	98.7%
		750	98.8%

- C. Transformers specifically designated on the drawings shall be Class 155 insulation minimum per UL 1561 and shall be designed for a maximum winding temperature rise of 80°C at rated load in a 40°C ambient. 80°C transformers shall comply with NEMA standard TP-1 and shall be designed for low energy losses at loads greater than 50% of nameplate rating. 80°C rise transformers shall have a continuous emergency overload capability of 30%. Provide 80°C rise transformers unless otherwise noted on the drawings.
- D. Isolation transformers shall be constructed with copper windings and minimum dual electrostatic (Faraday) shielding.
- E. The transformers shall be constructed, listed, and labeled to supply non-linear loads with a K-factor of K-13 minimum, including a 200% secondary neutral.
- F. Provide transformers with six 2-1/2 percent primary winding taps, two above and four below nominal voltage.
- G. Enclosures shall be suitable for indoor locations, either floor or platform mounting.
- H. Transformers shall be convection-cooled.

2.2 RATINGS

- A. Common mode noise attenuation – 140 dB.
- B. Transverse mode noise attenuation – 90 dB.
- C. Output voltage harmonic distortion: 0.5% with linear load; 5.0% maximum for 2/3 switched mode power supply load.
- D. Impedance - 3% minimum, 5.5% maximum.

- E. Efficiency - 96%, minimum.
- F. Audible sound, maximum at 5 feet:
 - 1. 15-50 kVA - 45 dBA
 - 2. 51-150 kVA - 50 dBA
 - 3. 151-225 kVA - 55 dBA
- G. Magnetic field strength - less than 0.1 gauss at 1.5 feet.
- H. Operating ambient conditions - 0°C. to 40°C, 0-95% RH (non-condensing).

2.3 TRANSIENT SUPPRESSION

- A. Units shall be constructed in accordance with NEMA Standard LS 1, UL 1449 Second Edition and tested using the transient waveforms specified in ANSI/IEEE C62.41 in accordance with the procedures set forth in ANSI/IEEE C62.45.
- B. Provide factory-installed input surge arresters of appropriate voltage rating, and having the following performance characteristics:
 - 1. FOW sparkover - 3200 volts maximum.
 - 2. Discharge voltage (8x20 microsecond waveform) - 2.2 KV maximum @ 1500 amperes.
- C. Provide a factory-installed output transient suppression network of appropriate voltage rating, fused, with status indicating lights, and having the following performance characteristics:
 - 1. Peak current handling - 40,000 amperes, minimum.
 - 2. Energy absorption - 200 joules per phase, minimum.

2.4 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide computer-grade isolation transformers manufactured by one of the following:
 - 1. TransMax - Harmonics Limited
 - 2. Controlled Power - Ultra K/Series 600K
 - 3. On-Line Power - Iso-Care Series

PART 3 - EXECUTION

3.1 GENERAL

- A. See Section 260500 BASIC MATERIALS.

3.2 INSTALLATION - TRANSFORMERS

- A. Provide primary and secondary connections with 24" of flexible steel conduit to minimize vibration transmission to the building structure.

- B. Bond grounded conductor to the transformer case, to the nearest available interior metal water piping, to nearest grounded building steel, and to other metal piping in accordance with requirements of NEC Article 250. Size conductors per NEC, but use no smaller than No. 4 AWG copper. Provide single-point ground per Section 260500 and as indicated on drawings.
- C. Connect with secondary neutral conductors rated 200% of rated secondary amperes.
- D. Adjust tap connections as necessary to achieve a no-load secondary voltage of 100-105% of nominal.
- E. Provide vibration & noise control and seismic restraints. Refer to Section 260548.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 REFERENCES

- A. Perform the work of this section in accordance with the requirements of Section 260000 General Provisions and Section 260500 Basic Materials.
- B. See other Division 26 sections for requirements of switchboards and other electrical distribution equipment not included herein.

1.3 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to state and local codes and laws.
- B. The design is based on equipment of the named manufacturers. Equipment of other manufacturers will be considered, subject to acceptability in the Engineer's judgment and opinion. The equipment must conform to the dimensions established by the drawings for mechanical spaces and other clearances.
- C. Materials and products provided shall be suitable for, and where applicable UL listed and labeled for, the intended use or application.

1.4 SUBMITTALS

- A. Submit manufacturers' catalog data for panelboards, including enclosure details and device specifications.
- B. Submittals: Include dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, and voltage rating. Include the following:
 - 1. Enclosure type and dimensions with details.
 - 2. Bus configuration, lug sizes, materials and current ratings.
 - 3. Short-circuit current rating of panelboard.
 - 4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.
 - 5. Accessories and options furnished.
 - 6. Wiring Diagrams: Details of schematic diagram including control wiring and differentiating between manufacturer-installed and field-installed wiring.
- C. Submit short circuit, arc flash and overcurrent protection coordination study as described in Section 260000. Study shall accompany equipment submittals. Failure to include the study with the equipment submittals will cause the equipment submittals to be rejected.

PART 2 - PRODUCTS

2.1 CIRCUIT BREAKER PANELBOARDS

A. General

1. Furnish and install approved panelboards of types and configurations indicated and specified herein.
2. Panelboards shall comply with the following industry standards:
 - a. UL Standards
Panelboards - UL67
Cabinet & Boxes - UL50
Circuit Breakers - UL489
 - b. National Electric Code Article 408
 - c. NEMA Standard - PB 1
3. Panels identified for use as service entrance equipment shall be so labeled and equipped.

B. Interiors

1. Interiors shall be completely factory assembled. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machining, drilling or tapping.
2. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated.
3. A manufacturer's nameplate shall be provided listing panel type and ratings.
4. Bus bar taps for panels with single pole branches shall be arranged for sequenced phasing of the branch circuit devices.
5. A copper ground bus shall be included in panels. An isolated ground bus shall be provided in panels as indicated on Contract drawings.
6. Where "SPACE" is indicated on the schedules, it shall be fully equipped for future installation of the indicated device, with a blank cover over live parts.

C. Boxes

1. Boxes shall be at least 20 inches wide made from galvanized steel. Provide minimum gutter space in accordance with standards. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. Provide gutter barriers for panels requiring through-feed gutters.
2. At least four interior mounting studs with adjustable nuts shall be provided.

D. Trim

1. Switching device handles shall be accessible without exposure to any live parts. Doors shall have flush type cylinder lock and catch, except doors over 48 inches in height shall have auxiliary fasteners top and bottom of door in addition to the flush type cylinder lock and catch.

2. Door hinges shall be concealed. Locks shall be keyed alike for #47 key; directory frame and card having a transparent cover shall be furnished with each door.
3. Exterior and interior steel surfaces of the trim shall be properly cleaned, primed with a rust inhibiting phosphatized coating, and finished with a gray ANSI 61 paint. Trims for flush panels shall overlap the box for at least 3/4 inch all around. Surface trims shall have the same width and height as the box.
4. Front trim shall be hinged "door within a door" construction consisting of an inner door, outer door and an outer frame. Inner door shall allow access to circuit breakers and the outer door shall allow access to circuit breaker terminations, wiring and gutter space without having to remove trim. Provide key operated latch(s) on each door with multiple latches as required by size of doors. The outer frame shall be secured to the enclosure box with coarse thread slotted machine screws. Toggles, clamps and cam-operated fasteners are not acceptable. Provide a centered, top mounted stud secured to the enclosure box to facilitate outer frame removal and installation.

E. Bus Bars and Connectors

1. Main bus bars and branch connectors shall be tin-plated copper, sized in accordance with UL standards to limit the temperature rise on any current carrying part.
2. Panelboards shall utilize bolt-on breaker connections.
3. Provide full capacity insulated neutral bus in each panelboard. Neutral bussing shall have a suitable lug for each outgoing circuit requiring a neutral connection.
4. Provide sub-feed, feed-through and through-feed lugs as shown on drawings.

F. Circuit breakers shall be thermal-magnetic molded case type. See Section 260500.

G. One and two pole circuit breakers for lighting circuits shall be labeled for switching duty (SWD) and (HID), if used for switching high intensity discharge lighting.

H. Circuit breakers shall be full-size type: Half-size, twin or tandem breakers are not acceptable.

I. Circuit breakers feeding exit lights and emergency lighting shall be provided with handle locking devices. Where so indicated, provide circuit breakers with padlocking devices.

J. Fusible Switches

1. Where protective devices are indicated to be fusible switches, provide 3-pole, quick-make, quick-break types mounted in metal enclosures, and which have external operating handles that are padlockable in the "Off" position. Switches rated 1200 amperes and larger shall be bolted-pressure type, 100% rated, per UL 977. Main fuse switches shall be equipped with blown-fuse protection and electric trip mechanism.
2. Where fusing is indicated, and unless otherwise specified, provide as follows:
 - a. Main service and feeder switches 0 - 600 amperes: Class RK1; specification grade, Bussmann Low-Peak, dual element, time-delay, 200 kA, Type LPN-RK (250 volt) or LPS-RK (600 volt) or approved equal by Ferraz Shawmut.

- b. Main service and feeder switches 601 - 6000 amperes: Class L; Bussmann Low-Peak, Type KRP-CSP, 600 volt, time-delay, 300 kA, or approved equal by Gould - Shawmut.
 - c. Motor and transformer branch circuits 0 - 600 amperes: Class RK5; Bussmann Fusetron, Type FRN-R (250 volt) or FRS-R (600 volt), time delay, 200 kA, or approved equal by Ferraz Shawmut.
 - d. Motor and transformer branch circuits 601 - 6000 amperes: Class L; Bussmann Low-Peak, Type KRP-C, 600 volt, time delay, 200 kA, or approved equal by Ferraz Shawmut.
 - e. Non-motor branch circuits 0 - 600 amperes: Class J; Bussmann Low-Peak Type LPJ, 600 volt, dual element, time-delay, 200 kA, or approved equal by Ferraz Shawmut.
 - f. Fuses shall be of the same manufacturer.
- 3. Provide three (3) spare fuses of each type and size installed, in manufacturer's original packaging.
 - 4. Where so indicated, provide switches with blown fuse protection, electric trip mechanisms and integral zero-sequence solid-state ground-fault protection, complete with current transformers, adjustable trip level and time settings, trip indication lights, trip test switches, and fused control power source.
 - 5. Provide switches with handle locking devices and padlocking hasps.
- K. Fusible Coordination Panelboards
- 1. Where panelboards are indicated to be selectively coordinated fused type, provide fused or non-fused main and one, two or three-pole as indicated, and fused branch disconnects. Include: dead-front construction, rejection fuse holders, blown fuse indication, and operating handles padlockable in the "Off" position.
 - 2. Fuses shall be of the same manufacturer.
 - 3. Provide three (3) spare fuses of each type and size installed, in manufacturer's original packaging.
- L. Short-Circuit Ratings
- 1. Panelboards and devices shall be fully rated for the short-circuit currents indicated, and shall be so labeled. Series rating of main and branch devices will not be accepted.
- M. Panelboard circuit configurations and voltage, ampere, and short-circuit ratings shall be in accordance with the schedules on the drawings.
- N. Panelboards shall be commercial or industrial grade. Residential grade load centers will not be accepted.
- O. Lighting and appliance panelboards and power distribution panelboards up to and including 400 amperes shall be NYC approved equivalent of Square D NQOD or NF series, Eaton Cutler-Hammer Pow-R-Line 2 series or GE A series.

- P. Power distribution panelboards rated above 400 amperes shall be NYC approved equivalent of Square D I-line type HCN, HCM, HCW, HCNM or HCWM-U, Eaton Cutler-Hammer Pow-R-Line 4 series or GE Spectra series.

2.2 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide panelboards manufactured by one of the following:
1. All City Switchboard Co.
 2. Atlas Switchboard Co.
 3. Electrotech Service Equipment Co.
 4. Lincoln Electric Co.
- B. Fusible coordination panelboards shall be equivalent of Cooper Bussmann Quik-Spec Coordination Panelboard Model QSCP, Eaton Cutler-Hammer Pow-R-Line 3FQS Fusible Panelboard, or approved equivalent by Siemens, Square D or GE or Littlefuse LCP (28"w x 6"d).

PART 3 - EXECUTION

3.1 GENERAL

- A. See Section 260500 BASIC MATERIALS.

3.2 INSTALLATION - PANELBOARDS

- A. Drawings show schematic locations for panelboards with Contractor #4 responsible for final field installation to Code standards and working clearances.
- B. Unless otherwise indicated, mount panelboards with top of enclosure 6'-6" above finished floor. Mount securely, per manufacturer's instructions, with top and sides level and plumb.
- C. Surface-mounted panelboards shall be mounted on 3/4-inch plywood backboard or 3/4-inch galvanized steel channel secured to wall. Do not use plywood backboard in wet or damp locations. Where required provide galvanized steel channel to stand panelboards six inches off wall to allow routing conduit or cable behind panelboards.
- D. Provide typewritten as-built circuit directory information for each panelboard, including load description and location. Circuit description shall conform to NEC Paragraph 408.4, which states "identification shall include sufficient detail to allow each circuit to be distinguished from all others."
- E. Clearly label the exterior of each panelboard with I.D. number from drawings, system voltage, and ampere rating of panel bussing and main protective device/MLO, and rating/Class of fuses on engraved nameplates.
- F. For flush-mounted panelboards, provide 3-1" EMT sleeves to ceiling cavity above and below (3 conduits up, 3 conduits down), capped, for future additional branch circuit wiring.
- G. Install required interconnecting conduit and wiring for multi-section panelboards.
- H. Provide insulated gutter tap assemblies with insulating cover; Burndy Type KPU-AC Polytap or Type UCU-AC Riser Tap or equal by O.Z. Gedney. Split-bolt and taped tap connections are not acceptable.

- I. Document and label the flash protection boundary and the incident energy in accordance with IEEE 1584, NEC and the approved short circuit, arc flash and overcurrent protection coordination study.
- J. Surge protection remote alarm: Provide for remote alarm monitoring connections. Provide raceway and 3#14 AWG conductors from surge protection device dry contacts to a junction box located adjacent to the switchboard including empty conduit from junction box to BMS. Final connection of SPD alarm contacts is provided under Division 23 and shall not require access to panelboard or de-energizing of panelboard.
- K. Where existing panelboards are replaced with new panelboards intercept the existing branch circuits and extend to the new panelboards and connect to the new circuit breakers. Extended circuits shall use the same size and number of conductors as the existing circuits unless otherwise indicated on the drawings.

END OF SECTION

SECTION 26 32 00

EMERGENCY POWER SYSTEM

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 REFERENCES

- A. Perform the work of this Section in accordance with the requirements of Section 260000 General Provisions and Section 260500 Basic Materials.
- B. See other Division 26 Sections for requirements of emergency system panelboards and other electrical distribution equipment not included herein.

1.3 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to state and local codes and laws.
- B. Materials and products provided shall be suitable for, and where applicable UL listed and labeled for, the intended use or application.

1.4 SUBMITTALS

- A. Submit manufacturers' project-specific technical data for emergency power system equipment and components, including construction details, engine and alternator performance specifications, and mounting and installation instructions.
- B. Submit project-specific shop drawings including the following:
 - 1. Factory dimensioned layout and arrangement drawings. Typical catalog cuts are not acceptable.
 - 2. Complete wiring diagrams for system components.
 - 3. Complete rigging diagrams and assembly procedures for the generator and generator enclosure
- C. Submit a listing and report of factory tests performed.
- D. Submit certified field test report upon completion of work.
- E. Submit complete operating and maintenance manual.
- F. Submittals shall be tabbed and indexed for easy reference and location of submitted components (i.e. generator, radiator, silencer, fuel system, enclosure, load bank, etc.).
- G. Submit short circuit, arc flash and overcurrent protection coordination study as described in Section 260000. Study shall accompany equipment submittals. Failure to include the study with the equipment submittals will cause the equipment submittals to be rejected.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide a complete integrated emergency power system including, but not limited to, engine-generator set, automatic transfer switches, fuel system, exhaust system, sound-attenuated weather protected enclosure, remote annunciation, and power distribution, as indicated and herein specified. The system shall provide specified voltage, power and frequency to the designated circuits and loads within 10 seconds of loss of utility power.
- B. The emergency power system shall be in compliance with the following codes and standards:
 - 1. NEC Compliance: Comply with applicable requirements of NEC Articles 700 (Emergency Systems), 701 (Legally Required Standby Systems), and 702 (Optional Standby Systems) pertaining to emergency and standby systems.
 - 2. NFPA Compliance: Comply with applicable requirements of NFPA 37, "Stationary Combustion Engines and Gas Turbines", and NFPA 110 "Emergency and Standby Power Systems" (Level 1).
 - 3. UL Compliance: Provide standby power generator system and enclosure components that are listed and labeled to UL 2200 standard.
 - 4. ANSI/NEMA Compliance: Comply with applicable requirements of ANSI/NEMA MG 1 "Motors and Generators", and MG 2 "Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators".
- C. The system manufacturer shall have a factory-authorized parts and service facility within a reasonable distance of the jobsite.

2.2 ENGINE-GENERATOR SET

- A. The engine-generator set shall be nominally rated as indicated on the drawings. The kW rating shall be at 0.8 power factor, 122°F/50°C ambient air temperature, for standby operation for the duration of any utility power outage. Motor-starting capability shall be minimum 261 kVA with a maximum 30% voltage dip. The manufacturer shall provide oversized components as may be necessary to meet this requirement.
- B. Engine
 - 1. The engine shall be an 1800 rpm water-cooled compression ignition diesel. Engine shall meet specifications when operating on No. 2 (Grade DF-2) domestic burner oil. Diesel engines requiring premium fuels will not be considered. The engine shall be equipped with fuel, lube oil, and intake air filters, lube oil coolers, fuel transfer pump, fuel priming pump, and gear driven water pump. The engine shall be Generac Model SD100. The engine shall be configured for low exhaust emissions and comply with Tier 3 (less than 500 kW) per EPA guidelines.
 - 2. The engine governor shall be isochronous electronic type and shall maintain frequency regulation not to exceed 0.25% (0.15 Hertz) from no load to full rated load.

3. The unit shall be mounted on a structural steel sub-base and shall be provided with adjustable spring-type vibration isolators. Provide anchor bolts of hot dipped galvanized steel, of the types and sizes recommended by the manufacturer.
4. Provide safety shut-offs for high water temperature, low water level, low oil pressure, overspeed and engine overcrank.
5. Provide a thermostat-controlled thermal circulation type jacket water heater to maintain engine jacket water at 90°F in an ambient temperature of 0°F, minimum 1500 watt, 120 volt .
6. Provide a crankcase emission control system that shall remove a minimum of 99% of crankcase emissions including NOX, hydrocarbon and oil.
7. An engine-mounted radiator with blower type fan shall be sized to maintain rated operation at 122°F/ 50°C maximum outside air temperature. The radiator shall be stacked core design. The aftercooler circuit shall be rated at 140°F. The engine cooling system shall be filled with an anti-freeze solution of 50/50 ethylene glycol/ water mixture. Rotating parts shall be guarded against accidental contact per OSHA requirements.

C. Starting System

1. Provide engine-generator unit with a 12 or 24 volt (manufacturer's standard) DC electric starting motor with positive engagement drive capable of three complete cranking cycles without overheating.
2. Provide a non-gassing lead calcium recombination type engine starting battery set of the heavy-duty diesel type to avoid requirements for ventilation. The battery set shall be of sufficient capacity to provide for one and one half minutes total cranking time without recharging. Include a corrosion-resistant battery rack, and necessary cables and clamps.
3. Engine mounted battery charging alternator shall be 45 ampere minimum with solid-state voltage regulator.
4. Provide a current limiting battery charger located at the generator to automatically recharge batteries and to maintain at full charge. Charger shall float at 2.20 volts per cell and equalize at 2.40 volts per cell. It shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressors, DC voltmeter, DC ammeter, and fused AC input. AC input voltage shall be 120 volts. Amperage output shall be no less than 10 amperes. Provide Stored Energy Systems Model NRG.

D. Exhaust System

1. Provide a internally mounted critical grade exhaust silencer including rain cap along with appropriately sized piping to the engine exhaust manifold. Final connection to the manifold shall be flexible stainless steel for vibration isolation. The silencer and piping shall be of high temperature and corrosion-resistant (aluminized shell & heads) construction. Manufacturer: GT Exhaust Systems, Inc.; Model 201-7100 Extreme Application series.
2. For interior installations, exhaust pipe extensions beyond the silencer will be furnished and installed under Division 23. Where no such extensions are required, provide a suitably configured exhaust outlet and, where required, a rain cap.

E. Generator (Alternator)

1. The generator shall be a three-phase, wye-connected, grounded neutral, 60 Hertz, single bearing, four pole, synchronous type, 105°C temperature rise at 130 kW / 162.5 kVA standby output, volts with brushless exciter and shall be built to NEMA Standards. 125°C or 150°C temperature rise is not acceptable. Shunt excitation is not acceptable. Class H insulation shall be used on the stator and rotor, and both shall be further protected with 100% epoxy dipped and baked impregnation. Stator shall be skewed with 2/3 pitch windings to minimize field heating and voltage harmonic effects. Generator shall be Generac 130kW alternator.
2. A generator mounted solid-state voltage regulator shall be provided to match the characteristics of the generator and engine. Voltage regulation shall be +/- 2% from no load to full rated load. Readily accessible voltage droop, voltage level and voltage gain controls shall be provided. Voltage level adjustment shall be a minimum of +/- 5%. One-step application of 100% rated load shall result in a voltage drop of no greater than 15% of rated, and recovery to steady-state shall be within 5 seconds. Generator output voltage distortion shall be less than 5% total harmonic distortion (THD) line-to-line and line-to-neutral when supplying full rated linear load with no greater than 3% individual harmonic content. To limit voltage distortion for non-linear load current harmonics, the generator per unit sub-transient reactance shall not exceed 0.11 at generator temperature rise rating under full load.
 - a. The manufacturer shall review the generator application, and the indicated loads served, to determine what level of filtering or derating, if any, is recommended or required for satisfactory regulator and generator performance. Provide equipment accordingly.
 - b. Provide alternator anti-condensation heater, thermostatically controlled, 100 watt, 120 volt.
3. Connection to the engine flywheel shall be via a semi-flexible disc coupling.
4. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for more than 10 seconds.
5. Provide separate unit mounted, three-pole, molded-case circuit breaker for legally required loads at the generator output terminals in NEMA 1 enclosure(s) to protect the generator and the generator supply conductors against overload as indicated on the drawings. Circuit breakers shall have field-adjustable electronic trip units (LSI), with field-interchangeable rating plugs within frame size to enable emergency system coordination with downstream devices. Refer to Section 260500 for additional circuit breaker requirements. Each circuit breaker shall have a trip rating as indicated on the drawings
6. Provide (2) sets of ear protection to reduce noise levels to 20 db for the person wearing the headsets. Provide rack to hang heads sets by entry door.

F. Engine-Generator Set Control:

1. The generator set shall be provided with a microprocessor-based control system, which is designed to provide automatic starting, monitoring, and control functions

for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification. Provide a digital generator set control for Windows software.

2. The control shall be mounted on the generator set. The control shall be vibration isolated and prototype tested to verify the durability of components in the system under the vibration conditions encountered.
3. The control shall be UL508 labeled, CSA282-M1989 certified, and meet IEC8528 part 4. Switches, lamps and meters shall be oil-tight and dust-tight, and the enclosure door shall be gasketed. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts. The controls shall meet or exceed the requirements of Mil-Std 461C part 9, and IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions. The entire control shall be tested and meet the requirements of IEEE587 for voltage surge resistance.
4. The generator set mounted control shall include the following features and functions:
 - a. Three position control switch labeled RUN/OFF/AUTO: In the RUN position the generator set shall automatically start, and accelerate to rated speed and voltage. In the OFF position the generator set shall immediately stop, bypassing time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
 - b. Red "mushroom-head" push-button EMERGENCY STOP switch: Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
 - c. Push-button RESET switch: The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
 - d. Push-button PANEL LAMP switch: Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.
 - e. Generator Set AC Output Metering: The generator set shall be provided with digital and analog metering set including the following features and functions:
 1. 2.5-inch, 90 degree scale analog voltmeter, ammeter, frequency meter, and kilowatt (kW) meter. These meters shall be provided with a phase select switch and an indicating lamp for upper and lower scale on the meters. Ammeter and kW meter scales shall be color coded in the following fashion: readings from 0-90% of generator set standby rating: green; readings from 90-100% of standby rating: amber; readings in excess of 100%: red.
 2. Digital metering set, 0.5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output kW, kW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display three phase voltages (line to neutral or line to line) simultaneously.

f. Generator Set Alarm and Status Message Display: The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status, and existing alarm and shutdown conditions. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. The generator set control shall indicate the existence of the following alarm and shutdown conditions on a digital display panel (in addition, provide items designated (*) to signal at remote annunciator):

1. pre-low oil pressure (alarm)*
2. low oil pressure (shutdown) *
3. oil pressure sender failure (alarm)
4. low coolant temperature (alarm)*
5. pre-high coolant temperature (alarm)*
6. high coolant temperature (shutdown)*
7. engine temperature sender failure (alarm)
8. low coolant level (alarm or shutdown--selectable)*
9. fail to crank (shutdown)
10. overcrank (shutdown) *
11. overspeed (shutdown) *
12. low DC (battery) voltage (alarm)*
13. high DC (battery) voltage (alarm)*
14. normal DC (battery) voltage*
15. weak battery (alarm)*
16. battery charger malfunction*
17. low fuel-daytank (alarm or shutdown--selectable)*
18. high AC voltage (shutdown)
19. low AC voltage (shutdown)
20. under frequency (shutdown)
21. over current (warning)
22. over current (shutdown)
23. short circuit (shutdown)
24. over load (alarm)
25. emergency stop (shutdown)
26. generator running*
27. normal utility power*
28. EPS supplying load*
29. Not in auto*
30. Fault* (owner selected condition)

g. In addition, provisions shall be made for indication of two customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

h. Engine Status Monitoring: The following information shall be available from a digital status panel on the generator set control:

1. engine oil pressure (psi or kPA)
2. engine coolant temperature (degrees F or C; Both left and right bank temperature shall be indicated on V-block engines.)
3. engine oil temperature (degrees F or C)
4. engine speed (rpm)
5. number of hours of operation (hours)
6. number of start attempts
7. battery voltage (DC volts)

- i. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.
- j. Control Functions: The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15 second rest period between cranking periods.
- k. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
- l. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting. The governor control shall be suitable for use in paralleling applications without component changes.
- m. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
- n. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.
- o. Alternator Control Functions: The generator set shall include an automatic voltage regulation system that is matched and prototype tested with the governing system provided. It shall be immune from mis-operation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below a threshold of 58-59 HZ. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alpha-numeric LED readout to indicate setting level. The voltage regulation system shall include provisions for reactive load sharing and electronic voltage matching for paralleling applications. Motorized voltage adjust pot is not acceptable for voltage matching.
- p. Controls shall be provided to monitor the output current of the generator set and initiate an alarm when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator.
- q. Controls shall be provided to monitor the kW load on the generator set, and initiate an alarm condition when total load on the generator set exceeds the generator set rating for in excess of 5 seconds.

- r. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.
- s. An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.
- t. Provide a battery monitoring system to load test the batteries each time the engine is started. Test failure shall alarm when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine starting, the low voltage limit shall be disabled, and if DC voltage drops to less than 14.4 volts for more than two seconds a "weak battery" alarm shall be initiated.
- u. Control Interfaces for Remote Monitoring - Control and interconnection points from the generator set to remote components shall be brought to a separate connection box. No field connections shall be made in the control enclosure or in the AC power output enclosure. Provide the following features in the control system:
 - 1. Form "C" dry common alarm contact set rated 2A @ 30VDC to indicate existence of any alarm or shutdown condition on the generator set.
 - 2. One set of contacts rated 2A @ 30VDC to indicate generator set is ready to load. The contacts shall operate when voltage and frequency are greater than 90% of rated condition.
 - 3. A fused 10 amp switched 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.
 - 4. A fused 20 amp 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit continuously from the engine starting/control batteries.
 - 5. The control shall be provided with a direct serial communication link using LonWorks communication network interface as described elsewhere in this specification and shown on the drawings.
 - 6. Serial interface communication port to allow the control to communicate with a personal computer running InPower software.
 - 7. Echelon LonWorks interface.
 - 8. Input/output expansion module – provides up to 16 configurable Form-C relays, 12 configurable discrete inputs and 8 analog inputs.

9. Digital output relay module – provides (3) relays, each with 2 normally open and 2 normally closed contacts rated 10A at 600 VAC, 5A at 24 VDC. Relay functions are configurable.

G. Remote Annunciator

1. Provide a remote alarm annunciator, (18) light minimum (refer to 2.02-F-4-f), in a surface-mounted NEMA 1 enclosure containing indicating lights/LED's for low oil pressure, high water temperature, overspeed, overcrank, low battery, low fuel level, fuel tank leak, other indications for NFPA 110, Table 3-5.5.2 (d) Level 1 (refer to generator control panel requirements), and an alarm horn with silencing pushbutton and light.
2. Remote annunciator shall be powered by the genset storage battery.
3. The remote annunciator shall have provisions to signal a common emergency power system alarm to the building security system. (See other Division 26 section for security system requirements).
4. The remote annunciator, located per drawings, shall have provisions for the manual start, transfer and transfer override features required by Code. Provide required wire and conduit between genset and remote annunciator.

H. Shutdown Switch

1. Provide a breakglass-type remote manual shutdown switch per NFPA 110, 5.6.5.6. Switch shall be located externally mounted to the outdoor generator enclosure; weatherproof type.

I. Sound Attenuated Weather Protected Enclosure

1. Provide corrosion-resistant sound attenuated weather protected enclosure for engine-generator set made of heavy gauge reinforced steel. Enclosure shall be sized for the engine-generator set and local auxiliaries (batteries, charger, and as specified and indicated). The enclosure shall be provided with necessary louvers, louver operators, maintenance access doors and heaters. Enclosures shall be Level II with measured sound pressure level performance as follows: average 75.5 dBA, maximum 76.7 dBA measured at 7 meters.

J. Acceptable Generator Manufacturers

1. The generator shall be manufactured by Generac, diesel engine-generator set, Model SD100.

2.3 FREE STANDING PRIMARY FUEL TANK

- A. Provide UL 142 listed day tank, free-standing from generator, size as hereinafter specified, complete with required connections and hardware.
- B. The day tank and all associated components shall be suitable for the application. Tanks with limitations on lengths of fill and/or vent piping shall not be permitted. Tanks shall have pressure ratings to comply with Code and local laws.
- C. The tank shall be constructed of heavy gauge steel, have a removable gasketed inspection plate 6" square, fuel level gauge, and fuel inlet strainer. Tank construction shall be double-wall, 200% rupture basin, rated 25PSI with automatic leak detection and alarm.

- D. The interior of the tank shall be epoxy coated and the exterior shall be rust-proofed and painted to match the color of the generator set.
- E. Plumbing and wiring between the tank and the generator set shall be field-installed. Tank fill and vent piping shall be provided and installed by Division 23.
- F. Tank shall be sized for 6 hours full load capacity, 55 gallon and be provided with appropriately sized and completely piped fill, drain, overflow and vent assemblies. Fuel system shall include: auxiliary hand pump, automatic level controls, solenoid valve(s) and alarms for trouble, leak, low and high fuel. Each alarm shall indicate at the remote annunciator and signal a fault to the security system and Building Management/Automation System (BMS). Provide "Reset" switch to extinguish and clear alarms until next event.

PART 3 - EXECUTION

3.1 GENERAL

- A. See Section 260500 BASIC MATERIALS.

3.2 SEQUENCE OF OPERATION

- A. Provide the following generator and automatic transfer switch (ATS) control and transfer sequence:
 1. Normal utility power supply source fails.
 2. The ATS sends a start signal to the generator control system.
 3. Generator(s) start. Normal operating voltage and frequency are achieved.
 4. ATS's sense the availability of an alternate power source or receives a permissive transfer signal from the emergency generator control system to transfer to the alternate source side. Emergency loads are picked up sequentially by the emergency generator's bus in accordance with load priority setting.
 5. The load priority settings are as follow:
 - a. At 3 seconds, Engine Start.
 - b. At 5 seconds, transfer Emergency ATS-E
 - c. At 8 seconds, transfer Legally Required Standby ATS-L1.
 6. The generator control system shall have the capability to control load shed operation, sending signals to load breakers and/or ATS devices removing loads from the emergency system in accordance with load priority setting to prevent generator overloading. This requires fast control processing as well as direct control of load serving breakers.
 7. Normal utility power supply source returns.
 8. ATS's transfer back to normal power supply source. The transfer can be either an open transition (momentary power interruption) or a momentary closed transition (no power interruption), depending on the emergency load requirements and the function and feature of the ATS installed.
 9. Generator(s) cool down and shut down.

3.3 INSTALLATION

- A. Install and connect generator sets and accessories where indicated, in strict compliance with manufacturer's instructions.
- B. Coordinate fuel system, exhaust system, and combustion/cooling air requirements with Division 23.
- C. Provide power, control, and signal wiring and connections as required for specified operation. Assure proper phasing of transfer switch normal and emergency source power connections.
- D. Coordinate wiring of ATS auxiliary contacts and Selective Load (BMS) Disconnect Contacts with Section 230923. Provide wiring and conduit from these contacts to mutually-agreed termination locations at the Division 23 interface equipment. Refer to Section 230923.
- E. Install a sign at the service entrance equipment indicating the type and location of the on-site emergency power source. Install a sign on the main grounding box identifying all emergency and normal sources connected at that location.
- F. The enclosure manufacturer shall provide supervisory labor during the rigging and re-assembly of the generator set enclosure at the jobsite.

3.4 FIELD ACCEPTANCE TESTING

- A. After completion of the emergency power system installation, perform a complete on site performance test per NFPA 110, Paragraph 7.13.
- B. Testing shall be conducted by authorized representatives of the equipment manufacturer(s), and witnessed by the Commissioner and any interested local authorities.
- C. Provide necessary calibrated test equipment, load banks, temporary cabling and connections, etc. as required to perform the testing in an approved manner.
- D. A certified report of test procedures, results, and any corrective measures taken shall be provided to the Owner.
- E. Demonstrate operating procedures to Owner's personnel and provide written operating and maintenance instructions.
- F. Tests and Approval:
 - 1. Factory Test: The engine-generator shall be tested fully assembled at the factory with a 0.8 PF inductive load bank. The generator set shall conform to the performance criteria of this section.
 - 2. The tests shall be conducted as follows:
 - a. Operation at full rated load for a minimum of two hours.
 - b. Records shall be maintained, throughout the test period on water temperature, oil pressure, ambient air temperature, voltage, current, frequency, noise readings, connected load and power factor.

3. On-Site Tests: The complete installation shall be tested for compliance with the Specification following completion of site work with a 1.0 PF resistive load bank for a minimum of 2 hours, or longer if required by NFPA 110 for specific occupancies and site conditions. Testing shall be conducted by representatives of the manufacturer, with required test equipment, witnessed by the Owner. Certified copies of test procedures and results shall be provided to the Owner.
4. On-Site load test shall repeat factory load test as described above and include the following:
 - a. Check fuel, lubricating oil, and antifreeze in liquid cooled models for conformity to the manufacturer's recommendations under environmental conditions present.
 - b. Test (prior to cranking engine) for proper operation of accessories that normally function while the set is in a standby mode. Accessories include: engine heaters, battery chargers, generator and control enclosure strip heaters and remote annunciators.
 - c. Check (during start-up test mode) for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and phase rotation.
 - d. Test, by means of simulated power outage, automatic start-up by remote-automatic starting, transfer of load, and automatic shutdown. Prior to this test, adjust transfer switch timers for proper system coordination. Monitor throughout the test engine temperature, oil pressure, battery charge level, generator voltage, amperes, and frequency.
 - e. Perform manual transfer of loads to generator simulating loss of automatic transfer switch operation.
 - f. Test for proper interfacing and sequences of operation of ATS auxiliary and selective load shedding (BMS) contacts with equipment and sequences described herein, on the drawings, and in Section 230923.
 - g. Upon completion of installation, demonstrate capability and compliance of system 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. Initial testing and retesting to be at no cost to Owner.
5. Provide complete instructions, consisting of three (3) operating and maintenance manuals, parts books, dimensional drawings. Separate unit wiring diagrams, and schematics and interconnection wiring diagrams shall be provided.
6. Owner Orientation: A representative of the supplier shall meet the Owner at the time of start up, and shall review the operation and parts books, starting and control methods, and recommended preventative maintenance procedures.
 - a. Furnish instruction as follows for a minimum of four employees of the system user:
 1. Instruction in the receipt, handling and acknowledgement of alarms.

2. Instruction in the system operation including manual control of output functions from the system control panel.
 3. Instruction in the testing of the system including logging of detector sensitivity, field test of devices and response to common troubles.
 4. The total Instruction requirement shall be a minimum of 8 hours or as required by the Owner, conducted on three successive days, but shall be sufficient to cover the items specified.
- G. Refill fuel oil tank so that Owner is provided with full tank upon successful completion of testing. This shall be at no cost to the Owner.

3.5 WARRANTY

- A. Provide five (5) year comprehensive extended coverage for standby power applications. The complete electrical power system (generator set, controls, and associated switches, switchgear and accessories) as provided by the single source manufacturer shall be warranted by the manufacturer against defects in materials and workmanship for a period of five (5) years or 1500 hours, whichever occurs first from the date of system start-up. Coverage shall include parts, labor, travel expenses, and labor to remove/reinstall said equipment per the manufacturer's standard published limited warranty. There shall be no deductibles applied to warranty.

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SECTION 26 36 23

AUTOMATIC TRANSFER SWITCH

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 REFERENCES

- A. Perform the work of this Section in accordance with the requirements of Section 260000 General Provisions and Section 260500 Basic Materials.
- B. See other Division 26 Sections for requirements of emergency system panelboards and other electrical distribution equipment not included herein.

1.3 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to state and local codes and laws.
- B. The criteria of design and performance to produce the required operation is based on equipment of the named manufacturers. Equipment of other manufacturers will be considered, subject to acceptability in the Engineer's judgment and opinion. The equipment must conform to the dimensions established by the drawings for mechanical spaces and other clearances.
- C. Materials and products provided shall be suitable for, and where applicable UL listed and labeled for, the intended use or application.

1.4 SUBMITTALS

- A. Submit manufacturers' technical data for automatic transfer equipment and components, including construction details, performance specifications, and furnished options and features.
- B. Submit project-specific shop drawings, including complete wiring diagrams for system components.
- C. Submit certified field test report upon completion of work.
- D. Submit complete operating and maintenance manual.
- E. Submit short circuit, arc flash and overcurrent protection coordination study as described in Section 260000. Study shall accompany equipment submittals. Failure to include the study with the equipment submittals will cause the equipment submittals to be rejected.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide automatic transfer equipment compatible with the existing emergency power system. The system shall provide specified voltage, power and frequency to the designated circuits and loads within 10 seconds of loss of utility power. Interconnect new transfer switch(es) to the existing emergency generator according to manufacturer's recommendations.
- B. The emergency power system shall be in compliance with the following codes and standards:
 - 1. NEC Compliance: Comply with applicable requirements of NEC Articles 700, 701, and 702 pertaining to emergency and standby systems.
 - 2. NFPA Compliance: Comply with applicable requirements of NFPA 110 "Emergency and Standby Power Systems" (Level 1).
 - 3. UL Compliance: Provide automatic transfer switches and components which are listed and labeled by UL or ETL.
- C. The switch manufacturer shall have a factory-authorized parts and service facility within a reasonable distance of the jobsite.

2.2 AUTOMATIC TRANSFER SWITCH

- A. Provide open-transition electrically-operated, mechanically-held, double-throw automatic transfer switch, quantity and locations as indicated on the drawings, complying with the requirements of UL 1008 and NFPA 110, Level 1.
- B. Voltage, ampere rating, and number of poles shall be as indicated. Fault withstand rating shall be suitable for the application, with the indicated upstream circuit protective device. ATS shall be SE (service entrance) rated where installed on the supply side of the service disconnect or as indicated on the drawings.
- C. Three-pole switches shall be provided with a fully rated, solid, unswitched neutral terminal. Four-pole switches shall be provided with full-capacity neutral switching.
- D. Provide transfer switch mechanisms and control components factory assembled and wired in a wall mounting NEMA 1 enclosure with hinged, lockable door.
- E. Electrical operation shall be accomplished by a non-fused momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions. Transfer switches using components of molded case circuit breakers, or contactors not designed for continuous duty repetitive switching between active power sources, are not acceptable.
- F. Switch action for double-throw-type switches shall be mechanically held in both directions.
- G. Overcurrent devices shall not be part of transfer switch products.

- H. Provide switch with a manual operator, capable of transferring the switch to either source position for maintenance purposes. Control circuit shall be disconnected from electrical operator during such manual operation.
- I. Provide the following ATS accessories and controls:
1. Close differential voltage sensing on each phase of normal source. Pick-up voltage shall be adjustable from 85 percent to 100 percent of nominal, and dropout shall be adjustable from 75 percent to 98 percent of the pick-up value. Factory set for pick-up at 95 percent and dropout at 85 percent.
 2. Time-delay override of normal source voltage sensing shall delay transfer and engine start signals. Adjustable 0 to 6 seconds, and factory set at 2 seconds.
 3. Voltage/frequency lockout relay and sensing of the emergency source shall be provided to prevent premature transfer. Voltage pick-up shall be adjustable from 85 to 100 percent of nominal. Factory set to pick-up at 90 percent of nominal. Pick-up frequency shall be adjustable from 90 percent to 100 percent of nominal. Factory set to pick-up at 95 percent. Provide adjustable time delay for transfer to emergency, 0 to 60 seconds, set at 0 seconds, to permit staggered transfer of multiple switches.
 4. System test switch, momentary type, to simulate normal source failure with load, no load and disabled options.
 5. Retransfer time delay to normal source, adjustable from 0 to 30 minutes and factory set at 15 minutes. Provide automatic defeat of the delay upon loss of voltage or sustained undervoltage of the emergency source, provided the normal supply has been restored.
 6. Pilot lights to indicate source to which the load is connected.
 7. Engine starting contacts, one isolated normally closed and one isolated normally open. Contacts shall be gold flashed or plated and rated 10 amperes at 32 VDC.
 8. Engine cool-down time delay to run engine unloaded after retransfer to normal source, adjustable 0 to 30 minutes, set at 5 minutes.
 9. Engine-generator exercising timer, adjustable in 15 minute maximum increments, from 0 to 2 hours, for operation once a week, with load/no load transfer.
 10. Unassigned Auxiliary Contacts: Two normally open contacts for each switch position, rated 10 amperes at 480 VAC.
 11. Source Available/Connected Indicating Lights: Provide a indicating light and engraved nameplate for each of the following:
 - a. "NORMAL SOURCE AVAILABLE"
 - b. "NORMAL SOURCE CONNECTED"
 - c. "EMERGENCY SOURCE AVAILABLE"
 - d. "EMERGENCY SOURCE CONNECTED"

- e. Supervision of sources shall be via the transfer switch normal and emergency source sensing circuits, respectively.
- 12. Transfer Override Switch: To override automatic retransfer control so the ATS will remain connected to the emergency power source regardless of the condition of the normal source. Provide a pilot light to indicate the override status. Retransfer shall occur if the emergency source fails and the normal source is available.
- 13. Provide each ATS with a factory-installed and wired internal in-phase monitor relay. The relay shall control transfer so it occurs when the two sources are synchronized in phase. The relay shall compare phase relationship and frequency difference between the normal and emergency sources and initiate transfer when both sources are within 15 electrical degrees and only if the transfer can be completed within 60 electrical degrees. In-phase transfer shall be initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage. The transfer switch shall be configurable to control the operation time from source to source (program transition operation). The control system shall be capable of enabling or disabling this feature, and adjusting the time period to a specific value.
- 14. Provide surge protection for normal, source and load sides, minimum 70 kA.
- 15. Provide load power and load current monitoring to measure load phase and neutral, current, power factor, real power (kW) and apparent power (kVA). Include trouble signal to warn of excessive neutral current resulting from unbalanced or nonlinear loads.

2.3 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide Generac Power Systems automatic transfer switches or equal as manufactured by one of the following:
 - 1. Automatic Switch Company (ASCO) 7000 Series.
 - 2. Russ Electric Company

PART 3 - EXECUTION

3.1 GENERAL

- A. See Section 260500 BASIC MATERIALS.

3.2 INSTALLATION

- A. Install and connect transfer switches and accessories where indicated, in strict compliance with manufacturer's instructions.
- B. Provide power, control, and signal wiring and connections as required for specified operation. Assure proper phasing of transfer switch normal and emergency source power connections.

- C. Coordinate wiring of ATS auxiliary contacts with Division 23. Provide wiring and conduit from these contacts to mutually-agreed termination locations at the Division 23 interface equipment. Refer to Division 23.

3.3 FIELD ACCEPTANCE TESTING

- A. After completion of the transfer switch installation, perform a complete on site performance test of the emergency power system per NFPA 110, Paragraph 7.13.
- B. Testing shall be conducted by authorized representatives of the equipment manufacturer(s), and witnessed by the Commissioner's representatives and any interested local authorities.
- C. Provide necessary calibrated test equipment, load banks, temporary cabling and connections, etc. as required to perform the testing in an approved manner.
- D. A certified report of test procedures, results, and any corrective measures taken shall be provided to the Commissioner.
- E. Demonstrate operating procedures to Commissioner's personnel and provide written operating and maintenance instructions.
- F. Test for proper interfacing and sequences of operation of ATS auxiliary and selective load shedding (BMS) contacts with equipment and sequences described herein, on the drawings, and in Division 23 Section 230933.

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SECTION 26 50 00

SERVICE LIGHTING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.2 REFERENCES

- A. Perform the work of this section in accordance with the requirements of Section 260000 General Provisions and Section 260500 Basic Materials.
- B. See other Division 26 sections and architectural reflected ceiling plans including lighting consultant's sections for requirements of architectural luminaires, and of lighting control and dimming equipment and systems, not included herein.

1.3 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to state and local codes and laws.
- B. The design is based on equipment of the named manufacturers. Equipment of other manufacturers will be considered, subject to acceptability in the Engineer's judgment and opinion. The equipment must conform to the dimensions established by the drawings for mechanical spaces and other clearances.
- C. Materials and products provided shall be suitable for, and where applicable UL or CSA listed and labeled for, the intended use or application.

1.4 SUBMITTALS

- A. Submit manufacturers' technical product data for luminaires and components, including the following:
 - 1. Dimensions.
 - 2. Materials and construction.
 - 3. Finishes.
 - 4. Photometric data.
 - 5. Ballasts (including normal, emergency and dimming).
 - 6. Lamps.
 - 7. Mounting accessories and details.
- B. Submit scaled and dimensioned shop drawings for custom-fabricated luminaires, and for custom field assemblies.

PART 2 - PRODUCTS

2.1 LUMINAIRES

- A. Provide luminaires of sizes, types and ratings indicated, complete with, but not limited to, housing, lenses, louvers, baffles, lamps, lamp holders, reflectors, ballasts, starters, wiring and mounting accessories.

- B. Luminaire types are indicated on schedules and drawings. Luminaires must comply with minimum requirements as stated therein or in the listed manufacturers' published data. Review architectural drawings and specifications to verify ceiling types, modules, and suspension systems appropriate to installation.
- C. Coordinate with the ceiling system supplier to ensure that the luminaires and components supplied will be fully compatible with the ceiling system construction.
- D. Recessed incandescent luminaires shall have built-in, automatic reset thermal protection, or be of low-temperature construction, as required by NEC 410-65 (c), and shall be provided with feed-through wiring boxes.
- E. Provide electrical wiring within luminaire suitable for the ampacity and operating temperature.
- F. Sockets for medium bi-pin fluorescent lamps shall be knife-edge type.
- G. Lenses for fluorescent luminaires shall be prismatic acrylic, pattern 12, minimum 0.156 inch thick. Provide gasketing between enclosure and frame and between frame and luminaire housing.
- H. Provide iridescent free reflectors and baffles for fluorescent luminaires.
- I. Provide internal fixture disconnecting means for fluorescent luminaires equipped with double ended lamps or ballasts supplied from multi-wire circuits per NEC 410.73(G).

2.2 BALLASTS

- A. Ballasts shall be Class P, thermally protected, ANSI C82.11-listed, U.L., CSA or ETL-listed, and compatible with the luminaires, lamps, and voltage systems specified. Include end-of-life protection for detecting excessive voltages across the lamp that can occur when the lamp nears end of life and shuts the ballast down safely before these high voltages can do harm or damage. Provide universal voltage ballasts rated for 120 – 277 VAC input unless otherwise indicated. Where applicable, ballasts shall comply with Public Law 100-357 and local utility energy conservation criteria for energy efficiency, and with the requirements of FCC Part 18. Ballasts shall meet FCC EMI/RFI emission requirements for consumer equipment. Ballasts shall contain no PCB's.
- B. Fluorescent ballasts for rapid-start lamps shall be high power factor, high frequency electronic type, sound rated A or better. Input Total Harmonic Distortion (THD) shall be less than 10% and ballast factor shall exceed 90%. Ballasts shall withstand line transients as defined in ANSI/IEEE C62.41, Category A. Ballasts shall be manufactured by Advance, Magnetek, Robertson or Sylvania, and shall come with a manufacturer's 5 year replacement warranty, including labor costs.
- C. Fluorescent ballasts for pre-heat lamps shall be high power factor, trigger-start type. Pre-heat ballasts with starters are not acceptable.
- D. Three-lamp fluorescent luminaires shall be provided with one 1-lamp and one 2-lamp ballasts, unless otherwise indicated. The center lamp of each shall be connected to the 1-lamp ballast.

- E. Ballasts for compact fluorescent and T-5 twin-tube lamps shall be electronic type. Total harmonic distortion shall be less than 10%. Ballast shall maintain constant output for a line voltage variation of +/- 10%, have transient voltage protection per ANSI C62.41 Category A, be sound rated A, have power factor and ballast factor >90% throughout dimming range, start lamp at minimum temperature of 50°F, and have lamp end of life detection and shutdown circuit.
- F. Emergency ballasts for fluorescent lamp emergency power supply shall be suitable for installation in ballast compartment of fluorescent luminaire. For luminaires not large enough to enclose the emergency ballast, provide a separate NEMA 1 enclosure accessible by removing the luminaire or ceiling tiles. Ballast output shall power each lamp for a minimum of 1100 lumens for 90 minutes. Battery shall be sealed lead calcium type, 5 year warranty, not pro-rated, with 7 to 10 year life expectancy. Include TEST switch and AC ON indicator light, installed to be operable and visible without disassembling luminaire. Emergency ballasts shall be Bodine B-50 ST (self-test) for T8 lamps, B35ST for T5 lamps, and B-84C ST for compact lamps and LP600 ST (self-test) for low profile and space-limited fixtures or approved equals. Include Bodine Model KTS remote keyed test switch or approved equal.
- G. Where installed outdoors, in unheated areas, cold storage areas or areas below 50°F fluorescent ballasts shall be low-temperature type, suitable for 0°F operation. Emergency ballasts installed in unheated areas shall be Bodine B50 Cold-Pak for linear fluorescent lamps, B4CF for compact fluorescent lamps or approved equals to withstand temperatures ranging from -4 °F to 131 °F and providing minimum 1200 lumens.
- H. Provide HID lamp ballasts capable of operating lamp types with ratings indicated; constant wattage autotransformer magnetic type (CWA), high power factor (>0.90), multi-tap (120/208/240/277 volt), core and coil assembly encapsulated in non-melt resin; install capacitor outside ballast encapsulation for easy field replacement. Remote ballasts shall be provided by the fixture manufacturer with the proper lamp ignitor for remote applications. Provide wiring in accordance with manufacturer's recommendations to withstand lamp starting voltage and operating temperature. Coordinate installation requirements with manufacturer to assure code compliant installation.
- I. Emergency ballasts for 175, 250 and 400 watt HID lamps with constant wattage autotransformer (CWA) ballasts shall maintain lamp arc for a minimum of two minutes until normal power is restored or emergency power takes over. Emergency ballasts shall be remote mounted up to 15 feet from HID fixture in a separate NEMA 1 enclosure. Battery shall be field replaceable, nickel cadmium type, 5 year warranty, not pro-rated, with 7 to 10 year life expectancy. Include charging indicator light. Emergency ballasts shall be Bodine Arc Keeper series or approved equal.
- J. Emergency ballasts for LED fixtures shall be Bodine BSL series emergency LED drivers, or approved equal, with rated current selected to provide fixture lumen output for minimum 90 minutes.
- K. Fluorescent Electronic Dimming Ballasts – Refer to Section 260943.

2.3 LAMPS

- A. Provide lamps as indicated on drawings or schedules, or to suit the specified luminaires.
- B. Fluorescent lamps shall be by the same manufacturer and shall be of the same color (3500K) with a Color Rendering Index (CRI) of 82 or higher for compact lamps and 85 or higher for other fluorescent lamps, unless otherwise indicated or required. Lamps of the same wattage, size and shape shall be identical. Fluorescent lamps shall be low-mercury types, and shall be EPA TLCP-compliant. Provide GE "Ecolux" series, Philips "ALTO" series, or Sylvania "Ecologic" series.

- C. Lamps shall be rated for dimming duty by the manufacturer where dimming control is shown on the drawings.
- D. Incandescent lamps shall be 120 volt, inside-frosted (except PAR types), sizes and bases as indicated or required for luminaire compatibility.
- E. High-intensity-discharge (HID) lamps shall be of the type and wattage specified, and compatible with the specified luminaires. High pressure sodium lamps for interior luminaires shall be diffuse-coated. Metal halide lamps for interior luminaires shall be phosphor-coated. Metal halide lamps for open luminaire operation shall be ANSI "O-rated" and include a quartz shroud around the arc tube to restrict end-of-life rupture. HID lamps for exterior luminaires shall be clear.

2.4 ACCEPTABLE MANUFACTURERS

- A. Cooper
- B. Lithonia
- C. Thomas
- D. Hubbell
- E. General Electric
- F. Lightolier
- G. Colombia/Prescolite/Moldcast

PART 3 - EXECUTION

3.1 GENERAL

- A. See Section 260500 BASIC MATERIALS.

3.2 INSTALLATION OF LUMINAIRES

- A. Install luminaires at locations and heights as indicated, in accordance with luminaire manufacturers' written instructions, applicable requirements of NEC and NEMA standards, and with recognized industry practices, to ensure that luminaires fulfill requirements.
- B. Electrical drawings show luminaire types, quantities, circuiting and approximate locations. Exact locations shall be as per the architectural drawings. Where exact dimensions are not given luminaires shall generally be centered in the room or area, equally spaced, sides parallel to walls, level, and in a straight line (for rows). Where conflicts occur or where exact locations cannot be determined, request clarification from the Commissioner.
- C. Provide necessary boxes, canopies, stems, chain, and mounting hardware for a complete installation.
- D. Luminaire suspension and mounting methods shall be capable of supporting the weight of the luminaire, plus the forces applied during re-lamping and maintenance.
- E. Pendant fluorescent luminaires shall be stem or chain suspended as indicated. Individual luminaires shall have two supports, equally spaced from each end. Continuous rows with rigid couplers shall have supports near the center of each luminaire, equally spaced. Stem-supported luminaires shall be wired via one of the stems. In finished or semi-finished areas, outlet boxes and stem mountings shall be provided with decorative canopies. Chain-supported luminaires shall be wired with 3-conductor Type MC cable, strapped to the chain to provide a neat appearance, with appropriate cable connectors at each end. Pendant luminaires shall be hung plumb and level, parallel and perpendicular

to walls.

- F. In unfinished areas and areas without finished ceilings including but not limited to Mechanical Equipment Rooms, storage rooms and utility corridors, install luminaires after completion of ductwork and piping, in approximately the locations shown. Luminaires shall not be mounted above ducts or pipes where rendered inaccessible or where the light will be substantially blocked. Luminaires shall not be supported from ductwork or piping. In Mechanical Equipment Rooms mounting heights and exact locations shall be field-determined, but in no case shall mounting height be less than 7'-0". Provide necessary support as described in Section 260500.
- G. Continuous rows of luminaires shall be rigidly aligned to provide a true straight-line appearance.
- H. 2' x 2' fluorescent luminaires in any one area or corridor shall be mounted with the lamps oriented in the same direction.
- I. Ceiling mounted lighting track sections, recessed downlights, outlet boxes, exit signs, etc. shall be securely mounted to the ceiling grid system and not supported by the acoustical ceiling tile only. Track shall be installed parallel and perpendicular to the grid system, unless otherwise indicated.
- J. Lay-in troffers for exposed grid ceilings shall be provided with hold-down clips to prevent T-bar spread and subsequent falling of luminaire.
- K. Recessed luminaires weighing more than fifty pounds shall not be installed directly on the concealed or exposed ceiling spline of a lightweight, mechanical acoustical ceiling system. Such fixtures shall be supported from the channel iron or the building structure.
- L. Surface or pendant type luminaires, regardless of their weight, shall not be mounted directly on the concealed or exposed ceiling spline of lightweight, mechanical acoustical ceiling system. Such luminaires shall be supported from the channel iron or the building structure.
- M. Install flush mounted luminaires to eliminate light leakage between luminaire frame and finished surface.
- N. Provide plaster frames for recessed luminaires installed in other than suspended grid types acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.
- O. Support surface mounted luminaires greater than 2' in length at a point in addition to the outlet box luminaire stud.
- P. Extra care shall be taken in the handling of parabolic baffle and louver assemblies. Factory-installed plastic protection should be left intact until just before final job completion.
- Q. Fluorescent lamps shall be stored lying flat. Do not stand on end.
- R. Install exit signs to be readily visible per Code and adjust locations up to five feet from locations shown on drawings at no additional cost.
- S. Install and operate UV filtering sleeves luminaires to insure proper fit. If any condition of incompatibility with the proposed luminaires is found, Contractor #4 shall submit for approval a luminaire of equal appearance and quality that has been found to be compatible with the lamp/sleeve combination.

3.3 ADJUSTING AND CLEANING

- A. Clean luminaires of dirt and debris upon completion of installation.
- B. Protect installed luminaires from damage during remainder of construction period.
- C. Adjust the aiming of adjustable floodlights, track-mounted luminaires, wall-wash luminaires, etc. as directed, or as required to direct the illumination to the intended locations. Where applicable, such adjustments shall be performed at night.
- D. Level and grout pole and bollard bases.

3.4 EXTRA STOCK

- A. At date of substantial completion, turn over to City of New York, in original factory packaging, spare lamps equaling 10% of the installed quantity of each type, and spare ballasts equaling 5% of the installed quantity of each type, minimum two (2) of each type.

3.5 LUMINAIRE SCHEDULE

- A. Refer to lighting /architectural drawings for luminaire descriptions and schedules. Refer to lighting specification Section 265100 for luminaire descriptions and schedules in addition to those shown in the following schedule:

TYPE	LAMP	DESCRIPTION
B1	(2)F32T8/SPX35	4 FOOT, LINEAR, LOW PROFILE T8 FLUORESCENT FIXTURE. PROVIDE INTEGRAL EMERGENCY BALLST WHERE INDICATED AND TUBE GUARD. BARTCO #BFL257-32 -120V- EB- TG Or approved equal.
B2, B2A, B2B	-	SINGLE CIRCUIT, SURFACE MOUNTED LIGHT TRACK IN MATTE BLACK FINISH. PROVIDE ALL COMPONENTS AND HARDWARE FOR A COMPLETE SYSTEM. PHILIPS LIGHTOLIER BASIC LYTESPAN 6000 SERIES - 120V <ul style="list-style-type: none"> • B2 - 45 1/16" • B2A - 96" • B2B - 93 1/16" Or approved equal.
B3	60W PAR16 NFL (HALOGEN)	BASIC CYLINDER TRACK LIGHT FIXTURE IN MATTE BLACK FINISH. LIGHTOLIER #6355 - 120V Or approved equal.
B4, B4A	6W WARM WHITE LED 3000K	LOW PROFILE STEP LIGHT WITH GLASS FACEPLATE. COLE LIGHTING #L 2158G-J -120V <ul style="list-style-type: none"> • B4 - BOTTOM MOUNTED JUNCTION BOX • B4A - BACK MOUNTED JUNCTION BOX Or approved equal.

B5	(8) 57W COMPACT FLUORESCENT	ARCITECTURAL GRADE HIGH BAY LIGHT FIXTURE WITH ALUMINUM DOME AND 21" DROP CLEAR POLY LENS. PHILIPS SPORTLITE TDX T5711S BK & 21DLCPV Or approved equal.
B6	150W A21	WALL MOUNTED LIGHT FIXTURE WITH TEMPERED 100 SERIES "BLUE" COLORED GLOBE AND GUARD. HUBBELL KILLARK #NV2IG15BHG Or approved equal.
X	L.E.D.	RECESSED EDGE-LIT EXIT SIGN WITH LED LIGHT SOURCE, 8" RED LETTERS ON CLEAR BACKGROUND WITH TRIM PLATE. SELF-CONTAINED EMERGENCY POWER BATTERY PACK WITH SELF-DIAGNOSTICS. FINISH PER COMMISSIONER. MOUNTING AND ARROWS AS REQUIRED. <ul style="list-style-type: none"> • SIGNTEX INC. CRYSTAL RECESSED CRR SERIES. • COOPER ATLITE MARATHON RECESSED SERIES. • HUBBELL DUAL-LITE NYE SERIES. Or approved equal.
X1	L.E.D.	PENDANT EDGE-LIT EXIT SIGN WITH LED LIGHT SOURCE, 8" RED LETTERS ON CLEAR BACKGROUND WITH TRIM PLATE. SELF-CONTAINED EMERGENCY POWER BATTERY PACK WITH SELF-DIAGNOSTICS. FINISH: MATTE BLACK. PENDANT: 25.25 INCHES. <ul style="list-style-type: none"> • SIGNTEX INC. CRYSTAL #CRS8BB-1RCX (MATTE BLACK)-NA-TW-PENX (25.25")-DG • COOPER ATLITE MARATHON SERIES. • HUBBELL DUAL-LITE NYE SERIES. Or approved equal.

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SECTION 26 51 00

ARCHITECTURAL LIGHTING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. General: Provide Architectural lighting in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Lighting Control Equipment
- B. Emergency Lighting

1.03 DEFINITIONS

- A. Fixture: The elements of a luminaire that are designed to distribute the light, and to position and protect the lamps.
- B. Luminaire: A complete lighting unit consisting of a lamp or lamps and ballasting (when applicable) together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to the power supply.
- C. Lighting Unit: A fixture or an assembly of fixtures with a common support, including a pole or bracket plus mounting and support accessories.
- D. Average Life: The time after which 50 percent of the lamps fail and 50 percent of the lamps survive under normal conditions.

1.04 QUALITY ASSURANCE

- A. Fixture Materials: Provide fixture parts and components that are constructed of materials most appropriate to their use or function, and that are resistant to corrosion in a marine environment and mechanical stresses encountered in the normal application and function of the fixtures.
- B. Manufacturers: Provide fixtures from manufacturers making like products for not less than three years.
- C. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL.
- D. Listing and Labeling: Provide fixtures and accessory components specified in this Section that are listed and labeled for their indicated use and installation conditions on Project.
 - 1. Special Listing and Labeling: Provide fixtures for use in damp or wet locations, underwater, and recessed in combustible construction that are specifically listed and labeled for such use. Provide fixtures for use in hazardous (classified) locations that are listed and labeled for the specific hazard.
 - 2. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

3. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- E. Applicable Codes: Fixtures shall be made and installed in accordance with the current version of the National Electric Code, the Uniform Building Code, the Federal Occupational Safety & Health Act, local codes and any other applicable regulations.
- F. Measuring and Testing Equipment: Instruments for the measurement of voltage, luminaire temperature, lighting level and fixture brightness level shall be available at all times on the site.

1.05 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, unless noted otherwise. Contractor shall be allowed one initial submission and one resubmission to meet all specification requirements. If the fixture submittals are not acceptable for approval after one resubmission, Contractor shall be required to provide fixtures exactly as specified, except where otherwise noted by the Commissioner.
- B. Substitutions:
 1. Contractor-offered substitutions beyond those named within the Luminaire Schedule in this Section must meet or exceed the aesthetic, dimensional and performance characteristics of the specified products. The Commissioner reserves the right to reject substitution submittals that do not meet the requirements of the application. In that event one of the specified products would have to be resubmitted.
 2. Some luminaires included in this specification are unique designs, available only from the specified manufacturer. No attempt shall be made to solicit bids from other manufacturers to copy or "knock-off" these luminaires.
 3. Some luminaires included in this specification are listed as having no alternate manufacturers. Where this is the case, it is because the Commissioner was unable to find a product for specification that met the requirements of the application. In these cases, the Contractor shall refer to Note 2.
- C. Product Data: Fixtures, lamps, ballasts and poles or other mounting components. Arrange Product Data for fixtures in order of fixture designation. Include data on features and accessories and the following:
 1. Outline drawings indicating dimensions and principal features of fixtures.
 2. Electrical Ratings and Photometric Data: Certified results of independent laboratory tests for fixtures and lamps. Provide data for the specified lamp or lamp/ballast combination.
- D. Provide data as required to demonstrate that the submitted product meets or exceeds the performance of the specified fixture.
 1. Include photometric data charts: C.U., candlepower distribution and/or luminance information as necessary.

2. Where technical charts alone cannot substantiate compliance, the submitting manufacturer may be required to provide a full photometric study of a specific project application for verification.
3. Lamp Data: Manufacturer, ordering code and technical information.
4. Ballast Data: Manufacturer, ordering code and technical data showing compliance with requirements.
 - a. Where a fixture manufacturer will utilize ballasts from multiple manufacturers depending on availability, technical data must indicate the minimum characteristics that will be met in all cases.
- E. Scaled shop drawings detailing nonstandard fixtures and indicating dimensions, weights, method of field assembly, components, features, and accessories. Details shall be scaled at not less than half full size.
 1. Scaled shop drawings of continuous run fixtures shall indicate overall length of each run, lamp combinations used to achieve the length, and any accessory components required.
- F. Wiring diagrams detailing wiring for control system showing both factory-installed and field-installed wiring for specific system of this Project, and differentiating between factory-installed and field-installed wiring.
- G. Coordination Drawings showing fixtures mounted on, in, or above ceiling. Indicate coordination with ceiling grids and other equipment installed in vicinity.
- H. Product certificates signed by manufacturers of lighting fixtures certifying that their products comply with specified requirements.
- I. Field test reports indicating and interpreting test results specified in Part 3 of this Section.
- J. Maintenance data for fixtures to include in the operation and maintenance manual specified in Division 1.

1.06 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall be in addition to, and run concurrent with, other warranties made under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty signed by manufacturer agreeing to replace external parts of lighting fixtures exhibiting a failure of finish as specified below. This warranty is in addition to, and not a limitation of, other rights and remedies specified elsewhere within the Contract Documents.
 1. Protection of Metal from Corrosion: Warranty against perforation or erosion of finish due to weathering.
 2. Color Retention: Warranty against fading, staining, and chalking due to effects of weather and solar radiation.
 3. Special Warranty Period: 3 years from date of Substantial Completion.

- C. **Special Warranty for LED Luminaires and drivers:** Submit a written warranty signed by manufacturer agreeing to replace LED luminaires and drivers that fail within 5 years from date of Substantial Completion.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. **Delivery:** Luminaires and lighting equipment shall be delivered to the project complete, including mounting devices, lamps, and components necessary for the proper operation of the equipment.
- B. **Marking:** All equipment must be clearly and boldly identified as to the fixture type and, where practicable, the fixture location.
 - 1. **Voltage Identification:** Fixtures designed for voltages other than 110-125 volt circuits shall be clearly marked.
 - 2. **Lamp Ballast Coordination:** Fixtures equipped with ballasts for operation of rapid start lamps shall be plainly marked "Use Rapid Start Lamps Only." Similarly, fixtures equipped with ballasts or other components requiring use of specific types of lamps shall be plainly marked. Markings must be clear and shall be located to be readily visible to service personnel *but invisible from normal viewing angles* when lamps are in place.
- C. **Timely Purchase:** Luminaires, associated lamps and other allied equipment shall be ordered in a timely fashion and securely stored to be available to meet the project schedule.

1.08 EXTRA MATERIALS

- A. **Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.**
 - 1. **Lamps:** 10 lamps for every 100 of each type and rating installed. Furnish at least one of each type.
 - 2. **Plastic Diffusers and Lenses:** 1 for every 100 of each type and rating installed. Furnish at least one of each type.
 - 3. **Ballasts:** 1 for every 100 of each type and rating installed. Furnish at least one of each type.
 - 4. **Globes and Guards:** 1 for every 20 of each type and rating installed. Furnish at least one of each type.
 - 5. **Parabolic Louvers and Reflector Cones:** 1 for every 100 of each type. Furnish at least one of each type.
 - 6. **Custom Luminaires:** When 10 identical custom fixtures are furnished, furnish one complete spare custom fixture as attic stock. Attic stock for custom color housings and reflector trims shall be furnished at the ratio of 1 for every 20, but no less than one.
 - 7. **LED Modules:** 1 for every 50 of the same type, from the same production run as the installed products.

8. Tools: Furnish manufacturer's recommended number of each tool required to service and maintain the fixtures.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Products: Subject to compliance with the submittal requirements of this specification, fixtures that may be incorporated into the Work include, but are not limited to, the products specified in the Lighting Fixture Schedule at end of this Section. The photometric performance of all submitted products must meet or exceed the performance of the specified fixtures where proposed.

2.02 FIXTURES AND FIXTURE COMPONENTS, GENERAL

- A. Sheet Metal Components: Provide the required dimensional thickness of metal, plastic and composite materials so that all fixtures are rigid, stable and will resist deflection, twisting, warping under normal installation, and relamping procedures.
 1. All luminaire housings shall be minimum 0.84 mm cold rolled steel, unless a heavier gauge is specified or required by code.
 2. All aluminum extrusion housings shall be minimum 5 mm thick.
 3. All spun, hydro-formed or sheet aluminum reflectors shall be fabricated from # 12 aluminum sheets minimum, 1.45 mm or heavier. Material shall be 3002 alloy, 99.5 percent pure aluminum with uniform grain structure.
 4. All spun aluminum housings shall be of an alloy of the 5000 series (ANSI/ASTM-B209-1977) or of an alloy that is found to have equal corrosion resistance.
- B. Joints: Provide positive, durable, means of connection at all joints as required. No hollow rivets, unless specifically approved.
- C. Gaskets: Provide neoprene, silicone, rubber, or other appropriate gaskets, stops, and barriers where required to prevent light leak, control sound and vibration, prevent water leaks and, if pertinent, water vapor penetration.
- D. Edges: Provide finished product with the following minimum qualities:
 1. Ground and/or burr free metal edges.
 2. Tight fitting connections, hinges, and closures.
 3. Clean neat corners, edges, trims, and frames.
- E. Castings: All cast parts, including die-cast members, shall be of uniform quality; free from blow holes, pores, hard spots, shrinkage defects, cracks, and/or other imperfections that affect strength and appearance, or are indicative of inferior metals or alloys.
- F. Reflecting Surfaces: Minimum reflectance as follows, except as otherwise indicated:
 1. White Surfaces: 85 percent.

2. Specular Surfaces: 83 percent.
 3. Diffusing Specular Surfaces: 75 percent.
 4. Laminated Silver Metallic Film: 90 percent.
- G. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or water white, annealed crystal glass, except as otherwise indicated. Greenish-tinted lenses are not acceptable. Heat resistant where required: borosilicate or Pyrex glass.
1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 2. Lens Thickness: 0.125 inch (3 mm) minimum; except where greater thickness is indicated.
- H. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
- I. Fixture Support Components: Comply with Division 26 Section "Basic Electrical Materials and Methods."
1. Single-Stem Hangers: ½ inch (12 mm) steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture
 2. Twin-Stem Hangers: Two, ½ inch (12 mm) steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture.
 3. Rod Hangers: 3/16 inch (5 mm) minimum diameter, cadmium-plated, threaded steel rod.
 4. Hook Hanger: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
- J. Track-Lighting Systems: Provide components, including track, fittings, and fixtures from same manufacturer and as recommended by manufacturer for intended use.
1. Maintain a continuity of conductors through feeds, splices, and boxes. The relative positions of live and neutral conductors must always be maintained along a continuous run so that track fittings connect into the track in a consistent manner.
 2. Install surface mounted track straight and true regardless of the ceiling contour.
- K. Cast-in Fixture: Housings installed directly in concrete shall be fabricated of hot dip galvanized steel or cast aluminum. Where cast aluminum housings are used, give two coats of asphaltum paint prior to installation. To prevent direct contact of housings to concrete, 3 mm thick x 51 mm diameter solid neoprene grommets shall be furnished at every point light fixture surfaces are mounted to concrete structure.

2.03 FINISHES

- A. Manufacturer's standard, except as otherwise indicated, applied over corrosion-resistant treatment or primer, free of streaks, runs, holidays, stains, blisters, and similar defects.
1. Prior to finishing, all surfaces must be free from foreign materials such as dirt, rust, oil, polishing compounds, and mold release agents.
 2. Where necessary, surface cleaned by accepted chemical means shall receive corrosion inhibiting phosphating treatment assuring positive paint adhesion.
 3. All castings and extrusions shall be machined, sanded or similarly treated, and given minimum one coat of baked-on clear methacrylate lacquer, unless a painted finish is specified.
 4. Aluminum surfaces exposed to weather (other than anodized reflectors covered elsewhere) receive a duronodic or polyester powder paint finish as specified for corrosion resistance.
 5. Sheet steel fixture housings, iron and steel parts, which have not received phosphating treatment ("Bonderizing" or similar process) or are to be utilized in exterior applications, are to be made corrosion resistant by zinc or cadmium plating or hot-dip galvanizing.
 6. Anodized aluminum reflectors required for exterior use shall have a minimum of 0.02 mm anodizing thickness.

2.04 LAMPS

- A. Available Products: Lamps of the same type (such as fluorescent or HID) shall be supplied from the same manufacturer. Where a specific lamp manufacturer has been indicated in the Luminaire Schedule within this Section, lamps shall be supplied from the named manufacturer. Provide fluorescent lamps from Osram Sylvania or Philips Lighting.
- B. Fluorescent Color Temperature and Minimum Color-Rendering Index (CRI): 3000 K and 85 CRI, except as otherwise indicated.
- C. Linear Fluorescent Lamp Life: Rated average is 25,000 hours at 3 hours per start when used on rapid start circuits.
- D. Environmentally Responsible Lamp Technology: Use only fluorescent and metal halide sources that are low mercury and TCLP-compliant, except where not available in a specified lamp type.
- E. Lamp Burn-in Period: Fluorescent and metal halide lamps that are specified for dimming shall be burned-in, or run continuously in a non-dim state, for a period of 100 hours prior to dimming the lamps.
- F. Solid State Lighting / Light Emitting Diode (LEDs):
1. All individual LEDs used within a luminaire must be manufactured by a reputable LED manufacturer, such as Cree, Osram Sylvania, Nichia, Philips (Lumileds) or approved equal. LED modules shall be manufactured by Bridgelux, Philips (Fortimo) or Xicato.
 2. Testing: All products shall be tested by a Nationally Recognized Testing Laboratory (NRTL) in accordance with IES LM-79 testing methods and shall carry a UL, ETL or CSA label. Fixture manufacturer shall confirm in writing that

the LEDs within the fixture will not exceed the maximum temperature to which the LED die was tested using IES LM-80 testing methods.

3. **Drive Current, Thermal Management and LED rated Life:** Drivers must not over-drive the LEDs beyond LED manufacturer's recommendations and shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management of LEDs within their fixtures. Drive current and luminaire thermal design must ensure minimum 50,000 hour rated life for the LEDs.
4. **Color Consistency:** All LEDs from the same manufacturer, both within each luminaire and from luminaire to luminaire, must be batch-sorted for visual color and brightness consistency. All luminaires of the same type shall be supplied at the same time and shall come from the same batch. Spare luminaires shall be provided from the same batch.
5. **Dimming:** Luminaire manufacturer must provide specific data on the means of dimming for coordination of the proper control device (specified elsewhere). Acceptable methods include electronic low voltage dimming and 0-10V 4-wire dimming protocol. Dimming must provide uniform, smooth, full-range dimming. LEDs must maintain consistent brightness and color throughout the dimming range.
6. **Technology Upgrades:** Supply the newest LED technologies that are available for the specified products when the orders are released, as long as there are no increases in input watts or cost.
7. **Warranty:** See Part 1.6 C. above for the warranty requirement for LED luminaire systems and LED drivers.

2.05 LAMPHOLDERS

- A. **Screw Base:** Screw base sockets for incandescent and metallic vapor lamps shall be of heavy duty heat resistant porcelain with spring center contacts and plated screw shells. For ceramic metal halide lamps with electronic ballasts, provide minimum 4 KV pulse rated lampholders.
- B. **Fluorescent Sockets:** Fluorescent lamp sockets operating with an open circuit voltage in excess of 300 volts shall be of the safety type that open the supply circuit when the lamp is removed from the sockets.

2.06 BALLASTS

- A. **Fluorescent Ballasts:** Electronic integrated circuit, solid-state, full-light-output, energy-efficient rapid start type, unless otherwise indicated; must be compatible with lamps and lamp combinations to which connected.
 1. Underwriters Laboratories (UL) listed, Class P, Type 1.
 2. Certification by Certified Ballast Manufacturers Association (CBM).
 3. Ballast shall be rapid start, unless otherwise indicated. Ballast starting parameters shall be consistent with lamp manufacturer's recommendations and shall provide full rated lamp life under normal operating conditions.

4. Ballast shall have audible noise rating of Class "A" except as otherwise indicated.
5. Voltage: Match connected circuits.
6. Lamp Flicker: Less than 5 percent.
7. Minimum Power Factor: 95 percent.
8. Total Harmonic Distortion (THD) of Ballast Current: 20 percent or less.
9. Minimum Ballast Factor (relative light output): 88 percent for T8 lamps, 87 percent for T5 compact fluorescent, 97 percent for all T4 compact fluorescent, and 100 percent for linear T5.
10. Multi-Lamp Ballasts: Use 2 lamp ballasts for multi-lamp fixtures where possible. Supply 3 or 4 lamp ballasts only if the ballasts comply with the other requirements of this specification.
11. Lamp-ballast connection method shall not reduce normal rated life of lamps.
12. Ballast shall comply with all applicable local, state, and federal efficiency standards.
13. For lamps smaller than one inch in diameter (all T2, T4 and T5 lamps) ballasts shall be equipped with a cut-off circuit that senses an over-voltage condition to the lamp for end-of-life protection.
14. Low-Temperature Fluorescent Ballasts: Comply with above requirements, except ballast may be Class P electromagnetic type. Starting temperature shall be minus 20 deg. F or colder, or the minimum available depending on lamp type.
15. Dimming Ballasts: Electronic rapid start type providing smooth dimming over a minimum range from 100 to 1 percent light output (unless otherwise specified). Listed for use with specific fluorescent dimming system provided.
16. Remote Ballasts: Where ballasts must be mounted remotely from fixtures, provide locations that fall within the manufacturer's recommended distance limitations.

2.07 TRANSFORMERS

- A. Suitability: Transformers shall be of the best quality and sized to compensate for voltage drop over indicated distances and meet with the following requirements:
 1. Where possible transformers have an integral line voltage switch.
 2. All transformers shall be locally fused.
 3. Provide adequate ventilation to meet code and manufacturers' requirements concerning temperature rise.

2.08 LED DRIVERS

- A. Provide line voltage LED product, where available, to eliminate the need for drivers. If the LED product is not available as line voltage, then the LED drivers shall meet the following requirements:
1. Drivers shall have a minimum efficiency of 85%
 2. Starting Temperature: -40° C
 3. Input Voltage: capable of 120 to 480 ($\pm 10\%$) volt, single phase or as required by the site
 4. Power supplies can be UL Class I or II output
 5. Surge Protection: The system must survive 250 repetitive strikes of "C Low" (C Low – 6kV/1.2 x 50 μ s, 10kA/8 x 20 μ s) waveforms at 1 minute intervals with less than 10% degradation in clamping voltage. "C Low" waveforms are as defined in IEEE/ASNI C62.41.2-2002, Scenario 1 Location Category C
 6. Drivers shall have a Power Factor (PF) of: ≥ 0.90
 7. Drivers shall have a Total Harmonic Distortion (THD) of: $\leq 20\%$
 8. Drivers shall comply with FCC 47 cfr part 18 non-consumer RFI/EMI standards
 9. Drivers shall be Reduction of Hazardous Substances (RoHS) compliant (see <http://www.rohs.eu/english/index.html>)

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's written instructions and approved Shop Drawings. Support fixtures according to requirements of Division 26 Section "Basic Electrical Materials and Methods".
- B. Support for Recessed and Semi-recessed Grid-Type Fluorescent Fixtures: Units may be supported from suspended ceiling support system, unless prohibited by local codes. No movement permitted after installation. Install ceiling support system rods or wires at a minimum of 4 rods or wires for each fixture, located not more than 6 inches (150 mm) from fixture corners.
1. Install support clips for recessed fixtures, securely fastened to ceiling grid members, at or near each fixture corner.
 2. Fixtures Smaller than Ceiling Grid: For fixtures that normally mount at the ceiling grid on at least one side, install a minimum of 4 rods or wires for each fixture and locate at corner of ceiling grid where fixture is located. Provide additional ceiling grid to frame out fixture. Do not support fixtures by ceiling acoustical panels.
 3. Fixtures of Sizes Less than Ceiling Grid: Center in acoustical panel. Support fixtures independently with at least two $\frac{3}{4}$ inch (20 mm) metal channels spanning and secured to ceiling tees.

- C. Support for Suspended Fixtures: Brace pendants and rods over 48 inches (1200 mm) long to limit swinging. Support stem-mounted, single-unit, suspended fluorescent fixtures with twin-stem hangers. For continuous rows, use tubing or stem for wiring at one point and tubing or rod or cable for suspension for each unit length of chassis, including one at each end.
 - 1. Provide all mounting components required for installation, including hickeys, stud-extensions, ball-aligners, canopies and stems.
 - 2. Provide stems on pendant fixtures of the correct length to uniformly maintain the fixture heights shown on the drawings or established in the field.
- D. Cast-in Fixtures: Housings installed directly in concrete shall be fabricated of hot dip galvanized steel or cast aluminum. Where cast aluminum housings are used, give two coats of asphaltum paint prior to installation. To prevent direct contact of housings to concrete, 3 mm thick x 51 mm diameter solid neoprene grommets shall be furnished at every point light fixture surfaces are mounted to concrete structure.
- E. Fixture Attachment: Fasten to indicated structural supports.
- F. Fixture Attachment with Adjustable Features or Aiming: Attach fixtures and supports to allow aiming for indicated light distribution.
- G. Lamping: Where specific lamp designations are not indicated, lamp units according to manufacturer's instructions.
- H. Installation Sequence: Install fixture mounting frames, plaster rings, etc. prior to the trim assembly, which shall not be installed until the project is "broom-clean." Where the fixture location or construction does not permit sequential installation, all reflectors, lenses, flanges, and other visible surfaces shall be carefully protected.

3.02 WIRING

- A. Minimum Standards: All wiring shall comply with the following standards:
 - 1. Wiring between fluorescent lamp holders and associated operating and starting equipment shall be of similar or heavier gauge than the leads furnished with the approved ballasts.
 - 2. Wire leads to the receptacle or connector of any side prong incandescent lamp or any "cool-beam" lamp, or any lamp 200 watts or over shall be SF-2 (silicone rubber insulated) stranded wire.
 - 3. Wiring within fixture construction is to be concealed, except where the fixture design or mounting dictates otherwise.
 - 4. Wiring channels and wireways shall be free from projections and rough or sharp edges throughout, and at all points or edges over which conductors must pass and may be subject to injury or wear.
 - 5. Insulated bushings shall be installed at points of entrance and exit of flexible wiring.

3.03 GROUNDING

- A. Ground fixtures according to the grounding provisions found under Section 26 0000 General Provisions for Electric, and 26 0500 Basic Materials for Electric. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values.

3.04 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Give advance notice of dates and times for field tests.
- C. Provide instruments to make and record test results.
- D. Tests: Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source.
- E. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.
- F. Report results of tests.
- G. Replace fixtures that show evidence of corrosion during Project warranty period.

3.05 CLEANING AND ADJUSTING

- A. Clean Fixtures After Installation: Remove all protective strippable coatings, dust, finger marks, paint spots, and any materials deleterious to the appearance or functioning of the fixtures. Use methods and materials recommended by manufacturer. Abrasive cleaners are not permitted.
- B. Focusing and Adjustment: After installation of all lighting fixtures, finishes and furnishings has been completed, provide personnel, ladders or lifts, spare lamps, and any other equipment necessary to expeditiously focus all lighting. All work shall be performed in accordance with applicable codes.
 - 1. Aim all adjustable lighting fixtures according to instructions.
 - 2. Program preset dimming system "scene" lighting levels, where applicable.

3.06 FINAL INSPECTION

- A. Upon completion of the installation, lighting equipment must be in first class operating order and free from defects in condition or finish.
 - 1. At time of final inspection, all fixtures and equipment must be installed and lamped with *new* lamps and be complete with all lenses, diffusers, reflectors, side panels, louvers, or other necessary components. Lamps that have been operating longer than the following time limits or that have already burned out must be replaced with new lamps prior to final completion.
 - a. Halogen Incandescent lamps: 200 hours (approximately 25 eight-hour days).

- b. Non-halogen Incandescent lamps: 75 hours (approximately 9 eight-hour days).
 - c. Fluorescent lamps: 1000 hours (approximately 125 eight-hour days).
 - d. HID lamps: 1000 hours (approximately 125 eight-hour days).
2. Fixtures shall be completely clean and free from finger marks, dust, plaster, or paint spots.
3. Any reflectors, lenses, diffusers, side panels, or other parts damaged prior to the final inspection shall be replaced.
4. Housings shall be rigidly installed and adjusted to a neat flush fit with the ceiling.
5. *No light leaks* shall be permitted at the ceiling line or from any visible part or joint.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L1	NOT USED		
L1A	Indirect/direct linear fluorescent T5 pendant suspended from sheetrock ceiling with 1-lamp cross section – nominally 8'-0" length Location: Admin Office 203	(3) FP21/830/ECO Input Watts: 74W	AXIS LIGHTING BDI-S-C-8-T5-1S-W-277V-ERS-1- CA With satin lens on bottom and clear lens on top; with minimum 4" overlap staggered lamps; bottom of fixture at 8'-0" A.F.F. in 9'-3" ceiling height; with white finish; provide with matching 4-1/4" diameter canopies, for feed and non-feed points, mounted in sheetrock ceiling; manufacturer's shop drawings showing length, lamping, and mounting are required for approval <i>Or approved equal by Gammalux or Focal Point</i>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L1B	<p>Indirect/direct linear fluorescent T5 pendant suspended from sheetrock ceiling with 1-lamp cross section – nominally 12'-0" length</p> <p>Location: Admin Office 209</p>	<p>(2) FP28/830/ECO (2) FP21/830/ECO</p> <p>Input Watts: 111W</p>	<p>AXIS LIGHTING BDI-S-C-S12-T5-1S-W-277V-ERS-1-CA</p> <p>With satin lens on bottom and clear lens on top; with minimum 4" overlap staggered lamps; bottom of fixture at 8'-0" A.F.F. in 9'-3" ceiling height; with white finish; provide with matching 4-1/4" diameter canopies, for feed and non-feed points, mounted in sheetrock ceiling; fixture canopy mounted in sheetrock ceiling; manufacturer's shop drawings showing length, lamping, and mounting are required for approval</p> <p><i>Or approved equal by Gammalux or Focal Point</i></p>
L1C	NOT USED		
L2	<p>Recessed linear fluorescent T5 slot fixture installed in 6" wide technical zone of an acoustical ceiling with 1-lamp cross section – nominally 4'-0" length</p> <p>Location: Admin Offices 204, 205, 211, 212, 213, & 214; Pantry 218</p>	<p>FP28/830/ECO</p> <p>Input Watts: 33W</p>	<p>AXIS LIGHTING B6R-S-FL-4-T5-1-W-UNV-ERS-1-TG9</p> <p>Provide with satin lens; recessed in a 6" wide technical zone; with tegular 9/16" grid; recessed in 8'-0" & 9'-3" ceiling height</p> <p><i>Or approved equal by Gammalux or Focal Point</i></p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L2A	Recessed linear fluorescent T5 slot fixture installed in 6" wide technical zone of an acoustical ceiling with staggered 1-lamp cross section – nominally 6'-0" length Location: Admin Offices 206, 210	FP21/830/ECO FP28/830/ECO Input Watts: W	AXIS LIGHTING B6R-S-FL-6-T5S-1-W-UNV-ERS-1-TG9 Provide with satin lens; recessed in a 6" wide technical zone; with tegular 9/16" grid; recessed in 9'-3" ceiling height <i>Or approved equal by Gammalux or Focal Point</i>
L2B	Recessed linear fluorescent T5 slot fixture installed in 6" wide technical zone of an acoustical ceiling with staggered 1-lamp cross section – nominally 8'-0" length Location: Admin Office 216	(3) FP21/830/ECO Input Watts: 70W	AXIS LIGHTING B6R-S-FL-8-T5S-1-W-UNV-ERS-1-TG9 Provide with satin lens; recessed in a 6" wide technical zone; with tegular 9/16" grid; recessed in 9'-3" ceiling height <i>Or approved equal by Gammalux or Focal Point</i>
L2C	NOT USED		
L2D	NOT USED		
L3	NOT USED		
L3A	NOT USED		
L4	NOT USED		
L5	NOT USED		
L5A	NOT USED		
L5B	NOT USED		

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L6	Surface mounted under cabinet linear fluorescent task light wired to ceiling occupancy sensor – nominally 3'-0" length Location: Ticketing 103, Office 114, Green Room 120, Wardrobe 159, Office 214, Copy/Storage 215, Pantry 218	FP21/830/ECO Input Watts: 29W <u>120V Only</u>	ALKCO LIGHTING L2F3-120V-SWH-SW Fixture to be wired to ceiling occupancy sensor; with low profile switch; low profile switch available only at 120V; fixture is hardwired; fixture to be completely hidden from view by millwork – Commissioner to coordinate mounting; with soft white finish
L7	Pipe mounted PAR38 adjustable halogen accent light Location: Theater 1	100PAR38/IRC/HAL/ FL25 Philips Lumens:2200 CBCP: 8500 Input Watts: 100W	LIGHTING SERVICES INC. 238-3G-WL-B-C998 With black housing finish; with wrench locking and beam softener lens; provide c-clamp mounting with cord – hardwired to junction box for house lighting
L7A	NOT USED		
L7B	NOT USED		
L7C	NOT USED		
L8	Recessed BT15 halogen 5" aperture downlight with poured-in-place concrete housing Location: Theater 1	BC75BT15/HAL/CL Philips Input Watts: 75W	EDISON PRICE HAL 15/4-COL-CCF-CONC Provide with poured-in-place concrete housing; Commissioner to coordinate fixture mounting with concrete mezzanine floor construction; Commissioner to provide custom color RAL flange finish to manufacturer; with semi-specular clear reflector finish

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L8 ALT	<p>Recessed dimmable LED 5" aperture downlight with poured-in-place concrete housing</p> <p>Location: Theater 1</p>	<p>3000K LEDs</p> <p>652 Total Lumens</p> <p>Input Watts: 14.7W</p>	<p>EDISON PRICE LED-OS-DL/5-800-3000-277V- COL-CONC-DM/Lutron "Hi-Lume A Series 1%"</p> <p>Provide with Lutron "Hi-Lume A Series 1%" LED driver to be used with dimming controls (specified by others); drivers to be remote outside theater- Commissioner to coordinate accessible and ventilated remote driver location; Commissioner to coordinate driver wiring with specified dimming controls; provide with poured-in- place concrete housing; Commissioner to coordinate fixture mounting with concrete mezzanine floor construction; Commissioner to provide custom color RAL flange finish to manufacturer; with semi- specular clear reflector finish</p>
L8A	<p>Recessed BT15 halogen 5" aperture downlight mounted in gyp. board ceiling</p> <p>Location: Theater 2 S.L.L.</p>	<p>BC75BT15/HAL/CL Philips</p> <p>Input Watts: 75W</p>	<p>EDISON PRICE HAL 15/4-COL-CCF</p> <p>Commissioner to coordinate fixture mounting with gyp. board ceiling; Commissioner to provide custom color RAL flange finish to manufacturer; with semi-specular clear reflector finish</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L8A ALT	Recessed dimmable LED 5" aperture downlight mounted in gyp. board ceiling Location: Theater 2 S.L.L.	3000K LEDs 652 Total Lumens Input Watts: 14.7W	EDISON PRICE LED-OS-DL/5-800-3000-277V- COL-DM/Lutron "Hi-Lume A Series 1%" Provide with Lutron "Hi-Lume A Series 1%" LED driver to be used with dimming controls (specified by others); drivers to be remote outside theater- Commissioner to coordinate accessible and ventilated remote driver location; Commissioner to coordinate driver wiring with specified dimming controls; Commissioner to coordinate fixture mounting with gyp. board ceiling; Commissioner to provide custom color RAL flange finish to manufacturer; with semi- specular clear reflector finish

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L9	Surface mounted dimmable linear LED wall grazer in cavity with remote power supplies – multiple lengths Location: Theater 1 (behind wood slats)	3000K LEDs 30deg. Beam 124 lumens/ft Input Watts: 4.5W/LF	WINONA LIGHTING WSL-102-(lengths)-30-30K-DM24V-A-NAA-STD Provide with 30° beam spread and 3000K color temperature LEDs; with remote mounted 24VAC magnetic transformer for use with low voltage magnetic dimming equipment (specified by others); remote power supplies to be located in nearby accessible ceilings outside of theater; cavity detail to be coordinated; two rows of fixtures per location – one row on top and one row on bottom inside cavity detail <i>Or approved equal by iO Lighting</i>
L9A	NOT USED		
L10	Surface mounted BT15 halogen 5" aperture downlight Location: Theater 1 (underneath Control Room)	BC75BT15/HAL/CL Philips Input Watts: 75W	EDISON PRICE BOM# 804883-MOD/-CC-COL-(black)-MG Fixture modified to take BT15 medium base lamp; Commissioner to coordinate fixture mounting with concrete control room floor construction; with black housing finish; with semi-specular clear reflector finish

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than ¾") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L10 ALT	Surface mounted dimmable LED 6" diameter cylinder downlight with integral power supply - nominally 11" length Location: Theater 1 (underneath Control Room)	3000K warm white LEDs 771 lumens 50,000 hours to L70 Input Watts: 18W	SOLID STATE LUMINAIRES DC1.0-S-3K-FL-BK-D Provide with 0-10V dimming driver to be used with dimming controls (specified by others); drivers to be remote outside theater- Commissioner to coordinate accessible and ventilated remote driver location; diecast and extruded aluminum housing; 25° narrow flood distribution; with black housing finish <i>Or approved equal by USAI</i>
L10A	NOT USED		
L10A ALT	NOT USED		
L11	Recessed 6" aperture 26W compact fluorescent downlight Location: Elevator Lobby 200, Admin 209	CF26DT/E/IN/830/ECO Input Watts: 28W	KURT VERSEN P921-SC-277V-WRL-WT Provide with SoftGlow clear reflector finish; Commissioner to coordinate mounting with sheetrock ceiling; with 26W wattage restriction label; L11, & L12 Series Kurt Versen flange sizes to match; with white flange finish

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L11A	NOT USED		
L12	<p>Recessed 6" aperture 26W compact fluorescent wallwasher</p> <p>Location: WC 112, ADA WC 113, Elevator Lobby 200, Admin 209, Copy/Storage 215, Hall 222</p>	<p>CF26DT/E/IN/830/ECO</p> <p>Input Watts: 28W</p>	<p>KURT VERSEN P953-SC-277V-WRL-WT</p> <p>Provide with SoftGlow clear reflector finish; Commissioner to coordinate mounting with sheetrock ceiling; consult manufacturer's instructions for correct mounting and housing orientation so that the designated wall will be washed; with 26W wattage restriction label; L11, & L12 Series Kurt Versen flange sizes to match; with white flange finish</p>
L12A	<p>Recessed 6" aperture 26W compact fluorescent corner wallwasher</p> <p>Location: Copy/Storage 215</p>	<p>CF26DT/E/IN/830/ECO</p> <p>Input Watts: 28W</p>	<p>KURT VERSEN P953-C-SC-277V-WRL-WT</p> <p>Provide with SoftGlow clear reflector finish; Commissioner to coordinate mounting with sheetrock ceiling; consult manufacturer's instructions for correct mounting and housing orientation so that the designated wall will be washed; with 26W wattage restriction label; L11, & L12 Series Kurt Versen flange sizes to match; with white flange finish</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L12B	<p>Recessed 6" aperture 26W compact fluorescent double wallwasher</p> <p>Location: Copy/Storage 215</p>	<p>CF26DT/E/IN/830/ECO</p> <p>Input Watts: 28W</p>	<p>KURT VERSEN P953-D-SC-277V-WRL-WT Provide with SoftGlow clear reflector finish; Commissioner to coordinate mounting with sheetrock ceiling; consult manufacturer's instructions for correct mounting and housing orientation so that the designated wall will be washed; with 26W wattage restriction label; L11, & L12 Series Kurt Versen flange sizes to match; with white flange finish</p>
L12C	NOT USED		
L12D	<p>Dimmable recessed 6" aperture 26W compact fluorescent double wallwasher</p> <p>Location: Rehearsal Studio 2</p>	<p>CF26DT/E/IN/830/ECO</p> <p>Input Watts: 33.2W</p>	<p>KURT VERSEN P953-D-SC-277V-DM/Lutron "Hi-Lume 1%"-WRL-WT Provide with Lutron "H-Lume 1%" electronic dimming ballast to be used with wall box dimming controls (specified by others); with double wallwash optic; provide with SoftGlow clear reflector finish; Commissioner to coordinate mounting with sheetrock ceiling; with 26W wattage restriction label; L11, & L12 Series Kurt Versen flange sizes to match; with white flange finish</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L12F	NOT USED		
L13	Surface mounted perimeter mounted linear fluorescent T5 with frosted lens – nominally 8' length Location: WC 121, Vestibule 119	(3) FP21/830/ECO Input Watts: 65W	AXIS LIGHTING BMS-F-8-T5-1S-W-277-ERS-1-S Surface mounted linear T5 fixture with frosted lens, provide .89 ballast factor program rapid start ballast equal to Universal Ballast B228PUNV90-C; fixture to run continuously from wall to wall, contractor to verify run length from field dimensions; Commissioner to verify white housing finish; manufacturer shop drawings showing run length, mounting and lamp are required for approval <i>Or approved equal by Gammalux or Selux</i>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L13A	Surface mounted perimeter mounted linear fluorescent T5 with frosted lens – nominally 19'-6" length Location: WC 122	(4) FP28/830/ECO (2) FP21/830/ECO Input Watts: 154W	<p>AXIS LIGHTING BMS-F-S(19'-6")-T5-1S-W-277-ERS-1-S</p> <p>Surface mounted linear T5 fixture with frosted lens, provide .90/.89 ballast factor program rapid start ballast equal to Universal Ballast B228PUNV90-C; fixture to run continuously from wall to wall, contractor to verify run length from field dimensions; Commissioner to verify white housing finish; manufacturer shop drawings showing run length, mounting and lamp are required for approval</p> <p><i>Or approved equal by Gammalux or Selux</i></p>
L13B	Surface mounted perimeter mounted linear fluorescent T5 with frosted lens – nominally 22'-9" length Location: WC 121	(5) FP28/830/ECO (2) FP21/830/ECO Input Watts: 184W	<p>AXIS LIGHTING BMS-F-S(22'-9")-T5-1S-W-277-ERS-1-S</p> <p>Surface mounted linear T5 fixture with frosted lens, provide .90/.89 ballast factor program rapid start ballast equal to Universal Ballast B228PUNV90-C; fixture to run continuously from wall to wall, contractor to verify run length from field dimensions; Commissioner to verify white housing finish; manufacturer shop drawings showing run length, mounting and lamp are required for approval</p> <p><i>Or approved equal by Gammalux or Selux</i></p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L13C	<p>Junction box mounted linear fluorescent T5 with asymmetric frosted optics—nominally 19'-0" length</p> <p>Location: Vestibule 119 (Control Room Level)</p>	<p>(4) FP28/830/ECO (1) FP21/830/ECO</p> <p>Input Watts: 152W</p>	<p>AXIS LIGHTING BMS-AF-S19-T5-1-AP-277-ERS-1-SC</p> <p>Junction box mounted asymmetric T5 linear fixture with frosted lens; Commissioner to coordinate j-box mounting with concrete slab ceiling; fixture to be mounted 18" away from wall to center of fixture; Commissioner to verify aluminum paint housing finish; manufacturer shop drawings showing mounting, lamping and length required for approval</p> <p><i>Or approved equal by Gammalux or Selux</i></p>
L13D	<p>Junction box mounted linear fluorescent T5 with asymmetric frosted optics—nominally 7'-0" length</p> <p>Location: Vestibule 119, Hall 158</p>	<p>(1) FP28/830/ECO (1) FP21/830/ECO</p> <p>Input Watts: 59W</p>	<p>AXIS LIGHTING BMS-AF-7-T5-1-AP-277-ERS-1-SC-C</p> <p>Junction box mounted asymmetric T5 linear fixture with frosted lens; Commissioner to coordinate j-box mounting with concrete slab ceiling; fixture to be mounted 18" away from wall to center of fixture; Commissioner to verify aluminum paint housing finish; manufacturer shop drawings showing mounting, lamping and length required for approval</p> <p><i>Or approved equal by Gammalux or Selux</i></p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than ¾") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L13F	<p>Junction box mounted linear fluorescent T5 with asymmetric frosted optics—nominally 4'-0" length</p> <p>Location: Vestibule 119</p>	<p>FP28/830/ECO</p> <p>Input Watts: 33W</p>	<p>AXIS LIGHTING BMS-AF-4-T5-1-AP-277-ERS-1-SC</p> <p>Junction box mounted asymmetric T5 linear fixture with frosted lens; Commissioner to coordinate j-box mounting with concrete slab ceiling; fixture to be mounted 18" away from wall to center of fixture; Commissioner to verify aluminum paint housing finish; manufacturer shop drawings showing mounting, lamping and length required for approval</p> <p><i>Or approved equal by Gammalux or Selux</i></p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L13H	<p>Perimeter wall mounted linear fluorescent T5 with asymmetric frosted optics—nominally 24'-0" length</p> <p>Location: Rehearsal Studio 2</p>	<p>(6) FP28/830/ECO</p> <p>Input Watts: 189W</p>	<p>AXIS LIGHTING BMWD-AF-7-T5-1-C-277-D/Lutron "H-Series"-1-C</p> <p>Provide with Lutron "H-Series 1%" electronic dimming ballast to be used with wall box dimming controls (specified by others); ballast can be wired in two different ways, high voltage or low voltage; Commissioner to coordinate wiring with specified dimming controls; perimeter wall mounted asymmetric T5 linear fixture with frosted lens - Commissioner to coordinate mounting; <u>asymmetric distribution to be aimed away from wall</u>; bottom of fixture to align with bottom of ducts; Commissioner to specify custom color housing finish; manufacturer shop drawings showing wall mounting, lamping and length required for approval</p> <p><i>Or approved equal by Gammalux or Selux</i></p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L14	<p>Surface wall mounted linear fluorescent T5 fixture with satin acrylic lens—nominally 3"H x 2-3/8"W x 4'-0" length</p> <p>Location: Hall 116, Vestibule 119, ADA W.C. 154 & 155, Hall 158</p>	<p>FP28/830/ECO</p> <p>Input Watts: 33W</p>	<p>PRUDENTIAL LIGHTING S1-1T5-04'-SAL-YGW-277V-SUR-T5OPT</p> <p>With satin acrylic lens at three sides; with gloss white housing finish; mounting height to be coordinated; allow 1" minimum space around fixture for removal of lens; with optimized length for T5 lamps to minimize socket shadows (T5OPT)</p>
L14A	<p>Surface wall mounted linear fluorescent T5 fixture with satin acrylic lens—nominally 3"H x 2-3/8"W x 18'-0" length</p> <p>Location: Dressing Room 156 & 157</p>	<p>(6) FP21/830/ECO</p> <p>Input Watts: 1C44W</p>	<p>PRUDENTIAL LIGHTING S1-1T5-R18'-SAL-YGW-277V-SUR-T5OPT</p> <p>With satin acrylic lens at three sides; with gloss white housing finish; mounting height to be coordinated; fixture is 18'-0" comprised of (3) 6'-0" length fixtures; allow 1" minimum space around fixture for removal of lens; with optimized length for T5 lamps to minimize socket shadows (T5OPT)</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L14B	Surface ceiling mounted linear fluorescent T5 fixture with satin acrylic lens—nominally 3"H x 2-3/8"W x 16'-0" length Location: Wardrobe 160	(4) FP28/830/ECO Input Watts: 126W	PRUDENTIAL LIGHTING S1-1T5-R16'-SAL-YGW -277V-SUR-T5OPT With satin acrylic lens at three sides; Commissioner to verify gloss white housing finish; fixture is 16'-0" comprised of (2) 8'-0" length fixtures; allow 1" minimum space around fixture for removal of lens; with optimized length for T5 lamps to minimize socket shadows (T5OPT)
L14C	Surface ceiling mounted linear fluorescent T5 fixture with satin acrylic lens—nominally 3"H x 2-3/8"W x 4'-0" length Location: Closet 151	FP28/830/ECO Input Watts: 33W	PRUDENTIAL LIGHTING S1-1T5-04'-SAL-YGW -277V-SUR-T5OPT With satin acrylic lens at three sides; Commissioner to verify gloss white housing finish; fixture is 4'-0"; allow 1" minimum space around fixture for removal of lens; with optimized length for T5 lamps to minimize socket shadows (T5OPT)
L15	In-grade linear fluorescent upright with stainless steel finish and white tempered glass lens – nominally 4" x 25" length Location: Control Room Level (underneath Stair 1)	FP14/830/ECO Input Watts: 18W	BEGA 8602P-14WT5-(side feed wiring) Fixtures wired in tandem from side feeds - Commissioner to coordinate; Commissioner to coordinate flush mounting into floor; with stainless steel finish and white tempered glass lens
L15A	NOT USED		

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L16	<p>Ceiling surface mounted compact fluorescent decorative acid-etched opal white glass globe fixture – nominally 13" diameter</p> <p>Location: Restrooms 122, ADA W.C. 218 & 220</p>	<p>CF26DT/E/IN/830/ECO</p> <p>Input Watts: 28W</p>	<p>FLOS FLO-BALL C</p> <p>Commissioner to coordinate mounting of fixture with sheetrock ceiling; gray painted aluminum diffuser support</p>
L17	<p>Wall surface mounted dimmable incandescent A-lamp "U" shaped construction strip light with lamp guard at each mirror – nominally 33" height x 24" width with 7 lamps</p> <p>Location: Dressing Rooms</p>	<p>(7) BC60BT15/HAL/W (Halogen A-lamp) Philips</p> <p>Input watts: 420W</p>	<p>COLE LIGHTING VS-12"-WG-(lengths)-SW-CO</p> <p>Supply with sockets 12" o.c. with polished chrome lamp guard and standard white powder coat finish channel approved by Commissioner on 02/20/12; with convenience outlet and integral rocker switch; see architectural drawings for run lengths and configuration; Manufacturer's shop drawings showing lengths, configurations, lamping and specified options required for approval</p>
L18	<p>Recessed 26W compact fluorescent wet location shower light with frosted lens</p> <p>Location: Shower 113</p>	<p>CF26DT/E/IN/830/ECO</p> <p>Input Watts: 28W</p>	<p>KURT VERSEN WP920-SC-FR-277V-WRL-WT</p> <p>Provide with frosted lens and SoftGlow clear reflector finish; with 26W wattage restriction label; with white flange finish</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L19	<p>Recessed 4" aperture LED downlight with decorative glass trim in wood ceiling with 4-15/16" recessing depth</p> <p>Location: Vestibule 100, Theater 2 entrance</p>	<p>3000K warm white Xicato LEDs</p> <p>80CRI</p> <p>1000 lumens</p> <p>50,000 hours to L70</p> <p>Input Watts: 15W</p>	<p>WILA LIGHTING 621-543/277-DA60-80-BDIM-TRP-ETR</p> <p>Provide with diffused Alzak reflector with 60° beam spread; provide Advance Mark 7 0-10V dimming driver dimming driver for use with dimming controls; Commissioner to specify custom finish trim ring paint; with decorative glass trim LiteOptic (ETR); final LiteOptic T.B.D.; fixture accommodates up to a 2" thick ceiling – Commissioner to coordinate fixture mounting with wood ceiling</p>
L19A	<p>Recessed 4" aperture LED downlight in gyp. board ceiling with 4-15/16" recessing depth</p> <p>Location: Rehearsal Studio 1</p>	<p>3000K warm white Xicato LEDs</p> <p>80CRI</p> <p>1000 lumens</p> <p>50,000 hours to L70</p> <p>Input Watts: 15W</p>	<p>WILA LIGHTING 621-543/277-DA60-80-LUD/277-TRP</p> <p>Provide with diffused Alzak reflector with 60° beam spread; provide Lutron Hi-Lume 1% dimming driver for use with dimming controls; Commissioner to specify custom finish trim ring paint; fixture accommodates up to a 2" thick ceiling – Commissioner to coordinate fixture mounting with gyp board ceiling</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L20	Recessed 4" aperture LED wallwasher in wood ceiling with 4-15/16" recessing depth Location: Theater 2 entrance	3000K warm white Xicato LEDs 80CRI 1000 lumens 50,000 hours to L70 Input Watts: 15W	WILA LIGHTING 622-543/277-DA60-80-BDIM-TRP Provide with diffused Alzak reflector with 60° beam spread; provide Advance Mark 7 0-10V dimming driver dimming driver for use with dimming controls; Commissioner to specify custom finish trim ring paint; fixture accommodates up to a 2" thick ceiling – Commissioner to coordinate fixture mounting with wood ceiling
L20A	Recessed 4" aperture LED wallwasher in gyp. board ceiling with 4-15/16" recessing depth Location: Ticketing 103	3000K warm white Xicato LEDs 80CRI 1000 lumens 50,000 hours to L70 Input Watts: 15W	WILA LIGHTING 622-543/277-DA60-80-BDIM-TRP Provide with diffused Alzak reflector with 60° beam spread; provide Advance Mark 7 0-10V dimming driver dimming driver for use with dimming controls; Commissioner to specify custom finish trim ring paint; fixture accommodates up to a 2" thick ceiling – Commissioner to coordinate fixture mounting with gyp board ceiling

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L20B	Recessed 4" aperture LED wallwasher in gyp. board ceiling with 4-15/16" recessing depth Location: Rehearsal Studio 1	3000K warm white Xicato LEDs 80CRI 1000 lumens 50,000 hours to L70 Input Watts: 15W	WILA LIGHTING 622-543/277-DA60-80-LUD/277-TRP Provide with diffused Alzak reflector with 60° beam spread; provide Lutron Hi-Lume 1% dimming driver for use with dimming controls; Commissioner to specify custom finish trim ring paint; fixture accommodates up to a 2" thick ceiling – Commissioner to coordinate fixture mounting with gyp board ceiling
L21	NOT USED		

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L22	LED step light with 30° internal angle bracket and with remote drivers – nominally 4-1/8" Dia. x 1-3/4"D Location: Theater 1	3000K warm white LEDs 75-82 CRI 66 lumens 50,000 hours to L70 Input Watts: 1W	MP LIGHTING L02-1-W30S-30-C-30-(finish) With 3000K color temperature, 30° beam, clear lens, and 30° internal angle bracket; mounted 20" A.F.F. to center of fixture; Commissioner to specify finish
L23	Pipe mounted adjustable PAR38 halogen accent light Location: Theatre 2	70PAR38/IRC/HAL/WFL40 Philips Lumens:1550 CBCP: 2320 Input Watts: 70W	LIGHTING SERVICES INC. 290-3G-WL-B-C998- Cross Baffle C With black housing finish; with wrench locking, beam softener lens, and cross baffle; provide c-clamp mounting with cord – hardwired to junction box for house lighting
L23A	Pipe mounted adjustable PAR38 halogen accent light with barn doors Location: Theatre 1 & 2	50PAR38/IRC/HAL/WFL25 Philips Lumens:970 CBCP: 4000 Input Watts: 50W	LIGHTING SERVICES INC. 290-3G-WL-B-C998-Barndoor C- Cross Baffle C With black housing finish; with wrench locking, beam softener lens, barndoor, cross baffle; provide c-clamp mounting with cord – hardwired to junction box for house lighting

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L24	<p>Dimmable LED step light with 45° cut-off louvers and with remote drivers – nominally 3"H x 13-1/4"W x 3"D</p> <p>Location: Theater 1 & 2, S.L.L.</p>	<p>3000K LEDs</p> <p>Input Watts: 6W</p>	<p>COLE LIGHTING L2158N-J-TP-277V-(custom RAL finish)-MOD/3" Depth Faceplate modified 3" or less recessing depth – Commissioner to verify if required; provide with 3000K color temperature; with remote supply(s) 24V/DC and Osram Sylvania "Optotronic Dim" dimming module to be used with 0-10V dimming controls (specified by others); Commissioner to coordinate remote power supplies outside theater; 50' maximum remote distance; fixture mounted 18" A.F.F. to center of fixture - Commissioner to coordinate mounting; Commissioner to verify if different finishes are need per fixture locations - Commissioner to provide custom RAL finish to manufacturer</p>
L25	<p>Vertically recessed in wall linear fluorescent slot fixture with frosted lens– length to be determined</p> <p>Location: Wardrobe 160 (mirror)</p>	<p>FP28/830/ECO FP21/830/ECO</p> <p>Input Watts: 8.5W/LF</p>	<p>AXIS LIGHTING BMRV-F-FL-(length)-T5-1S-W-UNV-ERS-1-DS Fixture length to be determined; Commissioner to coordinate vertical mounting in wall with drywall spackle flange; Commissioner to verify white trim finish; manufacturer shop drawings showing mounting, lamping and length required for approval</p> <p><i>Or approved equal by Gammalux or Selux</i></p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L26	Dimmable compact fluorescent pendant with acrylic diffuser - nominally 7" H x 48"Dia. X 10-3/4" Canopy Dia. Location: Ground Floor Lobby	(2) FT24DL/830/ECO (2) FT36/DL/830/ECO Input Watts: 132W	VIBIA 0535-01-DM/Advance "Mark 10"-MOD/Black finish Provide one circuit with Advance Ballasts "Mark 10 Powerline" 5% electronic dimming ballast; provide compatible dimming controls; bottom of pendant to be 10'-0" A.F.F. of Upper Lobby in 16'-9-1/4" ceiling height - Commissioner to coordinate; provide with black finish for trim ring, housing, and canopy; with grey cable suspension
L26A	Dimmable compact fluorescent pendant with acrylic diffuser - nominally 7" H x 48"Dia. X 10-3/4" Canopy Dia. Location: Mezzanine Lobby	(2) FT24DL/830/ECO (2) FT36/DL/830/ECO Input Watts: 132W	VIBIA 0535-01-DM/Advance "Mark 10"-MOD/Black finish Provide one circuit with Advance Ballasts "Mark 10 Powerline" 5% electronic dimming ballast; provide compatible dimming controls; bottom of pendant to be 9'-3" A.F.F. in 13'-6" ceiling height to align with bottom of adjacent dropped ceiling - Commissioner to coordinate; provide with black finish for trim ring, housing, and canopy; with grey cable suspension

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L27	Dimmable recessed 4.5" diameter aperture LED adjustable downlight Location: Lobby	3000K LEDs Xicato 50,000hrs 2150 2900 Lumens Input Watts: 32W	LUCIFER LIGHTING DL2YP-NC-W-(ceiling thickness)-8021-30-1 DH-NC-YF-(ceiling thickness)-8021-12L2 With Lutron 1% dimmable driver, 3000K color temperature; provide dimming controls (specified by others) to interface with dimmable driver; fixture accommodates maximum 1-3/4" ceiling thickness; Commissioner to choose ceiling thickness option from ordering code; Commissioner to note 9" recessing depth; with white flange finish
L28	Recessed 6" aperture PAR38 adjustable halogen accent light mounted in acoustical cloud Location: Theater 1	100PAR38/IRC/HAL/ FL25 Philips Lumens:2200 CBCP: 8500 Input Watts: 100W	EDISON PRICE DL38/40/6AA-COL-SC30-+2"CLG-(black finish)-MOD/No Light Leaks Commissioner to coordinate fixture mounting with acoustical cloud construction; with 0-40° tilt and 358° rotation; housing to have black paint finish and no light leaks; fixture can accommodate a 2" thick ceiling – Commissioner to confirm that acoustical cloud is no thicker than 2"; with semi-specular clear reflector finish; with black overlap finish to match acoustical cloud finish

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L29	<p>Surface mounted dimmable Class II rated LED strip light mounted in front of bar hidden by millwork "lip" with remote driver(s)</p> <p>Location: Lobby - Bar</p>	<p>3000K LEDs</p> <p>Input Watts: 1.25W/LF</p>	<p>BRUCK LIGHTING</p> <p>135401-1/2700K - Orion Belt</p> <p>70447 - 96W Dimmable Driver</p> <p>135910 - Power Feed</p> <p>135915 - Connector</p> <p>135912-1 - Mounting Channel</p> <p>135914 - Belt Clip</p> <p>Provide 0-10V dimming controls (specified by others) to interface with dimmable driver; fixture accepts (100V-240V) input voltage; provide dimmable drivers, wires, connectors, mounting channels, clips, and accessories per manufacturer's recommendation for a complete system; mounting detail to be coordinated; remote driver to be located at base of bar with access panel available for maintenance; driver can be located up to 25' away from fixture with 18 gauge wire - Commissioner to size wire gauge to match remote distance so that no more than a 2% voltage drop occurs; longer remote distance available if required with appropriate gauge wire - Commissioner to coordinate</p>
L30	NOT USED		
L31	NOT USED		
L32	NOT USED		

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L33	<p>Dimmable direct/indirect linear fluorescent T5 pendant with matte louver and side perforations - nominally 24' length</p> <p>Location: Rehearsal Studio 1</p>	<p>(12) FP28/830/ECO</p> <p>Input Watts: 387W</p>	<p>ZUMTOBEL</p> <p>ZX5-PC-RN-(black)-ZX5F-2285-24'-D/Lutron "H-Series 1%"</p> <p>ZX5TC-X-24' – Trunking</p> <p>ZX5ACS2-1- Suspension</p> <p>Provide with Lutron "H-Series 1%" electronic dimming ballast to be used with wall box dimming controls (specified by others); ballast can be wired in two different ways, high voltage or low voltage; Commissioner to coordinate wiring with specified dimming controls; with 9% uplight and 91% downlight distribution; with black finish for housing, trunking and canopy; provide matching 5" diameter canopies for feed and non-feed points – provide opening in Tectum panel to allow for fixture to be hung to ceiling structure</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L33A	Dimmable direct/indirect linear fluorescent T5 pendant with matte louver and side perforations - nominally 12' length Location: Rehearsal Studio 2	(6) FP28/830/ECO Input Watts: 193.5W	ZUMTOBEL ZX5-PC-RN-(black)-ZX5F-2285-12'-D/Lutron "H-Series 1%" ZX5TC-X-24' - Trunking ZX5ACS2-1- Suspension Provide with Lutron "H-Series 1%" electronic dimming ballast to be used with wall box dimming controls (specified by others); ballast can be wired in two different ways, high voltage or low voltage; Commissioner to coordinate wiring with specified dimming controls; with 9% uplight and 91% downlight distribution; with black finish for housing, trunking and canopy; provide matching 5" diameter canopies for feed and non-feed points - provide opening in Tectum panel to allow for fixture to be hung to ceiling structure
L34	NOT USED		
L35	NOT USED		
L36	Surface mounted linear LED scone with acrylic diffuser - nominally 1'-7" length (500mm) Location: ADA WC 113, WC 112, WC 219, ADA WC 220 (vanities)	2700K, LEDs 25,000 hrs 375 Lumens/500mm Input Watts: 6W	AAMSCO Alinea LED-50-(voltage)-SC Fixture is nominally 1'-7" length; Commissioner to specify voltage; with satin chrome channel finish; fixture mounted vertically on wall; Commissioner to coordinate mounting with mirror height; UL damp listed

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L36A	Surface mounted linear LED sconce with acrylic diffuser – nominally 9'-10" length (3 meters) Location: W.C. 121 (vanity)	2700K, LEDs 25,000 hrs 700 Lumens/meter Input Watts: 33W	AAMSCO Alinea LED-100-(19'-10")-(voltage)-SC Fixture is nominally 9'-10" length made up of (3) fixtures mounted end-to-end per Commissioner on 02/17/12; Commissioner to specify voltage; with satin chrome channel finish; fixture mounted horizontally on wall; Commissioner to coordinate mounting with mirror height; UL damp listed
L36B	Surface mounted linear LED sconce with acrylic diffuser – nominally 16'-5" length (5 meters) Location: W.C. 122 (vanity)	2700K, LEDs 25,000 hrs 700 Lumens/meter Input Watts: 55W	AAMSCO Alinea LED-100-(16'-5")-(voltage)-SC Fixture is nominally 16'-5" length made up of (5) fixtures mounted end-to-end per Commissioner on 02/17/12; Commissioner to specify voltage; with satin chrome channel finish; fixture mounted horizontally on wall; Commissioner to coordinate mounting with mirror height; UL damp listed

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than ¾") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L37	<p>Cable mounted 2-circuit track for use with dimmable Type L38 fixtures - nominally 6'-0" length</p> <p>Location: Upper Lobby 101</p>	<p>Input Watts: Allow 30W/LF</p> <p>120V System</p>	<p>LIGHTING SERVICES INC.</p> <p>32220 - Track</p> <p>30203 - End Cap</p> <p>73211 - Cable Support Kit</p> <p>73210 - Feed Kit</p> <p>With black finish; Contractor to field cut 8' track segment for overall 6' length; provide mounting hardware, feeds, connectors and all other components required per manufacturer's recommendations and guidelines for a complete system; control 2-circuit separately; refer to manufacturers installation instruction for mounting spacing requirements; suspension length to be coordinated; Commissioner to note 120V</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L37A	<p>Cable mounted 2-circuit track for use with dimmable Type L38 fixtures – nominally 16'-0" length</p> <p>Location: Upper Lobby 101</p>	<p>Input Watts: Allow 30W/LF</p> <p>120V System</p>	<p>LIGHTING SERVICES INC. (2) 32220 – Track 32211 - Joiner 30203 – End Cap 73211 – Cable Support Kit 73210 – Feed Kit With black finish; overall length to be 16'; provide mounting hardware, feeds, connectors and all other components required per manufacturer's recommendations and guidelines for a complete system; control 2-circuit separately; refer to manufacturers installation instruction for mounting spacing requirements; suspension length to be coordinated; Commissioner to note 120V</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L37B	Cable mounted 2-circuit track for use with dimmable Type L38 fixtures – nominally 26'-0" Location: Upper Lobby 101	Input Watts: Allow 30W/LF 120V System	LIGHTING SERVICES INC. (3) 32220/ (1) 32210 – Track 32211 - Joiner 30203 – End Cap 73211 – Cable Support Kit 73210 – Feed Kit With black finish; overall length to be 26'; provide mounting hardware, feeds, connectors and all other components required per manufacturer's recommendations and guidelines for a complete system; control 2-circuit separately; refer to manufacturers installation instruction for mounting spacing requirements; suspension length to be coordinated; Commissioner to note 120V

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than ¾") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L38	Track mounted LED accent light with wallwash optics for use with Type L37 track - dimmable	Xicato LED module 1120 delivered lumens 3000K 80+ CRI	LIGHTING SERVICES INC. V-LX2044-F-3-M6-00-B Accessory: LX204XWWFR – Wall Wash Front
	Location: Upper Lobby 101	Input Watts: 25W 120V System	Provide with cylindrical aluminum housing and Wall Wash Front kit which includes: 60° reflector, Backer Ring AA and Spread Gel (60°x10°); with black finish; with integral on/off switch on track fitting; Commissioner to note 120V; fixture is dimmable with compatible low-voltage electronic dimmers that use trailing edge or reverse phase dimming; provide dimming controls (specified by others) to interface with dimmable driver

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L38A	Track mounted LED accent light for use with Type L37 track - dimmable Location: Upper Lobby 101	Xicato LED module 1120 delivered lumens 3000K 80+ CRI Input Watts: 25W 120V System	LIGHTING SERVICES INC. V-LX2044-F-3-M2-00-B Accessory: AA998 – Beam Softener Provide with cylindrical aluminum housing, 20° reflector, and beam softener; with black finish; with integral on/off switch on track fitting; Commissioner to note 120V; fixture is dimmable with compatible low-voltage electronic dimmers that use trailing edge or reverse phase dimming; provide dimming controls (specified by others) to interface with dimmable driver
L39	Surface wall mounted linear fluorescent T6 lamp sconce – nominally 4' length Location: Elevator Lobby 106 & 150, Hall 105	Nippo Electric T6 3000K 20,000hrs Input Watts: 38W	BARTCO LIGHTING BT6400-50-(voltage)-SIN-ST Commissioner to specify voltage; with stainless steel housing finish; bottom of fixture mounted 6'-0" A.F.F.; fixture mounted horizontally on wall – Commissioner to coordinate
L39 ALT	Surface wall mounted linear fluorescent T5 lamp sconce with frosted lens – nominally 4' length Location: Elevator Lobby 106 & 150	FP28/830/ECO Input Watts: 33W	BARTCO LIGHTING IPR5S-28W-U-PRS-F-SM-SL With silver housing finish; bottom of fixture mounted 6'-0" A.F.F.; fixture mounted horizontally on wall – Commissioner to coordinate

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than ¾") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L39A	Surface mounted linear fluorescent T6 lamp sconce – nominally 1'-7" length Location: Hall 105	Nippo Electric T6 3000K 20,000hrs Input Watts: 17W	BARTCO LIGHTING BT6400-20-(voltage)-SIN- ST Commissioner to specify voltage; with stainless steel housing finish; bottom of fixture mounted 6'-0" A.F.F.; fixture mounted horizontally on wall – Commissioner to coordinate
L39A ALT	Surface mounted linear fluorescent T5 lamp sconce with frosted lens – nominally 2' length Location: Hall 105	FP14/830/ECO Input Watts: 18W	BARTCO LIGHTING IPR5S-14W-U-PRS-F-SM-SL With silver housing finish; bottom of fixture mounted 6'-0" A.F.F.; fixture mounted horizontally on wall – Commissioner to coordinate
L39B	Surface mounted linear fluorescent T6 lamp sconce – nominally 12'-4" length Location: Stair 1 Landing	(3) Nippo Electric T6 3000K 20,000hrs Input Watts: 114W	BARTCO LIGHTING BT6400-(505050)-(voltage)- (STA+ADD+TER)-ST Fixture is overall 12'-4" length; fixture is comprised of (3) 4' length fixtures mounted continuously; Commissioner to specify voltage; with stainless steel housing finish; bottom of fixture mounted 6'-0" A.F.F.; fixture mounted horizontally on wall – Commissioner to coordinate

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than ¾") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L39B ALT	Surface mounted linear fluorescent T5 lamp sconce with frosted lens – nominally 12' length Location: Stair 1 Landing	(3) FP28/830/ECO Input Watts: 96W	BARTCO LIGHTING IPR5S-28W-U-PRS-F-SM-SL-12' With silver housing finish; fixture length is comprised of three fixtures mounted end to end with clip connector; bottom of fixture mounted 6'-0" A.F.F.; fixture mounted horizontally on wall – Commissioner to coordinate
L39C	NOT USED		
L39C ALT	NOT USED		
L40	Recessed 2" aperture adjustable LED accent light Location: Banquette Area 202	3000K LEDs Xicato 50,000hrs 1300 Lumens Input Watts: 27W	LUCIFER LIGHTING DL8ZP-(installation type)-W-(ceiling thickness)-8013-30-1-SGL-2 Provide with 3000K color temperature LEDs; with Solite spread glass lens; Commissioner to coordinate mounting of fixture onto underside of soffit ceiling; with Non- IC mounting tray or remodel type downlight – Commissioner to confirm option and to detail fixture in soffit
L41	NOT USED		
L42	Surface mounted compact fluorescent indirect distribution sconce Location: Green Room	CF18DD/E/830/ECO Input Watts: 19W	ARTEMIDE Square Wall-white Bottom of fixture mounted at 6'-8" A.F.F. in 8'- 5-1/2" ceiling height; Commissioner to verify white finish

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L43	<p>Semi-recessed mounted LED puck light with remote power supply</p> <p>Location: S.L.L. 107 (Playbill Niche)</p>	<p>Warm white LED 3200K</p> <p>Input Watts: 3W</p>	<p>LUCIFER LIGHTING LPK-ALED-3K-A-Solite PSA-60-12P – Power Supply PSA-D B – Distribution Box Provide with 3200K color temperature LEDs; with Solite spread glass lens; provide power supply, wires, and accessories per manufacturer's recommendations for a complete system; refer to architectural drawings and details for mounting information - Commissioner to coordinate mounting of fixture onto underside of playbill wood niche; with remote power supply located in an accessible, ventilated location - Commissioner and Contractor to coordinate; maximum remote distance of power supply to fixture is 30' with 18AWG wire – fixture is supplied with 10' of 18AWG wire; with clear anodized faceplate finish</p>

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than ¾") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	LAMP CODE	MANUFACTURER/CATALOG/ BASIS OF DESIGN
L44	Recessed perimeter mounted staggered lamp linear fluorescent T5 lensed slot – nominally 5'-0" length Location: Admin 209	(1) FP28/830/ECO (1) FP21/830/ECO Input Watts: 96W	AXIS LIGHTING BBR-S-FL-10-T5-1S-W-UNV-ERS- 1-D Commissioner to coordinate drywall flangeless mounting with gyp. board ceiling; wallwash distribution to be aimed away from wall; fixture to be mounted 6" away from wall to center of fixture; Commissioner to verify white trim finish; manufacturer shop drawings showing mounting, lamping and length required for approval <i>Or approved equal by Gammalux or Selux</i>

END OF SECTION 265100

NOTES:

- 1) Contractor shall verify all catalog codes with drawn and written descriptions.
- 2) Commissioner to verify all fixture finishes.
- 3) Commissioner to verify ceiling type and grid system for light fixture installation. Contractor to coordinate all ceiling materials and thicknesses with fixture trim requirements. Thick ceilings (greater than 3/4") may require modifications to fixtures.
- 4) Commissioner to coordinate ballast wiring with specified dimming controls.
- 5) Commissioner to verify all supply voltages and specify emergency lighting.

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SECTION 26 55 61

THEATRICAL SYSTEMS ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes but not limited to:

- 1) Section includes general requirements for provision of electrical services and materials, and raceway and outlet box system suitable to accommodate installation of the Division 11 Theatrical Systems, including Theatrical Audio Video (AV) Systems, Theatrical Lighting Dimming and Control, Theatrical Rigging, and Fixed Theater Seating.
- 2) Coordinate Theatrical Systems-related electrical materials installation with Division 11 Theatrical Systems drawings.
- 3) Provide Theatrical Systems-related electrical materials and methods in accordance with all requirements and related sections of Division 26 and as detailed herein.
- 4) Provide all Theatrical Systems junction boxes, pull boxes, terminal cabinets, cable trays, conduit, enclosures, standard outlet and device back boxes, and other electrical materials and hardware for a complete Theatrical Systems electrical infrastructure as specified herein and in quantities and location as shown on Electrical drawings.
- 5) Provide all disconnects, panelboards and company switches for Theatrical Systems Equipment as specified herein and in quantities as shown on Electrical drawings.
- 6) Provide test reports and verification that wiring installations comply with applicable standards and the requirements set forth in the Division 11 Theatrical Systems documents and by the equipment manufacturers.

B. Theatrical Audio Video systems

- 1) Provide all conduit, pull strings, standard backboxes, cable trays, pull boxes and terminal cabinets required for the AV Systems infrastructure.
- 2) Install, terminate and test all AV Systems low-voltage cable as furnished under Section 11 61 83. Wire shall be terminated under the direct supervision of the AV Systems contractor.
- 3) Provide and terminate all AC power wiring and receptacles required for the AV Systems isolated technical ground system and general power system.
- 4) Install all AV Systems equipment as furnished by the Section 11 61 83 AV Systems Contractor. All Theatrical AV systems and equipment shall be installed under the direct supervision of the AV Systems Contractor.
 - a. The Electrical Contractor shall provide a separate trained crew of electricians dedicated to the installation of the Theatrical AV Systems equipment and

- cabling.
 - b. The Electrical Contractor shall not begin pulling Theatrical AV systems wiring through the empty conduit until all conduit, pull boxes, etc. for each given run (point-to-point) are completely installed by others and ready for such wire and cable installation.
 - c. The Electrical Contractor's foreman shall undertake a field inspection of the conduit system and pull boxes, reporting any missing conduit, sharp edges, missing bushings or drag lines, blocked runs and so forth, prior to attempting installation of wire and cable.
- C. Theatrical lighting dimming and control
- 1) Provide all conduit, wire, and wire pulling for theatrical lighting systems.
 - 2) Provide terminations for theatrical lighting systems racks and devices, low voltage termination will be terminated under the direct supervision of the Theatrical lighting contractor.
 - 3) Provide and terminate wiring and double gang receptacle outlets required for the Theatrical Lighting System "TL" power system as called out on drawings.
 - 4) Provide interface devices required to dim architectural LED lighting fixtures within the auditorium with input control signal (DMX control protocol or 0-10V) from Theatrical Lighting Dimming and Control system as provided under section 116163.
- D. Theatrical Rigging
- 1) Provide all conduit, wire, wire pulling and termination for motorized theatrical rigging equipment.
 - 2) Provide terminations for theatrical rigging systems racks and devices, low voltage termination will be terminated under the direct supervision of the Theatrical rigging contractor.
 - 3) Provide all local motor disconnects as required to complete system in a code compliant manner.
 - 4) Provide terminations for all system electrical safety devices.
- E. Fixed theater seating
- 1) Provide all conduit, wire, wire pulling, junction boxes for fixed theater seating aisle light fixtures. Fixture provided as an integrated arm end panel. Coordinate requirements with seating manufacturer.
- F. Future Telescopic bleacher system
- 1) Provide all conduit for future telescopic seating unit.
 - 2) Provide all conduit for 120V switched power circuit for relay control of future aisle lights fed from relay panel furnished under Section 11 61 63.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Theatrical Audio Video systems

- 1) Install all AV Systems equipment as furnished under Section 11 61 83.
- 2) Terminate all AV Systems AC power receptacles and devices within equipment racks (including receptacles, isolated ground bus bars, etc.), as furnished under Section 11 61 83.
- 3) Install all AV Systems specialty panel and device back boxes including floor boxes, recessed ceiling loudspeaker back boxes, etc. furnished by Division 11 where noted. Provide all required conduit, electrical hardware, and mounting brackets.

B. Theatrical lighting system

- 1) Receive, store and install dimmed and switched power distribution equipment and associated control equipment furnished under Section 11 61 63.
- 2) Receive, store and install all power and control distribution and connection devices furnished under Section 11 61 63.
- 3) Install terminal boxes and flexible multi-cable drops to pipe grids, etc.
- 4) Install all head-end control equipment furnished under Section 11 61 63 under the direct supervision of the equipment manufacturer.

C. Theatrical rigging system

- 1) Install all Theatrical Rigging Systems line voltage and low voltage control equipment as furnished under Section 11 61 33.
- 2) Install, in coordination with the Theatrical Lighting Contractor, cable management pantograph as furnished under Section 11 61 33.
- 3) Terminate all Theatrical Rigging System power disconnects and devices within equipment racks (including receptacles, etc.), as furnished under Section 11 61 33.
- 4) Install all Theatrical Rigging Systems specialty panel and device back boxes furnished by Division 11 where noted. Provide all required conduit, electrical hardware, and mounting brackets.

D. Fixed Theater Seats

- 1) Install all Fixed Theater seat aisle lights and transformers as furnished under Section 12 61 00.
- 2) Provide all required conduit, electrical hardware, and mounting brackets.

E. Future Telescopic Bleacher System

- 1) Terminate 120V relay circuit fed from relay panel supplied under Section 11 61 63 Theatrical Lighting Dimming and Control.
- 2) Provide all required conduit, electrical hardware, and mounting brackets.

1.3 SEQUENCE AND SCHEDULING

- A. The installation of the theatrical system wiring devices shall not occur until all painting in the area has been completed.
- B. Computer grade network components, rack processors and modules, and any other equipment sensitive to construction debris and dust shall not be installed until all debris and dust has been removed. Typical "office" cleanliness shall be required in rooms in which computer grade equipment is to be installed.
- C. Computer grade network components, rack processors and modules, and any other valuable equipment shall not be installed until equipment rooms are secure.
- D. The unpacking and installation of computer control consoles and peripheral devices shall not occur until the control room is secure and climate controlled.

1.4 SYSTEM START UP AND COMMISSIONING

- A. Test and "ring out" all 120V system socket-outlet devices to ensure that all systems components are wired properly and functional at the time of commissioning.
- B. Provide personnel at the time of commissioning to supervise the inspection / testing of theatre systems related electrical equipment. This includes distribution boards, circuit breaker panels, relay panels, and all mains voltage devices installed under this section.
- C. Provide the appropriate test equipment for the commissioning of theatre systems related electrical equipment.
- D. Provide access (ladders, lifts, scaffolding, etc) to all theatre systems related electrical equipment for inspection at the time of commissioning.
- E. Provide testing of Theatrical AV Systems low-voltage cabling as identified in specification section 116183, article 3.3.A.5. All cable testing shall be performed under the supervision of the AV Systems contractor.

PART 2 - PRODUCTS

2.1 RACEWAYS

- A. Conduit and Fittings
 - 1) Provide electrical metallic tubing (EMT) conduit for all Theatrical Systems wiring with the following exceptions:
 - a. Provide rigid steel conduit (GRS) for AV Systems wiring installed in poured concrete and masonry, and where specifically required.
 - b. PVC conduit is NOT acceptable, except within concrete slab.
 - c. Compression-type conduit connectors and couplings, rated for maximum continuity (conduit-to-box and conduit-to-conduit), shall be used for all AV Systems metallic conduit.
- B. Cable Trays

- 1) General
 - a. Provide cable trays, tray supports, and splicing hardware to accommodate cable runs as shown on theatre equipment drawings. Refer to sections 11.61.63 and 11.61.83.
 - b. Trays to be adequately mounted so that there is no visible deflection between supported sections.

- 2) Theatrical AV Systems
 - a. Provide 16-gauge steel cable tray, 18"w x 6"d, with three barriers for four wiring compartments. Cable tray interiors to be smooth and free of nicks, burrs, or any protrusions.
 - b. Length as required to carry AV Systems cabling from the terminal cabinets to the top or bottom of the equipment racks, or as indicated. Refer to Section 11.61.83 AV drawings.
 - c. Cable trays shall be electrically and mechanically connected (bonded) to the building electrical safety ground and isolated from the AV Systems equipment racks in order to maintain the integrity of the AV Systems technical isolated technical ground system.
 - d. Cable tray shall be by B-Line, Chalfant Series-6, or equal.

- 3) Theatrical lighting system
 - a. Provide high strength steel basket style cable tray, 300mm W x 50mm D (12" x 2" UL WB212) Cable tray interiors to be smooth and free of nicks, burrs, or any protrusions.
 - b. Provide length and quantity to accommodate cable runs as shown on drawings.
 - c. Cable trays shall be electrically and mechanically connected (bonded) to the building electrical safety earth.
 - d. Cable trays shall be finished flat black
 - e. Cable tray shall be by Cooper B-Line, or equal.

2.2 BOXES

A. Pull and Junction Boxes

- 1) Pull and junction boxes shall be as specified under Section 260500, 2.5 (C) ELECTRICAL BOXES: Pull and Junction Boxes.

B. Outlet Boxes

- 1) Outlet boxes shall be as specified under Section 260500, ELECTRICAL BOXES: with the following additional requirements:
 - a. Recessed outlet boxes:
 1. Provide outlet boxes as standard steel gang boxes for devices of 2-1/2" minimum depth.
 - a) Provide plaster rings of appropriate size (per Section 11.61.83 Appendix), and depth (per site conditions).
 - b) 3" x 2" gangable steel switch boxes ("GEM" boxes) shall not be acceptable as single or multiple-gang recessed back boxes.
 - b. Surface-mounted outlet boxes:
 1. Provide surface-mounted outlet boxes as Wiremold-type boxes or

weatherproof cast metal boxes ("bell boxes"), of 2-5/8" depth. Single-gang "bell boxes" of 2-5/8" depth shall be acceptable.

2. Any surface mount back box which allows the receptacle cover plate to overhang the edge of the box presents a safety hazard and shall not be acceptable.
- 2) AV Panel Back Boxes
 - a. Provide standard NEMA Type 1 screw cover back boxes for "C" Series AV panels, unless noted otherwise.
 - b. Back Box sizes and mounting conditions are as indicated on the Section 11 61 83 AV Systems drawings and specification.
 - c. All surface mount AV panel and device back boxes to be finished flat black, unless noted otherwise.
 - 3) AV Terminal Cabinets
 - a. Provide standard NEMA Type 1 telephone cabinet style terminal cabinets with plywood backboard, hinged door & locking handle for routing of all AV Systems wiring in and out of AV Systems rack rooms as indicated on AV Systems shop drawings.
 - b. Terminal Cabinet sizing & final quantities to be coordinated with AV Systems contractor. Sizing & quantities will be determined by overall system routing and distribution.

2.3 THEATRICAL SYSTEMS CONTROL CABLE

A. General

- 1) Provide only wire types specified in Electrical Documents and verified by Theatrical Systems Manufacturer's shop drawings. No substitutions allowed without written approval of the Commissioner and Theatrical Systems Manufacturers.
- 2) Wire types provided in Electrical documents represent the information available at the time of bid and are provided for development of conduit size requirement and bidding purposes. Determination of the final wire type is dependent on the specific systems of the successful Division 11 manufacturer. Do not purchase or install any Theatrical Systems control cable until shop drawings for these systems are approved.
- 3) All wire to be installed in conduit unless otherwise noted or by specific written agreement by the Commissioner. Should an exception be made allowing cable to be run outside of conduit, contractor shall provide appropriate plenum rated cable for approval by the Commissioner and Theatrical Systems Manufacturers.
- 4) Network cable runs shall be continuous. Cable splicing will not be acceptable.
 - a. All network cable runs must be confirmed. Lengths exceeding 75M shall be identified and run with fiber optic cable.

2.4 WIRING DEVICES

- A. Provide Theatrical systems receptacles and other required wiring devices, complete with associated hardware and wall plates, as specified below. Verify cover plate finish color with Commissioner.

- 1) AV System isolated ground receptacle
 - a. AV System isolated ground receptacles fed from Non-UPS power shall be colored orange.
 - b. AV System isolated ground UPS & Non-UPS circuits may not be housed within the same backbox.
 - c. Provide cover plate labeled "SOUND SYSTEM ISOLATED GROUND" with labeling identifying panelboard and breaker number feeding receptacle.
 - d. Edison/Straight Blade Receptacle Types
 1. Simplex 15 Amp 120V isolated ground Edison receptacles shall be standard NEMA 5-20R configuration, 2-pole, 3-wire
 - a) Receptacles shall be Hubbell IG5251, or approved equal.
 2. Duplex 20 Amp 120V isolated ground Edison receptacles shall be standard NEMA 5-20R configuration, 2-pole, 3-wire .
 - a) Receptacles shall be Hubbell IG5362, or approved equal.
 3. Duplex 30 Amp 120V isolated ground Edison receptacles shall be standard NEMA 5-30R configuration, 2-pole, 3-wire.
 - a) Receptacles shall be Hubbell IG9308, or approved equal.
 - e. Twist-Lock/Locking Receptacle Types
 1. Simplex 20 Amp 120V isolated ground Twist-Lock receptacles shall be standard NEMA L5-20R configuration, 2-pole, 3-wire.
 - a) Receptacles shall be Hubbell IG2310, or approved equal.
 2. Duplex 20 Amp 120V isolated ground Twist-Lock receptacles shall be standard NEMA L5-20R configuration, 2-pole, 3-wire.
 - a) Receptacles shall be (2) Hubbell IG2310 in two-gang backbox, or approved equal.
 3. Simplex 30 Amp 120V isolated ground Twist-Lock receptacles shall be standard NEMA L5-30R configuration, 2-pole, 3-wire.
 - a) Receptacles shall be Hubbell IG2610, or approved equal
 4. 3-phase 30 Amp 120/208V isolated ground Twist-Lock receptacles shall be standard NEMA L21-30R configuration, 4-pole, 5-wire.
 - a) Receptacles shall be Hubbell IG2810, or approved equal
- 2) Provide Theatrical Lighting system receptacles and other required wiring devices, complete with associated hardware and wall plates, as specified below and shown on Electrical drawings.
 - a. Theatrical lighting system power receptacles
 1. Quad receptacles shall be standard NEMA 5-20R configuration, 20A/120V 2-pole, 3-wire.
 2. Receptacle shall be colored gray.
 3. Receptacle shall be fed from Lighting Systems power panel board as shown on drawings.
 4. Receptacles shall be Hubbell or equal.

2.5 COMPANY SWITCHES AND RECEPTACLES

- A. Provide Theatrical Systems company switch disconnects and receptacles as described herein and as shown on Electrical drawings.
- B. 60 Amp AV Systems company switch receptacles
 - 1) Company switch receptacle configuration shall be 120/208-volt 3-phase 4-wire & equipment ground 60-amp mechanically interlocked pin and sleeve receptacle provided with mating plug connector.

- a. Connect technical isolated ground conductor to ground lug.
 - b. Provide 60-amp receptacle and plug
- 2) Manufacturers
 - a. Hubbell
 - b. Cooper Devices
 - c. Leviton
 - 3) Basis of Design
 - 1. Basis-of-design is 60-amp Hubbell HBL560MI9W Receptacle and HBL560P9W Plug. Comparable products by one of the manufacturers listed above shall also be acceptable.
- C. 60 Amp Theatrical Lighting company switch receptacles
- 1) Company switch receptacle configuration shall be 120/208-volt 3-phase 4-wire & equipment ground 60-amp mechanically interlocked pin and sleeve receptacle provided with mating plug connector.
 - a. Provide 60-amp receptacle and plug
 - 2) Manufacturers
 - a. Hubbell
 - b. Cooper Devices
 - c. Leviton
 - 3) Basis of Design
 - 1. Basis-of-design is 60-amp Hubbell HBL560MI9W Receptacle and HBL560P9W Plug. Comparable products by one of the manufacturers listed above shall also be acceptable.
- D. 100 Amp Theatrical lighting company switch receptacles
- 1) Company switch receptacle configuration shall be 120/208-volt 3-phase 4-wire & equipment ground 100-amp mechanically interlocked pin and sleeve receptacle provided with mating plug connector.
 - a. Provide 100-amp Receptacle and Plug.
 - 2) Manufacturers
 - a. Hubbell
 - b. Cooper Devices
 - c. Leviton
 - 3) Basis of Design
 - 1. Basis-of-design is 100-amp Hubbell HBL5100MI9W Receptacle and HBL5100P9W Plug. Comparable products by one of the manufacturers listed above shall also be acceptable.
- E. 200 Amp Theatrical lighting company switch
- 1) Company switch shall be 120/208-volt 3-phase 5-wire & equipment ground 200-amp device with means of connection for both single pole E1016 compatible connectors

and direct wire lugs in a connection chamber.

- a. Provide Lex Products CS-200F-C6DS1-BLK or Union Connector PBS-M2010W-C/SP Both with double neutral option.

PART 3 - EXECUTION

3.1 THEATRICAL SYSTEMS CONTROL CABLES

- A. Theatrical Systems Ethernet network shall be Category 5E UTP /100Base TX cabling installed in accordance with all applicable standards including but not limited to IEEE 802.3u standard.
 - 1) Cable runs between hubs shall not exceed 75 meters. Contractor shall verify run lengths prior to installation.
 - 2) No splices. No exceptions.
 - 3) Contractor shall provide field installation reports verifying that cable installations comply with specifications.
- B. Theatrical Systems Fiber Optic (single-mode fiber back bone) /100Base-FX cabling shall be installed in accordance with all applicable standards including but not limited to IEEE 802.3u standard (if required).
- C. Termination of all control cabling shall be undertaken only under the direct supervision of Theatrical Lighting Manufacturer's authorized field service personnel.

3.2 AV SYSTEM RACEWAY INSTALLATION

- A. General: proceed as directed under all related sections of Division 26, and as directed below. Should any requirements conflict, the most stringent condition shall apply.
- B. Rigid Conduit, Steel Electrical Metallic Tubing.
 - 1) All AV Systems empty conduit has been sized for wire and cable based on full use of the maximum "40% fill" area of each conduit, per the NEC.
 - 2) Provide 3/4" minimum conduit size.
 - 3) Provide a complete, continuous and clean conduit system, as indicated on the drawings, including all conduits, conduit supporting means, all electrical boxes and enclosures, etc., and all connections to terminal cabinets, pull boxes, and AV panels and receptacles.
 - 4) Provide separate and independent conduit systems for AV Systems wire and cable of the following different wiring/conduit groups, as shown on the drawings, without exception:
 - a. Group A - Microphone & Line Level Audio
 - b. Group B - Video & RF Level
 - c. Group C - Communication & Control Level
 - d. Group D - Loudspeaker Level
 - e. Group E - Spare (empty conduit only)

- 5) Maintain minimum separation required between AV Systems conduit groups, and between all AV Systems, production lighting system control, and AC power conduit as indicated in the separation schedules below.
- 6) All conduit must be clean and free of burrs, nicks, etc. Ream all conduit ends to prevent damage to cables.
- 7) Provide a pull box for any conduit run which is greater than 100' or which requires more than two 90-degree bends.
- 8) Provide nylon pull cord in all conduit runs, point to point.
- 9) All conduit and boxes shall be bonded to the building safety ground as required.
- 10) All conduit shall be electrically isolated from AV Systems equipment racks to maintain the integrity of the sound system technical isolated ground system. Mechanical conduit connections to equipment racks shall be made with non-conductive fittings.
- 11) The following conduit installation precautions shall be taken to prevent and guard against electro-magnetic interference (EMI), radio frequency interference (RFI), and electro-static interference:
 - a. AV conduit shall not be run through any electrical distribution or transformer rooms, lighting dimmer rooms, mechanical equipment rooms, backstage or engineering "shops," telephone or communication rooms, and computer rooms. No exceptions.
 - b. Do not install AV conduit near devices and conduit for incandescent light dimmers, high-density architectural or theatrical dimming systems, and fluorescent or vapor lamp fixtures (including separate lamps and remoted ballasts).
 - c. Do not install AV conduit directly parallel and adjacent to any AC power conduit. No exceptions.
 - d. AV Systems conduits may only cross AC power conduit at 90-degrees. No exceptions.
 - e. Minimum AV Systems conduit separation distances shall be considered most important for all conduit runs over fifty (50) feet. In some instances AV Systems conduit and other conduit may, by necessity, need to be installed closer than the distances indicated on the AV Systems Conduit Separation Schedule. In these cases, the length of closely spaced conduit shall be kept to an absolute minimum, and the frequency of these close spacings in a single run of conduit shall be kept to an absolute minimum. In particular, AV Systems conduit shall not run parallel to any AC power conduit.
 - f. Note: For example, if "Group A – Microphone & Line Level Audio" conduit is installed in close proximity to AC power feeder conduit in five locations of 10' each over a total run of 200', the resulting 50' of potential interference in the microphone conduit shall be considered unacceptable.
- 12) When it is physically impossible to maintain the minimum conduit separation distances for AV Systems conduit, the following special measures shall be taken to ensure adequate shielding from electro-magnetic and radio frequency interference:
 - a. For below grade slab conduit runs where the distance between any AV Systems conduit (only) is less than the specified minimum, rigid steel (GRS) conduit shall be substituted for the full run of each affected AV Systems conduit.

- b. For below grade slab conduit runs where the distance between any AV Systems conduit and any AC Power conduit is less than the specified minimum, rigid steel (GRS) conduit shall be substituted for the full run of each affected AV Systems conduit and AC power conduit which is less than the minimum.

3.3 AV SYSTEM LOUDSPEAKER ENCLOSURES

- A. Flush recessed ceiling loudspeaker back box enclosures (supplied by Division 11) shall be installed as shown on the Division 11 AV drawings and as detailed below:
 - 1) Loudspeaker enclosures mounted in suspended tile type ceilings: Connect enclosure to intermediate 4" square box in the loudspeaker trunk conduit by a section of flexible conduit (Greenfield). Extend flexible conduit a minimum of 36" beyond loudspeaker location. Pull box shall be used for wiring to adjacent loudspeakers in the same zone.
 - 2) Loudspeaker enclosures mounted in plaster and sheet rock ceilings: Connect loudspeaker enclosure directly to loudspeaker branch conduit by a section of flexible conduit (Greenfield). Extend flexible conduit a minimum of 36" beyond the loudspeaker location. Do not provide intermediate 4" square junction box at these locations.
 - 3) Provide mounting brackets as required for all flush recessed ceiling loudspeaker enclosures. Mounting brackets must support the entire weight of the loudspeaker assembly on the ceiling framing or structure.
 - 4) Loudspeaker enclosures shall not be directly supported from acoustic tile, sheet rock, or plaster ceiling construction. No exceptions.
 - 5) Surface wall mount loudspeaker back box enclosures (supplied by Division 11) shall be installed as shown on the Division 11 AV drawings and as detailed below:
 - a. Wall loudspeaker enclosures shall mount directly to a standard 4" square box. Conduit shall be run down to wall mount volume control directly below loudspeaker enclosure.

3.4 AV PULL BOXES

- A. Provide NEMA Type 1 AV Systems pull boxes as necessary in accordance with the NEC and as indicated on the drawings. Pull boxes shall be provided in accessible areas with removable screw cover.
- B. AV Systems pull boxes may be provided as follows:
 - 1) Provide separate, individual pull boxes for each AV Systems wiring/conduit group.
 - 2) Provide one pull box with full size, removable barriers for each AV Systems wiring/conduit group.
 - 3) Pull boxes shall be sized to accommodate the quantity of conduits indicated, per NEC requirements.
 - 4) Pull boxes shall be installed so as to allow complete pulls of AV Systems wire and

cable without break or splice.

3.5 AV ELECTRICAL IDENTIFICATION

- A. General: Proceed as directed under all related sections of Division 26, and as directed below.
 - 1) Provide a coordinated system of labeling and identification for the AV system empty conduit and outlet box system.
 - 2) Individual pull cords in conduits shall be clearly and securely tagged at each end with an indelible legend indicating the conduit group and destination of the specific run.

3.6 AV SYSTEMS ISOLATED TECHNICAL GROUND

- A. All components of the AV Systems shall be connected to an independent isolated technical ground. The AV Systems isolated technical ground shall originate separately at the building main service ground and connect through the isolation transformer directly to an insulated ground bus in the main AC power distribution panel.
- B. The AV Systems isolated technical ground and the building safety ground must only be connected at this one point.
- C. The isolated technical ground must not be connected to conduit, neutral, water pipes or other ground sources. Establishing the AV Systems isolated technical ground by connection to steel frame structural members will not be acceptable.
- D. The AV Systems isolated technical ground shall be established in a star configuration which radiates out from the distribution panel to insulated ground busses located at each technical power panelboard and then to uninsulated busses bonded to each equipment rack and to individual isolated ground power receptacles.
- E. All AV Systems isolated technical ground conductors must be insulated, stranded copper cable sized to provide an impedance of 0.1 ohms or less between any point in the system and the main service entrance ground. Provide 3/0 AWG stranded copper welding cable for all isolated ground busbar conductors.
- F. All cable splices must be fully insulated.
- G. All conductors must be contained within metallic conduit.
- H. Each AV Systems equipment rack will be bonded to an internal uninsulated copper busbar provided by Division 11. Where more than one rack forms a group, the busbar from each rack shall be bonded together at one central rack and then connected to the isolated ground conductor to maintain the star configuration. Physically ganging equipment racks together shall not be an acceptable method of bonding to the AV Systems isolated technical ground.
- I. All conduits and raceways entering equipment racks must be insulated from the racks with insulated couplings. All equipment racks must be insulated from the floor and situated so as to not come in contact with any ground items during normal operations.
- J. When the AV Systems isolated technical ground is complete, the Division 26 contractor must prove that it is not grounded at any other point than the main service entry panel. With the power to the system switched off, the contractor shall disconnect the isolated technical ground from the technical ground busbar at the main distribution panel. At this point, an open

circuit (greater than 1-megaohm) must be measurable between the AV Systems isolated technical ground and the building safety ground.

K. Isolated Ground Receptacles

- 1) All power receptacles for AV Systems use shall be isolated ground type with an insulated ground wire. Color of receptacle shall be orange. Type as specified herein or as determined by the Commissioner.
- 2) Power receptacles within racks shall have insulated ground conductors connected to the AV Systems isolated technical ground bus in each rack.
- 3) Individual isolated ground power receptacles shall have insulated ground conductors connected to the AV Systems isolated technical ground bus in the branch circuit panelboard from which they are fed.

3.7 AV SYSTEMS EMERGENCY MUTING FROM LIFE SAFETY SYSTEM

- A. Provide relay contact closure from the life safety system to the AV Systems equipment rack. Relay closure shall cause all loudspeaker circuits and other selected audio circuits to be on during "normal" conditions, and muted during "emergency" conditions.
- B. Provide all wiring from the main life safety control center to the equipment racks located in AV Equipment Rack Rooms 2M30 and 252, Theatre 1 Control Room, Theatre 2 Control Room and Theatre 3 Control Room. Provide relay and switching devices and all incidental materials in order to provide the Division 11 AV Contractor with a normally open dry contact closure for connection to the loudspeaker mute circuits. Refer to the Division 11 AV Systems Drawings.

3.8 AV SYSTEMS CONDUIT ADJACENT SCHEDULES

- A. Conduits serving AV Systems wiring groups, as defined herein and on the AV drawings, shall be separated from conduits serving other uses according to the following schedule:

Wiring Group in Conduit	Group A	Group B	Group C	Group D	Group E
Electronic Dimmer-Controlled Lighting or Other Electronically Switched Power Services	36"	12"	12"	6"	36"
Convenience Outlet Power Service	12"	6"	6"	Adjacent	12"
All Other Power Services	18"	6"	6"	Adjacent	18"

END OF SECTION

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SECTION 27 05 28

TELECOMMUNICATION AND DATA WIRING SYSTEM

PART 1 – GENERAL

1.1 WORK INCLUDED

A. The work under this Section includes providing of all material, labor, equipment and supplies and the performance of all operations to provide a complete working system as required by the Drawings and details and as specified herein. Where the Drawings, Specifications, Codes, Regulations, Laws, or requirements of the local Authority conflict, provide the higher quality and higher quantity indicated or required and follow the strictest requirement. In general, the work includes, but is not limited to, the following:

1. Equipment Racks and Cabinets.
2. Relay Brackets.
3. Administration Document Cabinets.
4. Terminations.
5. Data Cabling Systems including:
 - a. Horizontal Cabling.
 - b. Backbone Cabling.
 - c. Cable Management.
 - d. Work Area Outlets.
 - e. Modular Jacks.
 - f. Patch Panels.
 - g. Patch and Line Cords.
 - h. Cross Connect Blocks.
 - i. Cross Connect Cabling.
 - j. Connectors and Couplings.
 - k. Inner Duct.
6. Pathways and Supports – (Coordination with Section 260500).
7. Pathways and Supports – (Provide Specific Pathways and Supports that are not being provided under Section 260500, i.e., J-hooks, etc.).
8. Telecommunications Cable Runway (Within Telecommunications Spaces and Integral to Telecommunications Equipment Racks and Cabinets Layouts/Support)
9. Power Requirements - (Coordination with Section 260000).
10. UL 497 primary and UL 497A secondary line lightning and surge protection at entrance to the building from the exterior.
11. Protection of new and existing work.
12. Record Drawings and Documentation.
13. Staging.
14. Telecommunications Equipment Grounding/Bonding to Telecommunications Grounding Backbone System.
15. Telephone System Cabling System.
16. Seismic Supports, Supplementary Steel and Channels.
17. Operation and Maintenance Instructions and Manuals for this Section's work.
18. Nameplates, Labels and Tags.
19. Testing and certification.
20. Sealing of Penetrations and Openings.
21. Access panels and doors.
22. Phasing of work and maintenance of service to existing and temporarily relocated items, City of New York equipment or workstations, etc. as required to meet the project schedule, including premium time.

23. Coordination with manufacturers, other trades, Contractor #4 and City of New York. Include costs associated with adjustments and changes resulting from coordination.
- B. The work required by this Section is indicated on Drawings Numbered E-107 through E-108 inclusive.
 - C. Adhere and comply with all requirements of cabling manufacturers certification and warranty program. Provide Commissioner and designer with test results and documentation including testing documentation and as-built drawings
 - D. Coordinate that Contractor #4 indicates on the project schedule:
 1. Installer, Commissioner and City of New York coordination meetings: 3 months (90 days) prior to scheduled Substantial Completion date or as soon as Submittals are submitted and reviewed for projects with schedules shorter than 5 months (150 days).
 2. Systems Testing: 30-45 days prior to project completion and prior to Substantial Completion, Acceptance Demonstrations and Training.
 3. Acceptance Demonstrations: 15 days prior to project Substantial Completion and prior to City of New York acceptance of project.
 4. Systems Instruction: 15 days prior to final Substantial Completion and prior to the City of New York's acceptance of project.
 - E. Communications System Scope:
 1. Provide all labor, supervision, materials, tools, equipment, and ancillary devices necessary to provide a complete telecommunications cabling system as described herein these Specifications and shown on the Drawings, which shall provide state of the art internal and external communications systems. The telecommunications cabling system includes, but is not limited to voice, and data cabling systems. The intent is to establish a standard of quality, function and features.
 2. All interface cabling terminations and installation shall be per manufacturer's recommendations.
 3. Coordinate with the City of New York, Contractor #1, Contractor #4, Commissioner, and all systems Installers for Telephone Equipment and Data Network Equipment for a complete and fully operational cabling system.

1.2 DEFINITIONS

- A. Entrance Facility (EF) also known as Main Distribution Frame (MDF).
- B. Telecommunications Room (TR) also known as Intermediate Distribution Frame (IDF).
- C. Telecommunication Grounding Main Busbar (TGMB)
- D. Telecommunications Grounding Busbar (TGB)

1.3 REFERENCES

- A. American National Standards Institute (ANSI).
- B. American Society for Testing and Materials (ASTM).
- C. Institute of Electrical and Electronic Engineers

- D. National Electric Manufacturers Association (NEMA)
- E. Underwriters Laboratories (UL)
- F. National Fire Protection Association (NFPA)
- G. Federal Specifications
- H. American Association of State Highway and Transportation Officials (AASHTO)
- I. Americans with Disabilities Act (ADA)
- J. American Iron and Steel Institute (AISI)
- K. Insulated Cable Engineers Association (ICEA)
- L. Building Industry Consulting Service International, Inc. (BICSI)
- M. Federal Communications Commission (FCC)

1.4 INTERPRETATION OF DRAWINGS

- A. Schematic diagrams shown on the Drawings indicate the required functions. Standard diagrams of the manufacturer may be used for the functions indicated without exact adherence to the Schematic Drawings shown. Work required for such deviations shall be provided.
- B. The right is reserved to make reasonable changes in locations of work prior to rough-in at no additional cost.
- C. Drawings and Specifications may not indicate every item required to produce a complete and properly operating installation. Materials, equipment or labor not indicated, but which can be reasonably inferred to be necessary for a fully complete, secure and properly operating installation suitable for the intended use shall be provided.
- D. Where Drawings or Specifications do not coincide with manufacturer's recommendations, or with applicable Codes and Standards, alert the Commissioner in writing before installation. Otherwise, make changes in installed work as the Commissioner requires without additional cost.
- E. It is the intent of these Contract Documents to have systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the Installer has failed to notify the Commissioner, in writing, of the situation, the installer shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.
- F. In situations or where potential conflicts exist or where the Installer believes guidance is required, submit a sketch identifying proposed solution and the Commissioner shall review, note if necessary, and return this sketch appropriately marked for use by the Installer.

1.5 OBTAINING INFORMATION

- A. Obtain from the manufacturer the proper method of installation and connection of the equipment that is to be furnished or installed. Obtain all information that is necessary to facilitate the work and to complete the project. Include all such information in Operation and Maintenance Manual.

1.6 APPROVED CONTRACTOR

- A. The Telecommunications Contractor #4 must be a properly trained cable installer by the cable manufacturers warranty program. The Telecommunications Contractor #4 is responsible for workmanship and installation practices in accordance with the cable manufacturers warranty program. The manufacturers warranty will be applied once the Telecommunications Contractor #4 fulfills all requirements under the cable manufacturers warranty program.

1.7 PROTECTION OF WORK AND PROPERTY

- A. Be responsible for the care and protection of all work included under this Section until it has been tested and accepted.
 - 1. Protect all equipment and materials from damage from all causes including theft. All materials and equipment damaged or stolen shall be replaced with equal material or equipment at the option of the Commissioner and City of New York.
 - 2. Materials and equipment stored for this project shall be protected and maintained according to the manufacturer's recommendations and requirements and according to the applicable requirements of NFPA 70B.
 - 3. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen and make good any damage caused.
 - 4. Use caution to avoid damage to existing work, and to prevent harm to personnel working in all areas.
 - 5. Observe all safety precautions and requirements for the construction.
 - 6. Contractor #1 and Contractor #4 are responsible for initiating, maintaining, and supervising all safety precautions and requirements during construction.
 - 7. Coordinate installations with all other trades in order to not damage equipment or cables during construction. Any work that is damaged during construction shall not be repaired. Replace damaged work completely, with no splices in cabling, at no additional cost to the Project.

1.8 SUBMITTAL REQUIREMENTS

- A. Product Data: Submit catalog data sheets or other published materials showing appearances, electrical ratings characteristics and connection requirements, seismic ratings, performance characteristics, dimensions, weights, installation methods, and space requirements of equipment and their accessories, as listed below and as required elsewhere in the Specifications and as requested by the Engineer:
 - 1. Identification Methods
 - 2. Cable Runways
 - 3. Wire and Cable
 - 4. Wiring Devices
 - 5. Grounding and Bonding
 - 6. Seismic Supports and Supplementary Steel
 - 7. Seals and Fittings
 - 8. All equipment and devices as noted under "Work Included"
 - 9. Test Report Formats

10. Test Equipment
 11. Test Procedures
 12. Year 2000 equipment and software compatibility certification for each equipment and software.
 13. Submit 5'-0" sample of all cables to be installed on this project including associated published cabling specification and Note Nominal Velocity of Propagation (NOMINAL VELOCITY OF PROPAGATION (NVP)).
- B. Shop Drawings: Submit shop drawings indicating physical size and arrangement, (plans and elevations) construction details, provisions for conduits, access requirements for installation and maintenance, Seismic, finishes, and materials used in fabrication. Supplement shop drawings with wiring diagrams and information as described under Product Data. Provide Shop Drawings for the following and as required elsewhere in the Specifications and as requested by the Engineer:
1. Submit complete shop drawings showing inventory of equipment to be installed, parts, and quantity for each telecommunications equipment room and closet. Include configuration of complete installed system.
 2. Design Data: Submit completed cable schedules for each cable including horizontal and backbone cables, based on construction room numbering. Use the cable schedule form included at the end of Part 3 of this specification.
 3. Submit one line drawings for each system and sub-system. Show each and every component, sub-system and system as well as connections within systems and connections between systems.
- C. Samples: Submit three samples of each connector and termination.
- D. Submit certified test report on each piece of telecommunications field testing equipment to be used on this project. Certified test report shall include at least the factory calibration date and test results. Factory calibration and testing shall take place immediately before actual systems testing is to take place. Factory calibration and testing date deemed too far in advance of actual testing, may be rejected.
- E. Provide a detailed submittal for all of the cabling, equipment and systems as follows:
1. Submit a letter indicating that the system is as specified and indicated on the Drawings and that any and all exceptions are as listed in this letter.
 2. As a minimum the submittal shall include the following:
 - a. Description of the configuration and operation of the proposed system.
 - b. Outline drawings of all proposed equipment in plan and elevation views including overall dimensions, weights and clearances required.
 - c. A complete copy of the specifications with each sub-paragraph on each page noted in the right hand margin with the comment, "compliance", "deviation", or "alternate". In the case of non-primary, vendor-supplied items, the name of the sub-vendor supplying said item, including model number shall be indicated.
 1. By noting the term "compliance", it shall be understood that the Manufacturer is in full compliance with the item specified and will provide exactly the same with no deviations.
 2. By noting the term "deviation", it shall be understood that the Manufacturer prefers to provide a different component in lieu of that specified. Manufacturer shall indicate all deviations and indicate what is being proposed.
 3. By noting the term "alternate", it shall be understood that the Manufacturer proposes to provide the same operating function but prefers to do it in a different manner. An alternate shall be fully described as to what the manufacturer proposes to provide.

3. The Submittal shall include catalog cut sheets or other descriptive material of major components.
 4. Items specifically identified in this specification are to provide for specific performance and quality of components desired and shall not restrict any Manufacturer from furnishing an equivalent product for the performance and operation intended as described above.
 5. Provide a synopsis of like systems of similar nature and complexity previously delivered and installed with names and telephone numbers of design engineers or customer personnel for each system.
 - a. If there are two or more documented cases of operational problems and failures of a similar system, the proposed manufacturer may be rejected.
- F. Schedule of Shutdowns: After the project construction schedule is developed, submit the following information to the City of New York for all required shutdowns of existing systems.
1. Date of proposed shutdown.
 2. List of systems to be affected.
 3. List of areas affected by the shutdown.
 4. Description of work to be performed.
 5. Estimated length of the shutdown.

1.9 EXTENDED WARRANTY/GUARANTY - UTP AND FIBER OPTIC CABLING SYSTEM

- A. Channel model configuration may be applied to the horizontal and/or backbone sub-systems of the structured cabling system. Applications assurance is only applied to a channel model configuration. All copper channels are to be qualified for linear transmission performance up to 250 MHz to ensure that high-frequency voltage phase and magnitude contributions do not prove cumulative or adversely affect channel performance.
- B. Copper Cabling System Warranty
1. A twenty (20) minimum year manufacturer warranty available for the category 6 structured cabling system shall be provided for an end-to-end channel model installation which covers applications assurance, cable, connecting hardware and the labor cost for the repair or replacement thereof.
 2. Additional features of the warranty shall include:
 - a. Margin over category 6 channel specifications on all parameters across the entire frequency range of 1-250MHz as noted below:

Insertion Loss	0.1 dB
NEXT Loss	0.9 dB
PS NEXT Loss	1.9 dB
ACR	1.1 dB
PS ACR	2.1 dB
ELFEXT	0.6 dB
PS ELFEXT	0.6 dB
Return Loss	0.5 dB

Propagation Delay	20 ns
Delay Skew	10 ns

Performance claims based on worst case testing and channel configurations

C. Fiber Optic Cabling System

1. A twenty (20) year minimum manufacturer warranty available for the fiber optic structured cabling system shall be provided for an end-to-end channel model installation which covers applications assurance, cable, connecting hardware and the labor cost for the repair or replacement thereof.

D. Additional features of the warranty shall include:

1. Fiber guaranteed to meet IEEE 802.3ae 10 Gigabit Ethernet requirements as well as IEC-60793-2-10 and TIA-492AAAC specifications for laser bandwidth Differential Mode Delay (DMD) specifications. In addition, it exceeds all ANSI/TIA/EIA and ISO/IEC insertion loss and return loss requirements.

Fiber	Guaranteed Gigabit Transmission Distance (m)		Guaranteed 10 Gigabit Transmission Distance (m)		Minimum Bandwidth (MHz*km)		Maximum Attenuation (dB/km)		Group Index of Refraction	
	850 nm	1300 nm	850 nm	1300 nm	850 nm	1300 nm	850 nm	1300 nm	850 nm	1300 nm
50/125L	1040	600	550	300	Laser 4700		Tight Buffer 3.0	Tight Buffer 1.0	1.483	1.478
					O.F.L. 3500	O.F.L. 500	Loose Tube 3.0	Loose Tube 1.0		

E. Performance claims based on worst case testing and channel configurations

1. **Attenuation**
Qualified cables shall perform in accordance with the attenuation limits as noted above when tested per ANSI/EIA/TIA-455-46, -53, -61 or -78 (as applicable).
2. **Bandwidth**
Qualified cables shall perform in accordance with the bandwidth limits as noted above when tested per ANSI/EIA/TIA-455-51 or IEC/ISO 793-1-C2A.
3. **Transmission Distance**
The protocol pertinent to the transmission distances noted above for Qualified Cables is Gigabit Ethernet per IEEE 802.3:2002 and 10 Gigabit Ethernet per IEEE 802.3ae.
4. **Differential Mode Delay**
Qualified multimode cable shall perform in accordance with Differential Mode Delay specifications per TIA-492AAAC at 850nm and 0.88ps/m at 1300nm.

F. Product Warranty

1. The manufacturer of passive telecommunications equipment used in a manner not associated with the Systems Warranty must have a minimum five (5) year Component Warranty on all ITS product. The Products Warranty covers the components against defects in material or workmanship under normal and proper use.

G. Applications Supported

1. Existing and future applications supported for a channel model warranty include those approved by the Institute of Electronic and Electrical Engineers (IEEE), the Asynchronous Transfer Mode (ATM) Forum, the American National Standards Institute (ANSI) or the International Organization of Standards (ISO) that specify compatibility with the cable referenced herein.

1.10 CERTIFICATES OF APPROVAL

- A. Upon completion of all work, and as a condition to receiving payment at Substantial Completion, furnish to the Commissioner the following original signed certificates and include copies of these certificates as part of the Operation and Maintenance manuals:

1. Certification from the manufacturers authorized representative stating that authorized factory engineers have inspected and tested the operation of their respective equipment and found same to be installed in accordance with the manufacturer's requirements, all requirements for manufacturer's warranties are complied with, and equipment is in satisfactory operating condition. This certification shall be provided for each piece of major equipment and cabling and for all complete systems. Provide certificate for additional items requested by the Commissioner.
2. Certificates of inspection, letters or notices from the appropriate governmental authorized inspectional authorities stating that all portions of the work (indicate trade and responsibility) have been inspected and are installed in conformance with the applicable codes, laws, ordinances and referenced standards. If non-conformance notices are received, include the re-inspection certificate, letter of explanation, etc. as required to indicate complete conformance. Provide written evidence of all exceptions or variances given by any Inspector.
3. Certificate from the installing firm responsible for the work (indicate trade and responsibility) signed by an authorized Officer of the firm and the Foreman or Project Manager in charge, indicating trade license numbers and stating that to the best of the signer's knowledge and belief that the project (indicate project name and address) has been installed in compliance with the Contract Drawings, Specifications and Addenda, and all applicable codes, laws, ordinances and referenced standards. Where sub-contractors perform a portion of the work of this section include certificates from them.

- B. Final affidavit for the occupancy permit will not be signed until the above certificates have been submitted and accepted.

1.11 SUBSTANTIAL COMPLETION

- A. When Work under this Section, or a designated portion of Work, is substantially complete, submit written notice through Contractor #4 with a list of items remaining to be completed or corrected.
- B. Should Engineer observe and find Work is not substantially complete, promptly notify Contractor #1, in writing, listing observed deficiencies.

- C. Remedy all deficiencies and submit a second written notice of Substantial Completion.
- D. Substantial Completion shall not be considered unless work remaining is less than one percent of the Contract Value of this Section and all systems are operational and tested to verify compliance with Contract Documents. Only minor items shall remain to be completed.
- E. When Commissioner finds Work is substantially complete a Certificate of Substantial Completion in accordance with provisions of the Contract Documents will be prepared.

1.12 FINAL COMPLETION

- A. When Work under this Section is complete, submit through Contractor #1 written certification that:
 - 1. Contract Documents (which include addenda, clarifications, requests for information (RFI's), change orders and instructions from the Commissioner) have been reviewed.
 - 2. Work has been inspected for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents and deficiencies listed with Certificate of Substantial Completion have been corrected.
 - 4. Equipment and systems have been tested, adjusted and balanced and are fully operational.
 - 5. Work is complete and ready for Commissioner's final review.
- B. Should Commissioner observe and find Work incomplete, the review will be promptly suspended and Contractor #1 notified in writing.
- C. Complete work, remedy deficiencies and send a second certification of Final Completion.
- D. Commissioner shall, upon receipt of a second certification of completion, make a second review and shall notify Contractor #1 listing observed deficiencies.
- E. When Commissioner finds Work is complete, he will consider close out submittals.

1.13 OPERATING INSTRUCTIONS AND OPERATION AND MAINTENANCE (O&M) MANUALS

- A. Include copies of manufacturer's and Installer's warranties, properly executed and signed by an authorized representative.
- B. Include copies of all test reports and certifications.

1.14 SEISMIC REQUIREMENTS

- A. Equipment and work shall meet the seismic restraint requirements based on the parameters described in the structural documents for installation and connections of material and equipment to the building structure.

PART 2 – PRODUCTS

2.1 EQUIPMENT RACKS

- A. Provide products meeting the requirements of the Drawings and Specifications from one of the following manufacturers:
 - 1. Chatsworth, Panduit, Hoffman, Great Lakes, Hubbell, Siemon or Ortronics.
- B. All products shall be provided by the equipment rack Manufacturer.
- C. Free Standing Equipment Racks
 - 1. Free standing equipment racks shall be seven feet high, EIA nineteen inches wide, ten and a half inch minimum depth, seismic rated, open bay free standing as indicated on the Drawings. Rack features shall include the following:
 - a. Universal hole pattern on the front and rear flanges, and threaded mounting holes on both sides of rack assembly for management brackets and with an eight inch mounting floor plate on the front and rear.
 - b. Racks shall be clear anodized aluminum with 12-24 threaded equipment mounting holes. Mounting holes that require supplemental threaded clips are specifically prohibited. Provide 12-24 screws for all equipment mounting holes plus 32 spare screws per rack.
 - c. Shelves for electronic equipment with load carrying capacity to support at least 125 percent of each piece of electronic equipment weight. Shelves shall have adequate openings within them to dissipate heat and allow for adequate electronic equipment ventilation.
 - d. Mounting brackets specifically designed to support the equipment installed within the rack.
 - e. Side mounted, 6-inch vertical cable management channels on each rack. Provide front accessible and rear accessible channels in order to properly dress horizontal/back bone cables (rear) and patch cables (front).
 - f. Horizontal cable support bar on rear of each patch panel/cross connect block panel to support hook and loop (Velcro) strain relief. Cables shall not rely on terminations for cable support.
 - g. Hook and loop (Velcro) cable strain relief system on rear of rack to support horizontal and backbone cables. Tie-wraps are specifically prohibited.
 - h. Hook and loop (Velcro) horizontal and vertical cable management on front of rack for dressing patch cable and cross connect wiring. Tie-wraps are specifically prohibited.

- i. Hook and loop (Velcro) cable management system independent of telecommunications cable management to properly dress the electronic equipment power cords through the rack maintaining as much clearances between the two as possible. Tie-wraps are specifically prohibited.
- j. Bonding and grounding cables for all equipment not directly bolted to equipment rack (i.e., shelf mounted electronic equipment, etc.).
- k. Bonding and grounding bus bar with individual set screw terminals for at least a minimum of six #6 Cu. bonding cables. Bonding and grounding bus bars shall be EIA 19-inch (518 mm) wide supported by mounting holes in pre-drilled 12-24 both the left and right rack flanges.
- l. Surge protected power strip as described in this specification.
- m. Patch panels and cross connect block panels as described in this specification.
- n. All hardware, supplementary steel, channel and supports as required to properly assemble the rack and support it to the building structure.
- o. All equipment racks and their hardware shall match in appearance and shall be provided by a single manufacturer.
- p. Equipment rack shall support all electronic and passive devices and have the ability to open when fully loaded for rear accessibility of rack mounted equipment.

2.2 WALL MOUNTED RELAY BRACKETS

- A. Provide products meeting the requirements of the Drawings and Specifications from one of the following manufacturers:
 - 1. Wall mounted relay brackets shall be provided by the patch panel and cross-connect block panel manufacturer.
- B. All components shall be provided by the Relay Bracket Manufacturer.
- C. Wall Mounted Relay Brackets
 - 1. Wall mounted relay brackets shall be black color 3.5 inch high, minimum EIA nineteen inch (518mm) wide, wall mounted relay brackets for IDC Type cross-connect block panels as indicated on the Drawings. Bracket features shall include the following:
 - a. Integral hinged mounting flanges with universal mounting hole pattern and mounting holes on both sides of bracket assembly for cable management brackets.
 - b. Brackets shall have 12-24 threaded equipment mounting holes. Mounting holes that require supplemental threaded clips are specifically prohibited.
 - c. Provide horizontal cable support bar on rear of each patch panel/cross connect block panel to support hook and loop (Velcro) strain relief. Cables shall not rely on terminations for cable support. Hook and loop (Velcro) cable strain relief system within bracket to support horizontal and back bone cables. Tie-wraps are specifically prohibited.

- d. Hook and loop (Velcro) horizontal and vertical cable management on front and sides for dressing patch cables and cross connect wiring. Tie-wraps are specifically prohibited.
 - e. Provide bonding and grounding terminals for at least two #6 Cu. bonding cables.
 - f. Patch panel and cross connect block panels as described in this specification.
- D. All hardware, supplementary steel, channel and supports as required to properly assemble the bracket and support it to the building structure.
 - E. All relay brackets and their hardware shall match in appearance and shall be provided by a single manufacturer.

2.3 SURGE PROTECTED POWER STRIP

- A. Provide products meeting the requirements of the Drawings and Specifications from one of the following Manufacturers: APC, Wiremold Sentrex, TrippLite, S.L. Waber or Hubbell
- B. Surge protected power strip shall be rack mount type.
- C. Surge protected power strip with six NEMA 5-15R outlets 15 amp capacity, 120 volts, UL 1449 listed, maximum surge current of 33,000 amps, clamping voltage of 260 volts, maximum 5 picosecond response time, resettable overload circuit breaker, surge suppression warning light, surge protection for line to neutral, line to ground, neutral to ground, EMI/RFI filters. One required for each load up to 1200 watts (total of individual connected equipment loads).

2.4 ADMINISTRATION DOCUMENTS CABINETS

- A. Provide products meeting the requirements of the Drawings and Specifications from one of the following manufacturer: Rittal, B-line, Hoffman or custom manufactured.
- B. The cabinet shall be constructed of primed and painted, code gauge steel with a piano hinged door with locking handle. Locks for all document cabinets shall be keyed alike. Document cabinets shall be adequately sized to contain all of the documents required to be located within them. Cabinet shall be able to hold a complete set of rolled "As-Built" drawings and TIA/EIA 606 required reports. The preferred mounting location is on the room side of the passage door in the MDF (ER) unless otherwise noted on the drawings.

2.5 CABLE SUPPORTS

- A. Provide products meeting the requirements of the Drawings and Specifications from one of the following manufacturers:
 - 1. D-Rings: Hubbell or approved equal
 - 2. J-Hooks: Caddy, Snaketray, Minerallac, AT&T, Diamond, Chatsworth, Harrison/Dracon, B-Line, Nelson, Mono-System.
 - 3. Hook and Loop Fasteners: Hubbell or B-Line
 - 4. Beam Clamps: Burndy, Minerallac, Kindorff, Steel City, OZ/Gedney
 - 5. Split Mesh Strain or approved equal
 - 6. Reliefs (Kellums): Hubbell or approved equal

- B. D-Rings and J-Hooks shall be sized to correctly support the number of cables which pass through them. Under no circumstances shall cable quantity exceed 30 in any given support. Fill capacity shall be as required by code for conduit. That is to say that every D-Ring or J-Hook shall have a maximum of 40 percent fill capacity. Install additional supports as required.
- C. Hook and loop fasteners shall be designed for their specific application. For example, if a hook and loop fastener is used to support cables to a rack, it shall have a grommeted opening for use with a 12-24 rack mounting screw.
- D. Cable-ties are specifically prohibited.
- E. Beam clamps shall be steel with threaded bolt type closure. Spring steel or "quick-clip" type clamps are specifically prohibited.
- F. Split mesh strain relief shall be properly sized for each cable that they support. Only one cable shall be installed in each split mesh strain relief.

2.6 BONDING AND GROUNDING JUMPER CABLE

- A. Provide products meeting the requirements of the Drawings and Specifications from one of the following manufacturers: Belden (No. 8669) or equivalent.
- B. Jumper cable shall be hollow braided, 60 amp capacity, copper.
- C. Provide equal conductor as described in "B" above for aluminum equipment.
- D. Jumpers shall have compression or exothermic type terminals on both ends of cables. Terminals shall be compatible with jumper cable material and equipment material in order to not have any degenerative reaction.

2.7 UNSHIELDED TWISTED PAIR (UTP) STATION CABLING SYSTEMS

- A. Provide products meeting the requirements of the Drawings and Specifications from the following Manufacturers while following warranty requirements:
 - 1. BERK-TEK
 - 2. MOHAWK
 - 3. SIEMON
 - 4. GENERAL CABLE
 - 5. COMMSCOPE
- B. Each work area outlet shall consist of the following:
 - 1. Single gang faceplate stainless steel with number of voice, and data, jacks as indicated in the Specifications and Drawings, unless otherwise noted.
 - 2. Oversized face plates are specifically prohibited.
 - 3. Furniture mounted work area outlet shall be single gang with number of voice and data jacks indicated on Drawings or in Specifications, semi-flush mounted on furniture utilizing manufacturer provided box or opening in raceway. Adhesive mounting is not allowed. Furniture work area outlets shall be coordinated with furniture manufacturer and shall be specifically designed for powered furniture. Surface mounted outlets that are designed for general use applications are specifically prohibited.

4. Each faceplate shall be able to support the jack modules, as required. All openings remaining after required number of jack modules have been installed in faceplates shall be blanked off with manufacturer provided blank modules.
5. Manufacturer and Installer Company logo, signage or any advertisement shall not be permitted on face of work area outlets.
6. Wall mounted telephone outlets shall have modular jack integral to the faceplate and shall have hardware to support the telephone device. Cover plate shall be stainless steel. Provide wall mounted telephone outlets approved by the manufacturer of the work area outlets being provided on this project.
7. Work area outlets shall have integral identification label holders with clear plastic cover panel. Adhesive label holders are specifically prohibited.
8. Work area outlets shall have cable strain relief for each cable terminated. Cables shall not rely on the conductor termination for support.
9. Work area outlets shall have rear accessible modules and use Phillips head cover plate screws.
10. Refer to Work Area Outlet Details for placement of jack
11. Provide products meeting the requirements of the Drawings and Specifications from one of the following manufacturers.

Wire and Cable: Berk-Tek LanMark 1000 P/N: 10032094
 General Cable Genspeed 6500 P/N: 7131282 or 7131431
 Mohawk Advance Net 6E P/N: M57193
 Commscope Ultra Media P/N:7504

Cat 6 Modular Jacks (Gray): Ortronics P/N: OR-TJ600-78
 Siemon P/N: MX6-F04
 Hubbell P/N: HXJ6GY

Patch Panels: Ortronics P/N: OR-PHD66U24 or OR-PHD66U48
 Siemon P/N: HD6-24 or HD6-48
 Hubbell P/N: P624U or P648U

Cable Management: Ortronics / Siemon / Hubbell

Cross Connect Blocks: Ortronics / Siemon / Hubbell

Cross Connect Block Panels: Ortronics / Siemon / Hubbell

Patch Cables: Ortronics P/N: OR-MC607-06
Siemon P/N: MC6-8-T-07-06
Hubbell P/N: PCX6BK08

12. Cross Connect Cabling: Shall be provided by Wire and Cable Manufacturer.
 - a. NOTE: Each of the products listed herein shall be provided to ensure manufactures warranty.

C. UTP Cabling system Pin/Pair Termination Assignment

1. The UTP cabling systems shall have TIA/EIA T568B pin/pair termination assignment. All eight conductors provided shall be properly and consistently terminated at both ends throughout the entire systems. Splitting pairs of conductors between multiple jacks or other devices is specifically prohibited.

D. Horizontal Cable

1. TIA/EIA Category 6 Unshielded Twisted Pair (UTP) - Data Cabling
 - a. Cable shall meet or exceed 1000 Mbps at 250 MHZ, 24 AWG, four unshielded twisted pairs (UTP), NRTL certified to TIA/EIA 568B.1 for Category 6 (UL Category 6).
 - b. Maximum cable diameter shall be 0.235 inches
 - c. Plenum rated cable - CMP rated jacket.
 - d. Cable sheath shall be the following colors: Data – Blue
2. TIA/EIA Category 6 Unshielded Twisted Pair (UTP) – Voice Cabling
 - a. Cable shall meet or exceed 1000 Mbps at 250 MHZ, 24 AWG, four unshielded twisted pairs (UTP), NRTL certified to TIA/EIA 568B.1 for Category 6 (UL Category 6).
 - b. Maximum cable diameter shall be 0.235 inches
 - c. Plenum rated cable - CMP rated jacket.
 - d. Cables sheath shall be the following color: Voice – White
3. TIA/EIA Category 6 Unshielded Twisted Pair (UTP) – “Emergency Telephone” Cabling
 - a. Cable shall meet or exceed 1000 Mbps at 250 MHZ, 24 AWG, four unshielded twisted pairs (UTP), NRTL certified to TIA/EIA 568B.1 for Category 6 (UL Category 6).
 - b. Outside plant cable - Gel-filled (Six pair) outside non-plenum rated cable - CMX rated jacket.
 - c. Plenum rated cable - CMP rated jacket.
 - d. Riser rated cable - CMR rated jacket.
 - e. Cables sheath shall be the following colors: Voice – Red
4. Modular Jacks (Work Area Outlets)
5. Data jacks shall be TIA/EIA Category 6 (UL Category 6) with printed circuit board or lead frame technology and integral board mounted, color-coded, high density, IDC type terminations. Provide 8 position modular jacks. Keyed jacks are not allowed. Jacks shall be able to withstand at least a minimum of 2000 mating cycles without any transmission degradation.
6. Voice jacks shall be TIA/EIA Category 6 (UL Category 6) with printed circuit board or lead frame technology and integral board mounted, color-coded, high density, IDC type terminations. Provide 8 position modular jacks. Keyed jacks are not allowed. Jacks shall be able to withstand at least a minimum of 2000 mating cycles without any transmission degradation.

7. Modular jacks color shall be:
 - a. Voice – Gray (Category 6)
 - b. Data – Gray (Category 6)
 - c. Data – Gray (Multimode Fiberoptic)
 - d. Data – Gray (Single Mode Fiberoptic)
8. Each work area outlet and modular jack shall have jack opening dust cover. Modular jacks that do not have integral dust covers shall have dust covers installed on each modular jack.
9. Each 8-position modular jack shall be gray and have color-coded icons.
10. Horizontal cables shall have single point IDC Type connection integral to the jacks only.
11. Jack modules shall be flame retardant thermoplastic with integral cable strain relief.

E. Patch Panels – Data Cabling Systems

1. Patch panels shall be EIA nineteen inch (518mm), rack mounted, TIA/EIA Category 6, UL Category 6 type patch panels with integral printed circuit board or lead frame technology, color-coded, high density, IDC type terminations and 8 position modular jacks. Keyed jacks are not allowed. Jacks shall be able to withstand at least a minimum of 2000 mating cycles without any transmission degradation.
2. Provide 24/48 port, high density, 1.75/3.5 inch (44/88mm) high, rack mounted patch panels and verify size with drawings.
3. Horizontal cables shall have single point IDC type connection integral to the jacks only.
4. Each port shall have color-coded identification label. Continuous label strips for multiple in-line ports are acceptable. Silk screened identifiers "1" through "48" are acceptable.
5. Provide patch panels for Horizontal Cabling Systems.

F. Cable Management

1. Each equipment rack and equipment cabinet shall have cable management panels with horizontal and vertical brackets.
2. Cable management shall be EIA nineteen inch (518mm) rack mounted 1.75 inch (44mm) high panel with horizontal and vertical patch cable distribution rings, or approved equivalent and shall be provided above and below each patch panel in the equipment rack.
3. Equipment rack cable management shall be furnished by patch panel manufacturer.
4. Cable management for high density, IDC Type cross-connect block panels shall be distribution rings integral to the panel or approved equivalent. Cable management shall be provided above and below each cross connect block in the equipment rack.

G. Patch Cables and Line Cords

1. Data patch cables shall be factory provided pre-connectorized, Category 6 (TIA/EIA Category 6) (UL Category 6), 4 UTP, 8-position modular jack, stranded conductors. Patch cables and line cords shall be able to withstand at least a minimum of 2000 jack mating cycles without any transmission degradation. One data patch cable per station location. Provide two (2) duplex patch cords for each port configuration on the patch panels, according to the following percentages and lengths:
 - a. 50% as 7 foot cables
 - b. 25% as 5 foot cables
 - c. 25% as 15 foot cables
2. Voice line cords shall be factory pre-connectorized, TIA/EIA Category 6 (UL Category 6), 4 UTP, 8-position modular jack, stranded conductors. Patch cables and line cords shall be able to withstand at least a minimum of 2000 jack mating cycles without any transmission degradation. One seven foot voice line cord per station location.
3. Meet the following performance specifications:

Frequency (MHz)	Attenuation (dB/100m)	PS ELFEXT (dB)	PS NEXT (dB)
1	2.4	67.8	72.3
4	4.5	55.8	63.3
10	7.1	47.8	57.3
16	9.1	43.7	54.2
20	10.2	41.8	52.8
31.25	12.8	37.9	49.9
62.5	18.5	31.9	45.4
100	23.8	27.8	42.3
200	34.8	21.8	37.8
250	39.4	19.8	36.3

H. Cross Connect Blocks – Voice Cabling Systems

1. Category 6:
 - a. Cross-connect blocks shall be TIA/EIA Category 6 (UL Category 6) color-coded, high density, IDC type terminations, 50, 100, 200, or 300 pair, cross connect blocks. Type 66 IDC cross connect blocks or similar are not allowed. Cross-connect blocks shall have integral stand-off support.
 - b. Modular connectors that allow cables fitted with connectors to be connected to the cross connect blocks are specifically prohibited. Cables shall have single point IDC type connection to the cross-connect blocks only.
 - c. Each (4 pair) connection shall have color-coded identification label. Continuous label strips for multiple in-line terminations are acceptable.
 - d. Provide with horizontal and vertical cable management.
 - e. Provide separate, dedicated cross-connect blocks for voice cabling systems.
 - f. Cross-connect cabling shall be NRTL certified that it meets or exceeds the TIA/EIA UL category rating of the system installed.
 - g. Cross Connect Blocks – Facilities Systems Cabling

2. Cross-connect cabling shall be NRTL certified that it meets or exceeds the TIA/EIA UL category rating of the system installed.

Meet the following performance specifications: Margin over category 6 @ 250MHz		
Parameters	Worst Case	Typical
Insertion Loss (dB)	0.12	0.15
NEXT* (dB)	12.7	13.9
FEXT* (dB)	22.1	22.6
Return Loss (dB)	5.3	5.9

2.8 FIBEROPTIC CABLING SYSTEMS

A. Manufacturers

1. Provide products meeting the requirements of the Drawings and Specifications from one of the following Manufacturers (where xxx denotes fiber quantities):
 - a. Cable Multimode: Berk-Tek PDPK12Bxxx-FB3015/X5, CommScope P-xxx-DZ-5K-FxUAQ, Superior Essex L4xxxF401.
 - b. Cable Singlemode: Berk-Tek PDPK12Bxxx-AB0707, General Cable APxxx1PNU-ILP, Mohawk M9SMxxx, CommScope P-xxx-DZ-8W-FxUYL, Superior Essex L4xxx3401.
 - c. Connectors and Couplers: Ortronics, Siemon, Hubbell.
 - d. Patch Panels: Ortronics, Siemon, Hubbell.
 - e. Patch Cables: Shall be provided by fiberoptic patch panel manufacturer.
 - f. Cable Management: Shall be provided by fiberoptic patch panel manufacturer.
2. Multimode Fiberoptic Backbone Cable – Inside Plant – Data Cabling Systems:
 - a. Cable shall be NRTL certified to TIA/EIA 492CAAA, 492AAAA, 568A, TSB72 and ANSI X3T9.5 fiberoptic specifications,
 - b. See drawings for quantities
 - c. 50/125 micron 850 nm and 1300 nm, graded index, optical fiber waveguide
 - d. Tight Buffer Multimode Plenum Distribution Cable.
 - e. Riser-Rated Multi-Mode Cable - OFNR Jacket, Distribution Cable.
 - f. Plenum Rated, Multi-Mode Cable - OFNP Jacket, Distribution Cable.
 - g. The maximum attenuation measured at 23 degrees C. shall be 3.0 dB/km @ 850 nm and 1.0 dB/km @ 1300 nm. The minimum bandwidth shall be 4700 MHZ @ 850 nm for effective modal bandwidth and 500 MHZ @ 1300 nm for over filled launch.

B. Modular Connectors and Couplers

1. Fiberoptic modular connectors/couplings shall be NRTL listed and TIA/EIA compliant, type "568LC" terminations with zirconia ferrules. Connectors and couplings shall be able to withstand at least a minimum of 2000 mating cycles without any transmission degradation. Maximum optical loss budget shall not exceed 1.5 dB per mated pair of terminations (0.75 dB per termination).
2. The connectors and couplings shall be compatible with the installed fiber optics: multi mode 50/125 micron optics.
3. Fiberoptic connectors shall be terminated by the following methods:
 - a. Hot Melt
 - b. Heat Cured Epoxy

- c. Ultra Violet Cured Epoxy
 - d. Mechanical (Compression with Index Matching Gel)
4. Fiberoptic connectors and couplers shall be provided by a single Manufacturer.
 5. Multimode connectors shall be beige in color.
 6. Maximum Insertion Loss (dB) 0.65.

C. Fiberoptic Patch Panels

1. Patch panels shall be capable of terminating a minimum of 12 pair (24 strands) of a fiberoptic cable. See drawings for exact quantities.
2. Patch panels shall be rack mounted or cabinet mounted.
3. Patch panels shall be EIA nineteen (19) inch, rack mounted drawer type with integral cable management, locking door and preloaded with duplex 568-LC couplings. "LC" coupling shall allow for "LC" male connectors to be connected to the front and back of the patch panel. Provide silk screening on panel to distinctly identify TX and RX at each port. Provide large bold label indicating information similar to "caution - severe eye damage. Do not look into fiber optic connector while energized," and mounted signature to the fiber optic patch panel.
4. Provide separate patch panels for each of the following:
 - a. Horizontal Cabling – Data Cabling Systems
 - b. Backbone Cabling – Data Cabling Systems

D. Fiberoptic Patch Cables

1. Provide NRTL certified EIA/TIA 492AAAA, 568A, TSB67, performance tested patch cables as required for a complete operational system. Patch cables shall be factory fitted with connectors, two strand, "568LC" type connectors with zirconia ferrules, tight buffer. Patch cables connectors shall be provided by the same manufacturers as the fiberoptic connectors and couplings. One 3m duplex patch cord per pair of backbone fiber.
2. Patch cables shall match the fiberoptic system installed multimode 50/125 micron multimode.
3. One strand of the patch cable shall have a distinguishing mark throughout its entire length to simplify the distinction between Transmitting (Tx) and Receiving (Rx) at the patching area. Color coded factory marked (Tx-Rx) connectors are preferred.
4. Be 100% optically tested to meet the following performance specifications:

Parameter	50/125µm		62.5/125µm	
	850nm	1300nm	850nm	1300nm
Min. Cable Bandwidth (MHz*km)	4700*	500&	200&	500&
Max. Insertion Loss (dB)	0.65 (0.40 Typical)			
Min. Return Loss (dB)	20 (25 Typical)			
* =	Effective Modal Bandwidth 850nm Differential Mode Delay (DMD) measurement per TIA-455-220			
& =	Over filled launch per TIA-455-204			

E. Fiberoptic Cable Management

1. Each equipment rack shall have horizontal and vertical cable management panels and brackets.
 - a. Horizontal cable management shall be EIA nineteen inch (482mm) rack mounted 1.75 inch (44mm) high drawer panel with integral cable management and shall be provided for each fiberoptic patch panel. This cable management drawer panel is to manage the fiberoptic patch cables and is separate from the fiberoptic patch panel.
2. Fiberoptic patch panels shall have an integral means for managing the fiberoptic backbone strands in order to safely and neatly maintain 15 feet (4.5m) of cable slack.

2.9 TELECOMMUNICATIONS CABLE RUNWAY

- A. Cable trays are provided by Division 26 section 260500.

2.10 INNERDUCT

- A. Refer to Part 1 - GENERAL for additional Manufacturer's requirements.
- B. Provide products meeting the requirements of the Drawings and Specifications from one of the following manufacturers:
1. Max-Cell
 2. Carlon
 3. Kwikpath
 4. George Ingraham
 5. Pyramid Industries
- C. PE constructed innerduct shall be used when placed in underground conduits.

PART 3 - EXECUTION

3.1 GENERAL

- A. Inspect the site, existing conditions, fully understand the Work required, and provide the Work according to Contract Documents and all existing site conditions. Confer with the Manufacturer's of existing systems to be retained, modified or extended. Include all required costs and components for a fully functional system performing as indicated herein and on the Drawings. No additional compensation will be granted because of existing conditions.
- B. Verify the exact location of all items that may be indicated and determine exact location of all items that are not indicated on the Drawings.
- C. Any work installed contrary to the Contract Documents or written directions from the Commissioner shall be subject to change as directed by the Commissioner and no extra compensation will be allowed for making these changes or any work of any other trade due to these changes.

- D. Do not install equipment and materials which have not been reviewed by the Commissioner. Equipment and materials which are installed without the Commissioner's review or without complying to comments issued with the review shall be removed from the project when so instructed by the Commissioner. No payment will be made for unapproved or removal if it is ordered removed. The Installer shall be responsible for any ancillary costs incurred because of its removal and the installation of the correct equipment and materials.
- E. Manufacturers:
1. Manufacturers shall refer to all parts of the Project Specifications and Drawings to familiarize themselves with all project requirements and include, in cooperation with the Installer, all associated costs.
 2. During construction, each Manufacturer or an authorized Representative shall visit the site periodically to observe the installation of projects furnished. Immediately notify the Installer in writing if products are not being installed as recommended by the Manufacturer of the product. Provide copy of notice to Contractor #1 and the Commissioner.
 3. Upon completion of the work, each Manufacturer shall certify the installation as indicated under "CERTIFICATES OF APPROVAL".
 4. When a Manufacturer, or authorized Representative accepts an order for material and equipment, they agree to adjust Submittals and production schedules as required to accommodate the project schedule. Schedules shall be included with Submittals indicating review times as specified herein and manufacturing and delivery times such that material and equipment will be manufactured and delivered to the site sufficiently ahead of schedule so as not to delay the completion of the work.
- F. At the start of construction, consult with Contractor #4 and all Trades and determine and verify the telecommunications requirements and characteristics of all equipment which is supplied under the Contract.
- G. Request, in writing, that Contractor #4 and each Trade prepare and submit to this Section a complete list of all equipment which they are supplying under their respective Sections which require or effect work under this Section.
- H. Obtain detailed information on installation requirements from the manufacturers of all equipment to be furnished, installed or provided. At the start of construction, check all Contract Documents including all Drawings and all Sections of the specifications for equipment requiring connections and service and verify characteristics of equipment prior to roughing.
- I. Request Contractor #4 to provide, as soon as possible after approval, two copies of approved submittals of equipment which require or effect the work of this section. Review these submittals for characteristics and return the submittals to Contractor #4 noting any disagreement within two weeks of receipt.
- J. Equipment and systems shall not be installed without first coordinating the location and installation of equipment and systems with Contractor #4 and all other Trades.
- K. Any and all material installed or work performed in violation of above requirements shall be re-adjusted and corrected by the Installer without charge.

- L. Refer to all Drawings associated with the project, prior to the installation or roughing-in of the work and to determine the exact location of all outlets.
- M. Assure that all equipment is accessible, such as junction boxes, pull boxes, and such other apparatus as may require maintenance and operation from time to time. Provide necessary construction access panels sized to provide adequate and required access for installation by Contractor #4. Provide rated panel or door appropriate for the construction being installed into (fire, smoke and/or acoustical).
- N. After installation, equipment shall be protected to prevent damage during the construction period. Openings in conduits and boxes shall be closed to prevent the entrance of foreign materials. All cables are to be supported properly during construction.
- O. Home runs indicated are not to be combined or reduced without written consent from the Commissioner.
- P. Cables and raceway sizes indicated shall be continuous throughout circuit unless otherwise indicated.
- Q. Connections to equipment shall be made as required, and in accordance with the approved submittal and setting drawings.

3.2 EQUIPMENT RACKS, CABINETS AND BRACKETS

- A. Securely mount equipment racks, cabinets and wall mounted relay brackets to the building structure. Provide Seismic bracing. Proper supports such as 3/8" lag screws and expansion anchors shall be used. Proper quantity of supports shall be utilized. Dry wall screws and other types of supports not specifically approved to support equipment are specifically prohibited. Submit mounting supports for approval before installation.
- B. Position racks, cabinets and wall mounted relay brackets in order to have minimum 3 foot clearance for easy access. Equipment racks, cabinets, and relay brackets mounted on or against walls shall have 3 foot clearance in front of deepest component. Free standing equipment racks and cabinets shall have 3 foot clearance in front and rear of deepest components. Provide 3 foot clearance between free standing equipment racks or cabinets and any other obstruction to allow access from front to rear of rack or cabinet for maintenance.
- C. Provide cable runway over each rack and cabinet as required to facilitate a neat and orderly installation of cables and to secure the top of the racks to the structure. Cables shall drop straight down (through "waterfall" fittings) to equipment racks and cabinets. Cable runways shall be secured at both ends to the structure and connected together as required for a complete contiguous installation. Utilize proper supports to support the cable runway to the building structure as well as the equipment rack and cabinet. Submit mounting supports for approval before installation.
- D. Install terminating components such as patch panels cable management, etc., into the racks, cabinets and wall mounted relay brackets.
- E. Patch Panels: Mount patch panels onto the rack(s) in top-to-bottom fashion with the first patch panels cable management, etc., into the racks, cabinets and wall mounted relay brackets. Provide separate patch panels for backbone and horizontal data cabling systems, video distribution system, facility cabling systems, etc.
- F. Cross Connect Blocks: Mount cross connect blocks on to the backboards in top-to-bottom fashion with the first block mounted at the top of the backboard. Uniquely label each cross connect block according to the numbering convention outlined in the Section on labeling. Each four pair termination shall be uniquely labeled. The lowest cross connect block shall be a minimum 18" above finished floor. Refer to details on the Drawings.

- G. Cable Management: All cable shall enter the telecommunication's room/closet to within the equipment racks and/or brackets. Secure the bundle(s) to the rack strain relief and wire management behind the patch panels and cross connect blocks. Install horizontal and side-mounted vertical cable management panels and brackets for routing and management of patch cables and cross connect cabling. Maintain EIA/TIA and BICSI standards on bundling, support and bend radii.
- H. Once the cabling system has been installed and terminated, coordinate installation of all active components such as Hubs, UPS and surge protected power strips into the racks, cabinets and wall mounted relay brackets.
- I. Coordinate power requirements with Contractor #4. It is this section's responsibility to provide additional power requirements for their equipment that has not been provided in the Drawings and Specifications of Division 260000.

3.3 WORK AREA OUTLETS

- A. All work area outlets locations shall be as indicated on the Drawings. Uniquely label each work area outlet and jack within the outlet according to the numbering convention outlined in the section on labeling.
- B. Work area outlets installed in powered furniture partitions shall have their cables installed within the integral furniture raceway.
- C. Utilize philips head screws to secure the work area outlet cover plates to the outlet box.
- D. Install jack and connector modules as indicated in the details on the Drawings.
- E. Work area outlets shall be seated properly and shall be installed level on walls and parallel to building elements as required.

3.4 TERMINATIONS

- A. All copper and fiber conductors of every cable shall be completely terminated at both ends.
- B. Terminations shall be as indicated under the type of cabling specified in Part Two of the Specifications.

3.5 CABLE PATHWAYS

- A. Install cables in pathways provided under Section 260500 or required under the execution part of this section.
- B. Provide all equipment and cabling for a complete installed operating system. In general, pathways, outlet boxes and grounding are provided under Section 260500. However, it is the Installers responsibility under this Section to coordinate with the Drawings and Specifications for Section 260500 and to provide all pathways and outlet boxes required that are not provided under Section 260500.
- C. All pathways provided under this Section shall comply with fill capacities as per the Electrical Code, EIA/TIA and BICSI.
- D. Cable bending radius shall not be less than minimum required by EIA/TIA and BICSI.
- E. Cabling installed concealed shall be supported from the building structure (e.g. cable trays, "J" hooks, etc.).

- F. At a minimum, exposed cabling installed in return air plenums shall be plenum rated cables.
- G. Cables shall be installed no closer than 12 inches (305mm) to electrical equipment and wiring. When cables are required to cross power wiring, they shall only do so perpendicular to the power wiring. Telecommunications cabling and power wiring shall only cross each other the minimal number of times as required due to building design limitations.
- H. Clearances: Clearances between cabling and other building systems as required by EIA/TIA 569 and BICSI shall be maintained throughout the building.
- I. All cables shall be installed in a neat and workman-like manner. Cables shall be installed parallel and perpendicular to building elements.
- J. Cables installed in telecommunications rooms and closets shall be installed in approved path way systems (cable tray, etc.). Under no circumstance shall cables be allowed to "hang" across any spaces. Lace or wrap cables frequently in order to dress them properly.
- K. All cables shall have a minimum of 10 foot service loops in the intermediate distribution frame and rooms and shall have a minimum of 18 inch service loop at the work area outlet.
- L. Provide expansion fittings and adequate cable slack at all building expansion joints.

3.6 TELECOMMUNICATIONS GROUNDING/BONDING

- A. Provide Bonding to Grounding Buses.
- B. Grounding/Bonding conductors shall be of electrical grade copper except where otherwise indicated.
- C. Grounding/Bonding connector shall be un-insulated unless otherwise indicated.
- D. Grounding connections shall be made by means of approved and listed bronze clamps equal to Burndy type GBM, compression connections or exothermic welding.
- E. Raceways including wireways, conduits, cable runways, etc., are installed for low voltage or fiber optic cabling shall be made electrically continuous for grounding purposes. Provide hollow braided copper jumpers between sections equal to Belden No. 8669 (60A ampacity). Provide equal conductor for aluminum raceway.
- F. Bond raceways to the ground bus located in the MDF/IDF rooms. Bond raceways in each room they terminate in.
- G. Grounding or bonding conductors installed for Telecommunication Systems shall be labeled near their termination points. Labels shall be non-metallic and include the following:
 1. A WARNING if this connector or cable is loose or must be removed, please call City of NY.
 2. Labels and installation shall meet the requirements of ANSI/TIA/EIA 606 and 607.
 3. Connections shall be made readily accessibly for inspection. No connection shall be made concealed in floors or walls.

4. In general, all connections shall be exothermic welded where safe to apply except that substantial mechanical connections shall be used where disconnection is required for test and where called for on the Drawings.

3.7 INSTALLATION

- A. All cabling shall be installed in conduit or in cable tray where indicated on plans or shall be installed open using "J" hooks.
- B. Use industry standard EIA/TIA and BICSI color codes and maintain consistent color coding throughout the building.
- C. At telephone board locations designated on the Drawings, furnish 3/4 inch thick sheet of MDO plywood backboard with smooth finish for the mounting of equipment and cable terminators. The backboards shall be painted matte white with two coats of non conductive, fire retardant paint. Exact dimensions of the backboards shall be as indicated on the Drawings.
- D. All equipment, materials and devices listed and inferred shall be furnished and installed under this section unless noted otherwise.
 1. Refer to the Drawings for locations and quantities.
 2. Refer to Part 2 Products of this specification for additional information.
- E. Typical Layouts and Requirements:
 1. Equipment racks and cabinets
 2. Backbone cabling
 3. Typical layout of telecommunications equipment racks and cabinets
 - a. Each equipment rack and cabinet shall contain the following equipment:
 - Fiber optic patch panel
 - Fiber optic cable management
 - Space for Hubs / Switches
 - Space for UPS
 - Patch panels - Horizontal distribution
 - Horizontal distribution cable management
 - Patch panels - Telephone distribution
 - Telephone distribution cable management
 - Vertical cable management
 - Patch cords
 - b. Provide space for the installation of Hubs, Switches, UPS and Hub distribution patch panels in the equipment racks. Coordinate with the City of New York's installer to determine the exact amount of space required in each rack.
 - c. Provide horizontal cable management between each patch panel (fiber optics, Horizontal distribution and telephone distribution).
 - d. Provide, at a minimum, horizontal distribution patch panels with sufficient ports to terminate all modular jacks indicated on the Drawings plus twenty percent spare.
 - e. Provide all equipment racks and cabinets required to support the aforementioned equipment.
 - f. The main distribution frame (MDF) room shall contain fiber optic patch panel quantities which correspond to the total number of fiber optic patch panels located at the intermediate distribution frame (IDF). See drawings for quantities.

- g. Provide the required grounding to ensure that all of the equipment is grounded and bonded.
4. Typical backbone cabling
- a. Provide backbone cabling consisting of the following:
Fiber optic cables installed in innerduct sized appropriately.
Unshielded twisted pair cabling (UTP)
 - b. Provide backbone between fiber optic patch panels in each IDF and the MDF.
Provide fiber optic cable from each fiber optic patch panel in each intermediate distribution frame (IDF) to its corresponding fiber optic patch panel in the main distribution frame (MDF) room.
Terminate both ends of all fiber optic strands installed.
 - c. Provide all IDC cross connect block panels and hardware for terminating voice and facilities backbone cabling systems. Terminations of these systems onto the IDC cross connect block at the head-end shall be provided under this section.
 - d. Final terminations from IDC cross connect blocks to telephone equipment and PBX by Telephone Company and Equipment Installer. Coordinate with Telephone Company and Equipment Installer for final terminations. Final terminations from IDC cross connect blocks to voice and facilities cabling horizontal cabling systems shall be by City of New York.

3.8 CABLE SUPPORTS

- A. Provide strain relief system for backbone cables at each floor level as they pass from one floor to the next. Include all racking anchors, mounts, cable supports, etc. necessary to a complete and functioning system. Maximum distance between supports shall be five feet (1500 mm).
- B. Provide hook and loop (Velcro) cable wraps at all panels, equipment racks and cabinets. Cable ties are specifically prohibited.
- C. Hook and loop (Velcro) cable wraps for horizontal cables shall be secured with minimum required compression in order to secure the cables properly without impeding the signal transmission rating (geometry) of the cable. Cable-ties are specifically prohibited.
- D. When pathways are not provided or specified, provide raceways or "J" hook or "D" ring supports from the building structure as required for cable runs to the cable drop location. Maximum distance between supports shall be four feet (1200mm) depending on the structural elements of the building. Maximum number of cables per support shall be thirty. Provide additional supports as required when cable quantities exceeds thirty and to maintain required bending radius of cables. Cables installed exposed or in areas subject to abuse (below 10 feet (3m) above finished floor) or in accessible areas shall be installed in conduit.
- E. All cables shall be supported directly from building structure. Under no circumstance shall cable be installed using cross bracing, plumbing/sprinkler pipes, ceiling systems or any other system that is not a specifically approved method to independently support telecommunications systems cables. Cables shall not be allowed to rest on ceiling tiles, ductwork, piping, etc. Supports shall be provided as required in order for cables to avoid contact with any other building system. Bundle cables in groups by common destination.
- F. Cable supports shall be installed in order to have minimal disruption to fireproofing. Fireproofing that is removed in order to install supports shall be replaced by the installer under this section under the supervision of Contractor #4. Coordinate with Contractor #1.

3.9 SEISMIC SUPPORTS, SUPPLEMENTARY STEEL AND CHANNELS

- A. Provide all supports, supplementary steel and channels required for the proper Seismic installation, mounting and support of all work installed under this Section.
- B. All supports, supplementary steel and channels shall be furnished, installed and secured with all fittings, support rods and appurtenances required for a complete support or mounting system.
- C. Supplementary steel and channels shall be firmly connected to the building construction in a manner approved by the Commissioner prior to the installation of same. Submit to the Commissioner, via Contractor #1, the locations proposed for using supplementary steel and channels for the support of equipment, fixtures and raceways. The submittal shall indicate the mounting methods, size and details of the supports, channels and steel; it shall indicate also that weight which the supports, channels and supplementary steel is to carry.
- D. The type and size of the supporting channels and supplementary steel shall be of sufficient strength and size for seismic restraint and to allow only a minimum deflection in conformance with the channel and supplementary steel manufacturer's requirements for loading.
- E. All supplementary steel and channels shall be installed in a neat and workmanlike manner parallel to the walls, floor and ceiling construction. All turns shall be made with 90 degrees and 45 degrees fittings, as required to suit the construction and installation conditions.
- F. All supplementary steel, channels, supports, and fittings, shall be Underwriters' Laboratories, Incorporated, approved, be galvanized steel and be manufactured by Steel City, Unistrut, Power-Strut, T. J. Cope, Chalfant or approved equal.
- G. Provide supports to meet the required Seismic rating as indicated under "Part One" of this Specification.
- H. Provide beam clamps with set screws (C-clamp type).
- I. Work under this Section shall be held in place by Seismic rated methods.
- J. Supporting from the roof decking will not be acceptable.
- K. Provide expansion anchors on masonry units or brick work. Power actuated supports will not be accepted.
- L. Provide stainless steel or corrosion resistant supports in corrosive areas on wet or damp areas.
- M. Support work from the building structure, independent of suspended ceilings, roof deck or other trades work. Where ductwork, pipes, pipe racks, type of building construction materials or structural framing members provide obstruction or difficult support means, hanger rods shall be used in association with horizontal sections of steel support channels, in an approved manner.
- N. All work shall be installed in a rigid and satisfactory manner and shall be supported by bar hangers in frame construction or shall be fastened directly with wood screws on

wood, bolts with expansion shields on concrete or brick toggle bolts on hollow masonry units, and machine screws or welded threaded studs on metal. Threaded studs of the proper type and holding capacity driven in by a power charge and provided with lock washers and nuts are acceptable for mounting of equipment on solid concrete walls or slabs.

- O. Obtain written permission from Contractor #1 allowing use of power activated charges. Use only properly trained and licensed operators.
- P. Do not use power charge driven supports for any work that is to be hung from a horizontal surface without written permission from the Commissioner.
- Q. Preset inserts of the proper type and holding capacity shall be used in overhead slab construction wherever possible.
- R. Provide lateral supports for work to prevent excessive movement during a seismic event using rods, braces or galvanized or stainless steel cables.
- S. Pendants, supports or hanging rods longer than 12 inches (300mm) shall be laterally braced.
- T. Where installed in damp, wet and areas requiring wash down, all surface mounted panels, boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.

3.10 CABLE PROTECTION

- A. Cables to be installed in existing enclosed open bays or furred spaces where conduit stubs are not provided, shall be protected from chafing or any damage. The Installer shall verify that the warranty shall not be violated before installing any cabling in these locations.
- B. Provide bushings in all metal studs and other openings where cables will pass through. Bushings shall be of two (2) piece construction with one piece inserted through the openings and the second piece locking it into place. Single piece bushings with locking tabs or friction fit are specifically prohibited.
- C. Provide cutting, coring, sleeves and bushings and seal as required at all penetrations.
- D. Fiberoptic backbone cables shall be installed in innerduct. Innerduct shall be plenum rated where installed in HVAC air plenum spaces. PE rated innerduct when installed in underground conduit.
- E. Cables damaged during installation shall not be repaired. They shall be completely replaced with new cable.

3.11 COPPER CABLING SYSTEMS

- A. The general topology shall be a "hierarchical star" configuration. All segments shall originate in NRTL listed patch panels or IDC blocks located in the MDF(ER) or IDF(TR) and end at the work area outlet.
- B. All horizontal cables shall be terminated at their respective equipment racks in the MDF/IDF rooms. Allow ten feet (3m) of cable slack coiled up for future cable movement within the MDF/IDF rooms and ten feet (3m) of cable slack coiled up in the ceiling at the work area outlet.
- C. All cables shall have both ends completely terminated at their respective patch panel, cross-connect block, work area outlet, splitters, tap, etc. Individual conductors shall be

trimmed flush with IDC block. Cables indicated to be "spare" shall have one end terminated at their respective patch panel or cross-connect block and the other end shall be hermetically sealed with a polyolefin heat-shrinkable cap. Provide Raychem Co. or approved equivalent after testing. Tape shall not be approved.

- D. The total length of permanently installed cable for any complete segment shall not exceed 295 feet (90m) for UTP. Do not splice or otherwise re-terminate any cable used, terminate only at the patch panels, cross connect blocks and work area outlets. Route cables (minimum of 12 inches (305mm) away) to avoid light ballasts, transformers, power wiring and other electrical devices so that there is no EMI or RFI interference with data transmission. Permanently label all cables six inches from the connector at each end, according to the numbering convention outlined in the section on labeling. All cables shall be terminated at outlets, patch panels or cross connect blocks only.
- E. Maximum pulling tension shall not exceed 25 lbs/ft. when installing cables.
- F. Modular Jacks
 - 1. Each Category 6 jack shall have a Category 6 home cable run back to its associated patch panel.
 - 2. Each Category 6 jack shall have a Category 6 home cable run back to its associated cross connect block.
- G. Maximum pulling tension shall not exceed 25 lbs/ft. when installing cables.
- H. Once the cabling system has been installed and terminated, install all active components such as Network Electronics, UPS and surge protected power strips into the racks, cabinets and wall mounted relay brackets.

3.12 FIBER OPTIC CABLING SYSTEMS

- A. Cabling
 - 1. The general topology shall be star configuration. All segments shall originate from NRTL listed fiber optic patch panels located in equipment racks/cabinets in the main distribution frame (MDF) and be distributed to fiber optic patch panels in intermediate distribution frame (TR). Each TR shall connect directly back to the MDF with fiber optic cables.
 - 2. All strands within the fiber optic backbone cable shall have both ends terminated in their respective patch panels. "Dark" fibers are not allowed.
 - 3. All fibers supplied in cable shall be usable fibers and meet required specifications.
 - 4. Multimode fiber optic cable:
 - a. Multimode fiber optic cable shall be furnished and installed from the main distribution frame (MDF) to each intermediate distribution frame (TR). See drawings for quantities and locations.
 - 5. Single Mode Fiber Optic Cable System:
 - a. Provide single mode fiber optic cable between main distribution frame (MDF) and each intermediate distribution frame (TR). See drawings for quantities and locations.
 - 6. Pulling tension shall not exceed 25 lbs/ft when installing cables.
 - 7. Fiber Optic Cable Management

- a. Hook and loop (Velcro) type cable wraps shall be secured with minimum required compression in order to secure cables properly without impeding the signal transmission rating (geometry) of the cable. Cable ties are specifically prohibited.
 - b. Split mesh metal strain relief (Kellums) shall be provided to secure cables installed vertically.
8. **Fiberoptic Patch Panels**
- a. Provide a minimum of 1 fiberoptic patch panel in each main distribution frame (MDF) and each intermediate distribution frame (TR).
 - b. "SC" couplers shall allow for "SC" male connectors to be connected to the front and back of the patch panel. Provide silk screening on panel to distinctly identify transmit (Tx) and receive (Rx) at each port. Provide large bold label indicating information similar to "CAUTION - SEVERE EYE DAMAGE! DO NOT LOOK INTO FIBEROPTIC CONNECTOR WHILE ENERGIZED!", and mount signage to the fiber optic patch panel.
9. **Fiberoptic Patch Cables**
- a. Verify the connectors provided by the electronics provider. If the electronic equipment has ST connectors, provide hybrid cables with SC connectors on one end and ST connectors on the other end.
10. **Innerduct**
- a. All fiber optic cabling shall be installed in innerduct.
 - b. Provide two (2) 1 1/2 inch innerducts and one (1) 1 1/4 inch innerduct each with 200-pound-test pull line, in each four inch (102mm) conduit provided for fiberoptic cabling.
 - c. Fiberoptic cabling installed exposed through air plenum spaces (cable tray, etc.) shall be installed in plenum rated innerduct. Provide J-hooks or similar and innerduct. Bound innerducts together neatly utilizing hook and loop fasteners.
- B. Fiberoptic backbone shall be installed in innerduct.

3.13 IDENTIFICATION

- A. All equipment and cabling shall be properly identified by means of clear and concise labels. All identification shall meet or exceed the minimum requirements of EIA/TIA-606 and BICSI standards. Handwritten and embossed type labels are specifically prohibited.
- B. Permanently label, using pre-printed labels, all cables and terminations exactly as defined:
- 1. Label patch panels and cross connect blocks numerically, top-to-bottom.
 - 2. Label patch panel and cross connect blocks ports numerically.
 - 3. Label the cable segments as indicated on Drawing Schedules. Each outlet will be designated by the incoming cable, and will be labeled accordingly.
 - 4. Label each equipment rack, panel and cross connect block uniquely.
 - 5. Refer to Administration section for specific labeling requirements.
- C. **Labels**
- 1. Provide color-coded labels with CODED identifiers as follows:
 - a. Conduits and other pathways shall be labeled at all end points including equipment rooms, MDF/IDF rooms, pull boxes and the like. Provide

adhesive labels on the conduit with at least one label within each space that the conduit passes through. Labels shall be attached by means of the label adhesive and color-coded pressure-sensitive tape wrapped around conduit at least one and one half times.

- b. Cable trays and wireways shall be labeled at all end points and at ten foot (3m) intervals along the length of the entire cable tray. Provide adhesive labels on the cable tray with at least one label within each space that the system passes through. Labels shall be attached by means of the label adhesive. Should the label not adhere properly, provide a permanent means of mounting.
 - c. Telecommunications Rooms and Closets shall have engraved labels provided on the interior side of the door entering the space located above the Administrative Documents holder indicating the room identification. Administrative documentation shall be modified to reflect the Telecommunications label identifier in relation to the Architectural room designation.
 - d. Cables shall have double lapped adhesive labels at all end points including work area outlets, telecommunication closets and equipment rooms. Cables shall have factory imprinted sequential cable length markings at a minimum of two foot (610mm) intervals the entire length of the cable (each cable's markings do not have to start at two feet.) Cables shall also have factory imprinted manufacturer's name, part number and the NRTL certified UL EIA/TIA category rating designation at a minimum of two foot (610mm) intervals along the entire length of the cable.
 - e. Termination hardware shall have adhesive labels on both the front and rear (if accessible) of the hardware.
 - f. Engraved Nameplates - shall be provided at each equipment cabinet (1/3 the distance down from the top), equipment rack (top), patch panel (left side), pullbox (1/3 the distance down from top), cross connect block [panel] (left side) and the like. Nameplates shall be fastened by means of tamper proof screws or rivets. Nameplates located 10 feet (3m) or higher above the finished floor or above accessible ceilings shall have nameplates with 1 inch (25mm) high characters.
 - g. Insert Labels - shall be provided in each work area outlet patch panel termination hardware (top of jack) cross connect blocks (edge of block) and the like.
 - h. Outlet boxes and junction boxes shall have adhesive labels attached on the inside where visible from the outlet opening.
 - i. Grounding and bonding system shall have engraved labels at each ground bar and backbone grounding cable as it passes through each room. Each bonding jumper shall have heat shrink labels at all end points.
2. Labels shall be constructed of approved material in order to meet the legibility, defacement, adhesion (adhesive labels only), and exposure requirements of UL 969. All labels shall be mounted horizontally in order to be read from left to right.
- a. Adhesive Labels - shall be constructed of color-coded paper with a clear polyester over laminate, Brady USA, Inc. PermaShield J, Raychem TMS or approved equal. Adhesive material used shall be approved for material being attached to, typeface shall be medium density, Helvetica, 1/8 inch (3mm) high black characters unless indicated otherwise.
 - b. Engraved Nameplates - shall be constructed of color-coded three-ply bake-lite. Typeface shall be engraved, Helvetica 1/4 inch (6mm) high black characters unless indicated otherwise.
 - c. Heat-Shrink Labels - shall be constructed of color-coded flame retardant, heat-shrinkable polyolefin, Brady USA, Inc. Raychem TMS or approved equal. Typeface shall be medium density, Helvetica 1/8 inch (3mm) high black characters unless indicated otherwise.

- d. Insert Labels - shall be constructed of color-coded paper inserted behind clear plastic label holder. Work area outlets shall have white color labels inserted behind a flush mounted (recessed) plastic window. Patch panels and cross connect block may have continuous clear plastic insertion strips label holders with label strips. Label strips shall have distinct markings to indicate where one jack or cross connect ends and the adjacent one starts. Typeface shall be medium density, Helvetica 1/8 inch (3mm) high black characters unless indicated otherwise.
- e. Each work area outlet shall have each of its eight-position modular jacks provided with a color-coded, embossed modular ICON. The telephone jack icon shall be red and shall have either the word "VOICE" or a telephone logo. The data jack icon shall be blue and shall have either the word "DATA" or a computer logo. The work area outlet jack provided shall also be able to have additional ICON types such as but not limited to "LAN1" or "LAN2" and the like available for use. Coordinate with the City of New York through the Commissioner, the specific Icon's required for this project.
- f. Handwritten or embossed labels are not allowed.

3. Color Coding

- a. Provide hierarchical color-coded labels as follows:
 - (1) Horizontal Cables Color Code: All horizontal and backbone connection hardware shall have color-coded labels.
- b. Cables shall be standard manufacturers colors.
- c. Category 5e cables shall be different color than Category 6 cables.
- d. Voice cables shall be different color than data cables.
- e. Shall be standard manufacturers colors. Category 5e backbone cables overall color shall be a different color than Category 6 backbone cables overall color. UTP backbone cables shall have different colors than fiber optic backbone cables.
- f. Category 5e - 100 pair backbone cables shall contain four 25-pair binders. Each 25 pair binder group shall maintain 25 pair backbone conductor pair color code similar to 25 pair backbone cable. All 25-pair binder groups shall be cut down in order of the following binder color:
 - (1) Blue
 - (2) Orange
 - (3) Green
 - (4) Brown
- g. White conductors shall have a co-extruded color stripe to match its companion conductor for efficient pair identification.

4. Coded Identifiers

- a. Provide coded identifiers as follows:

BCD-xxx	backbone conduit
CB-xxx	backbone cable
ER-xxx	equipment room
SE-xxx	service entrance

- b. The work area outlet shall be labeled in the format of AB-CDNN where:
 A = Floor Number, B = Building Section, C = Rack Number, D = Patch Panel and NN = Jack Number. For 1st Floor Part A from Rack #3 Patch Panel D Jack 36, the identifier would be as follows: 1A-3D36.
 Each jack within the outlet faceplate shall have unique identifier: V = voice, D1 = Data1, D2 = Data2, D3 = Data3, D4 = Data4, MT = Multi-mode transmit, MR = Multi-mode receive, ST = Single-mode transmit and SR = Single-mode receive. Voice is always located in the upper left corner of the faceplate. Data1 and Data3 are located in the top row in positions 1 and 2. Data2 and Data4 are located in the second row in positions 1 and 2.

3.14 TESTING

- A. Horizontal cabling indicated to be spare shall be fitted with connectors and tested as described below. The connector shall be cut off and the cable hermetically sealed for future.
- B. Test all cabling and passive components. Provide certification that entire installation of cabling, equipment and jacks are NRTL certified meeting or exceeding a minimum of TIA/EIA TSB67 Standards. Tests shall indicate each cable segment performance as well as each cable overall link performance.
- C. All cable segments and links shall be tested from both ends of the cable. (Verify that cable labeling matches at both ends).
- D. Test Reports: Upon completion and testing of the installed system, test reports shall be submitted in booklet form showing all factory and field tests performed. Organize test reports by each MDF and TR. Test reports shall be typewritten. Provide documentation and a copy of the standards being tested to. Indicate where test is in compliance, and acceptable limits for the test, measured value of the test and application involved. Submit test report formats to Commissioner for approval. Provide test results on CD with appropriate software.
- E. Produce bound hard copies of all test reports for every segment and link.
- F. The system shall not be considered certified until the tester has acknowledged, in writing, that the performance of the physical layer of the system has been fully tested and is operational at the completion of the installation phase.
- G. At completion Installer shall contact City of New York's representative in writing to witness testing of random cable tests. Random locations shall be indicated by City of New York's representative. Random testing shall not exceed 10% the total number of installed jacks.
- H. Equipment Manufacturers Factory Test
 - 1. Each cable and equipment manufacturer shall factory test their respective products being installed on this project and provide test reports at time of delivery to the Telecommunications Cabling Installer. Provide separate respective test reports indicating that they meet or exceed the latest EIA/TIA Standards for the following:
 - a. UTP Cable - Factory-test each master reel. Cable shall be tested off of the reel. Provide test report for same with each sub-reel, and box indicating all latest EIA/TIA Standards required testing information as well as NEXT, Structural Return Loss, Attenuation, Power-Sum, opens, shorts and Characteristic Impedance.
 - b. All other products relative to this Specification shall be tested to its respective industry's strictest standards.
 - c. Each manufacturer shall factory test their respective cable or equipment provided to this project at several lower frequency levels, including the minimum and maximum frequency level indicated herein. The test reports shall indicate test results for at least 5 equal incremental frequency levels including the maximum required.
 - d. High density IDC Type cross connect blocks - provide test report indicating the latest EIA/TIA Standards (SP-4195-B and SP-4195-B-1) required testing information as well as Structural Return Loss, NEXT, opens, shorts, crossed pairs, binder groups, and Characteristic Impedance.

- e. Patch panels -provide test report indicating the latest EIA/TIA Standards (SP-4195-B and SP-4195 B-1) required testing information as well as Structural Return Loss, NEXT, opens, shorts crossed pairs and Characteristics Impedance.
- f. Jacks - provide test report indicating the latest EIA/TIA Standards (SP-4195-B and SP-4195 B-1) required testing information as well as Structural Return Loss, NEXT, opens, shorts and Characteristics Impedance.

I. Field Testing Equipment

- 1. Submit shop drawings on the testing equipment to be utilized on this project. Test all fiber optic, copper and coax cables installed on the project. Shop drawings shall be submitted during the normal submitting process. Provide a hard copy of all field testing for fiber optic, copper and coax cables.
- 2. Fiber optic Testing:
 - a. Test all fiber optic cable segments end-to-end from the fiber optic backbone patch panel in the main distribution frame (MDF) to each fiber optic backbone patch panel in each intermediate distribution frame (TR) with an Optical Power Meter and high resolution Optical Time Domain Reflectometer (OTDR) for compliance to latest EIA/TIA Standards performance requirements, at 850 and 1,300 nm.
- 3. Twisted pair Testing Equipment:
 - a. The cable tester shall be a level III tester with latest software version and calibration including a wide variety of preprogrammed cable types as an integral part of its testing system and have the ability to test cables less than 6 meters from the test point.
 - b. Test all cables to their specified performance category. Category 6 cables shall meet TIA/EIA-SP 4195-B and SP 4195-B-1 performance.
 - c. Test results shall include:
 - Wire Map
 - Length
 - Attenuation
 - Power Sum Near-end Crosstalk (PS NEXT)
 - Remote
 - Local
 - NEXT Loss (pair to pair)
 - ELFEXT loss (pair to pair)
 - Power Sum ELFEXT loss
 - Return Loss
 - Insertion Loss
 - Propagation Delay
 - Delay Skew
- 4. Wire map shall determine the following:
 - a. Continuity to the remote end
 - b. Shorts between any two or more conductors
 - c. Crossed pairs
 - d. Reversed pairs
 - e. Split pairs
 - f. Any other mis-wiring
- 5. Length:
 - a. Length is determined by the propagation of delay of signals and depends on the twist helix and dielectric materials. Note: Calibration of Nominal Velocity of Propagation (NOMINAL VELOCITY OF PROPAGATION

(NVP)) is critical to the accuracy of the length measurements when estimating from either frequency or time domain methods.

- b. The maximum physical lengths for
- c. Basic link = 90 meters including test equipment cords.
- d. Channel = 100 meters including equipment cords and patch cords.
- e. Test results shall be reported in feet.

6. Attenuation:

- a. Link attenuation shall include all connection hardware

7. Near end Cross Talk (NEXT) Loss:

- a. All copper cables (including 4 UTP, 25 UTP and 100 UTP) shall be power sum tested.
- b. Next shall be measured from both ends of the cable or link under test. For accurate measurements, at least 380 linearly spaced sample points in a 350 MHz sweep are required.
- c. When a test result is closer to the test limit than the accuracy of the field tester, the result shall be marked with an asterisk (*). Contractor #4 shall provide documentation to interpret results marked by an asterisk.
- d. The specified accuracy of the tester shall be indicated on the testing results. Acceptable limits of accuracy for the proposed tester is as follows:
- e. Any reconfiguration of link components after testing may change the performance of the link and thus invalidate the previous test result. These links shall be retested.
- f. Test all installed horizontal cable segments end to end, from each work area outlet to:

Each TR horizontal patch panel/cross connect block.

Each MDF horizontal patch panel/cross-connect block.

- g. Test all installed backbone cable segments end to end from each outlet on TR backbone patch panel/cross-connect block to each respective MDF backbone patch panel/cross-connect block.
- h. Utilize a signal injector, Graphical Link Testing Meter and Time Domain Reflectometer (TDR) for compliance to latest EIA/TIA Standards performance requirements, as well as NEXT, structural return loss, alternating power sum, opens, shorts, continuity, cable length, and Characteristics Impedance.
- i. In general, provide certification that all cabling and equipment installed has been tested for wire mapping, cable length, NEXT, attenuation, shorts, opens, polarity, split pairs and that the pin configuration is consistent throughout the entire systems.

8. City of New York's Observation of Tests

- a. The City of New York reserves the right to observe (witness) 10% of the testing provided on each cabling system.
- b. Should any of the cabling system's cables fail to pass the test or is improperly labeled (identified) the City of New York reserves the right to have the entire system retested and documented by the installer under this Section at no additional cost to the City of New York.

9. Engineer's Observation of the Test

- a. The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications Contractor #4, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the City of New York.

10. Test Results

- a. Test documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words "Wiring Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of a test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

3.15 DOCUMENTATION

- A. Label all equipment as specified above
- B. Provide the City of New York with:
 1. Hard copy documentation of "As-Built" Telecommunications Cabling Systems Administration Reports.
 2. Hard copy and electronic documentation of test results for every cable segment and link in 3-ring binder. Documents shall include measured values as well as whether or not the test passed.
 3. "As-Built" drawings indicating location of all equipment including but not limited to work area outlets, patch panels, cross connect blocks, on each segment and cable routing. Indicate labeling for each piece of equipment.
 4. Refer to Part One for additional documentation.

3.16 SYSTEM ACCEPTANCE

- A. Obtain written acceptance from the City of New York or their authorized representative for each cabling system installed on this project. Failure to obtain written acceptance shall result in delay of start of warranty period. No claim for additional costs will be allowed due to not receiving written acceptance. Warranty period will start upon receipt of written acceptance.

3.17 ACCEPTANCE DEMONSTRATIONS

- A. Systems installed under this section shall be demonstrated to the City of New York and Commissioner. Demonstrations are in addition to necessary testing and instruction sessions. Notify all parties at least 7 days prior to the scheduled demonstration. Schedule demonstrations in cooperation with and at times convenient to all parties and so as to not disturb ongoing activities.
- B. Systems shall be tested prior to the demonstrations and each system shall be fully operational and tested prior to arranging the Acceptance Demonstration.
- C. If the demonstration is not totally complete, performing all functions, features and connections or interfaces with other systems, or if there is a failure during the demonstration, additional demonstrations shall be arranged. Provide and pay for all costs, labor and expenses incurred for all attendees for each additional demonstration required for acceptance and demonstration of complete system operation.
- D. Demonstrations shall be scheduled in ample time to complete all activities prior to final acceptance and City of New York occupancy. Demonstrations shall take place at least

30 days prior to the scheduled project completion date and 30 days prior to City of New York's use and occupancy.

- E. As a minimum, provide demonstrations for systems indicated under "Work Included" under Part One of the Specifications. Provide demonstrations of additional systems as requested by the City of New York or Commissioner.

3.18 PROJECT COORDINATION

- A. Prior to Substantial Completion of the project and in ample time to address and resolve any coordination issues, request and arrange meetings between the City of New York, Commissioner, and Contractor #4 to discuss the Scope of Work for each system being provided and the interface required for a fully functional and operational system upon project completion. Initial meetings shall be scheduled three months prior to the scheduled Substantial Completion date or as soon as Submittals are submitted and reviewed for projects with shorter schedules.
- B. At these meetings the required interface with the City of New York shall be reviewed, requests for information required to complete programming or for coordination shall be presented and system operation and philosophy shall be discussed.
- C. Additional meetings shall be held as requested by any party so that all issues are resolved and with the goal and intent being that all systems are fully operational and functional upon project Substantial Completion and that the responsibility for all components required is clearly established.

3.19 CLEANING UP

- A. Upon completion of all work and testing, thoroughly inspect all exposed portions of installation and completely remove all exposed labels, markings, and foreign material.
- B. The interior of all equipment and cabinets shall be left clean; exposed surfaces shall be cleaned and plated surfaces polished.
- C. Repair damage to finish surfaces resulting from work under this section.
- D. Remove material and equipment from areas of work and storage areas.
- E. All equipment shall be clean from dirt, dust, and fingerprints prior to final acceptance.
- F. Touch up all damaged pre-finished equipment using materials and methods recommended by the Manufacturer.

3.20 PROJECT CLOSEOUT

- A. Provide close out submittals as required herein and in Division One including the following close out submittals.
 - 1. Operation and Maintenance Manuals
 - 2. Record Drawings.
 - 3. Video Tapes / DVDs of Instruction.
 - 4. Test Reports.
 - 5. Cabling Systems Administration Reports.
 - 6. Extra Materials.
 - 7. Obtain written receipts of acceptance close out submittals submitted. Receipts shall specifically detail what is being delivered (description, quantity and specification section) and shall be dated and signed by firm delivering materials and by the Commissioner.

- B. Telecommunications:
1. Provide ten percent spare dust covers provided to the City of New York at the completion of the project.
- C. Provide 15% spare patch cables and line cords for each cable type and length of each type provided.
1. Provide record drawings indicating actual cable routings and cable terminations and all required identifiers. Provide copy mounted in each intermediate distribution frame and the main distribution frame.

END OF SECTION

SECTION 280500

COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Work of this Division shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this Division as shown on the drawings, as specified herein, and/or as required by job conditions.
- B. This Section governs general procedures, materials and workmanship as applicable to the electrical work specified in the other Division 28 sections. Perform the work of this section in accordance with the requirements of Section 260000 General Provisions, Section 260500 Basic Materials, Section 283100 Addressable Fire Alarm, and architectural Sections for Door Hardware.
- C. Perform the work in accordance with the requirements and provisions of applicable codes and laws.
- D. Equipment, materials, and installation shall conform to applicable standards and requirements of the following organizations and documents:

ANSI	-	American National Standards Institute
ASTM	-	American Society for Testing and Materials
AWS	-	American Welding Society
CSA	-	Canadian Standards Association
ETL	-	ETL Testing Laboratories
FCC	-	Federal Communications Commission
FM	-	Factory Mutual
FS	-	Federal Specifications
ICEA	-	Insulated Cable Engineers Association
IEEE	-	Institute of Electrical and Electronic Engineers
NEC	-	National Electrical Code
NECA	-	National Electrical Contractors Association
NEMA	-	National Electrical Manufacturers Association
NESC	-	National Electric Safety Code
NETA	-	International Electrical Testing Association
NFPA	-	National Fire Protection Association
NYCA	-	New York City Amendments to the 2005 NEC
OSHA	-	Occupational Safety and Health Administration
UL	-	Underwriters Laboratories, Inc.

1.02 INTENT

- A. It is the intention of the specifications and drawings to obtain finished work, clean, tested, and ready for operation.
- B. The drawings show, among other things, the intent of the system components and routing. Some fittings and accessories are shown, but it is not the intent to show all the fittings and accessories that will be required in order to install the systems in a coordinated way, as finished work. The contractor shall include all fittings and accessories as may be required in order to accomplish the coordination of the various building systems, to ensure the systems fit within the spaces provided.

1.03 WORK INCLUDED

- A. The work under this Division shall include labor, material, equipment, services and administrative tasks required to complete and make operable the electrical work shown on the drawings and specified herein, and including, but not limited to, the following:

1. Preparation and submission of shop drawings, diagrams and illustrations.
2. Procuring necessary permits and approvals, and paying required fees and charges in connection with the work of this Division.
3. Coordinating with, and complying with requirements of, the local electric utility, telecommunications service provider, and other franchised utility and service companies as applicable to the scope of this work.
4. Record drawings.
5. Operating and maintenance instructions and manuals.
6. Identification labels, tags, charts and diagrams.
7. Final connections to electrical equipment and devices.
8. Cutting, drilling, and patching required for the work of this Division.
9. Excavation and backfill for underground electrical work.
10. Maintain existing life safety systems in operation during construction.
11. Testing and adjustment of systems and equipment furnished, installed, and/or connected under this Division.

1.04 APPROVALS

- A. See General Conditions and Division 1 sections, in addition to the following requirements.
- B. Submit for approval a list of manufacturers of equipment proposed for the work. Contractor's intent to use exact make specified does not relieve him of responsibility for submitting such a list.
- C. Where any specific material, process or method of construction, or manufactured article is specified by name or by reference to catalog number of a manufacturer, or other standards, the intent is not to take precedence over the basic duty and performance specified, noted on drawings, or as required for intended results. The Contractor shall verify the duty specified with the specific characteristics of the equipment offered for approval.
- D. If material or equipment is installed before it is approved, the Contractor shall be liable for its removal and replacement with no additional cost.

1.05 SUBMITTALS

- A. Shop Drawing Schedule
 1. The Contractor shall submit, within 30 days of the award of his contract, a schedule of proposed shop drawing submissions.
 2. The schedule shall include the following information.
 - a. Item to be submitted
 - b. Date of submission
 - c. Latest date for approval
 - d. Manufacturers of the specified item.
 3. Items not specifically listed as "approved equal" should be listed for consideration at this time.

- B. See Division 28 equipment sections for specific submittals required. Unless otherwise indicated, submittals are required for electrical devices, equipment, and systems including basic construction materials such as conduit, 600 volt building wire, and standard fittings and boxes.
- C. **Manufacturers' Data**
1. If catalog cuts of standard manufactured items show different types, options, finishes, performance requirements, or other variations, those features that the Contractor proposes to furnish shall be clearly identified. If any variations from the catalog description are proposed or required, such variations must be clearly noted on the cut.
- D. **Shop Drawings**
1. Shop drawings shall clearly indicate details, sectional views, arrangements, working and erection dimensions, kinds and quality of materials and their finishes, and other information necessary for proper checking and for fabrication and installation of the items, and shall include information required for making connections to other work.
 2. Shop drawings shall be numbered consecutively, and drawings related to various units comprising a proposed assembly shall be submitted simultaneously so that such units may be checked both individually and as an assembly.
 3. Contractor shall keep on the site, in good order, a complete up-to-date set of approved shop drawings. Shop drawings shall be made available for inspection by the Architect.
 4. The approval of shop drawings will be for general conformance to drawings and specifications, and shall not be construed as permitting any departure from the contract requirements. If the shop drawings show any variations from contract requirements because of standard shop practices or other reasons, such variations shall be clearly identified on the drawings or specifically noted in the letter of transmittal, in order that, if acceptable, suitable action may be taken for proper adjustment in other work affected thereby. If the Contractor fails to so identify such variations, he will not be relieved of responsibility for executing the work in accordance with the contract, even though such shop drawings have been approved and the work installed. Approval shall not relieve the Contractor of responsibility for any error in details, dimensions, etc. that may exist on shop drawings, nor for the furnishing of materials or work required by the contract and not indicated on the shop drawings. Approval shall not be construed as approved departure from details or instructions previously furnished by the Architect.
 5. No work for which shop drawings are required shall be executed until the Architect's approval is obtained.
- E. Submittals will be reviewed for conformance with the contract drawings and specifications. The engineer's review stamp will be affixed to submittals. One of the following actions will be taken.
1. **NO EXCEPTION** - Submittal appears to comply with the contract drawings and specifications. Contractor is not relieved of responsibility to meet the requirements of the contract drawings and specifications due to errors, omissions, or conflicts with other equipment or trades.
 2. **EXCEPTIONS AS NOTED** - Submittal appears to comply with the contract drawings and specifications except for the items noted by the engineer. Contractor is not relieved of responsibility to meet the requirements of the contract drawings and specifications due to errors, omissions, or conflicts with other equipment or trades.
 3. **REVISE AND RESUBMIT** - In the opinion of the engineer the nature and/or

quantity of exceptions is sufficient to require resubmission to demonstrate compliance. Submittals must be returned within 30 days for contingent acceptance to remain valid. Submittals will become rejected if not returned within 30 days.

4. REJECTED - Submittal does not comply with contract drawings and specifications.

1.06 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Furnish manufacturers operating and maintenance instructions, parts lists and sources of supply for replacements in accordance with Division 1 - General Requirements.
- B. Provide the following:
 1. Complete sets of final and correct shop drawings, maintenance and replacement parts manuals, and operating instructions, for equipment supplied.
 2. Bind each set within a common binder. Index and organize with a table of contents, to permit quick and convenient reference.
 3. One day of instruction in operation and maintenance of equipment to Owner's maintenance force. Schedule a 2-week period, convenient to Owner, during which qualified personnel, including manufacturers' technicians and engineers will be available for Owner's instruction.
 4. Master Operating Manual (submit in quadruplicate).
 5. Manufacturer's mechanical and electrical equipment parts list of components of the systems listed on the equipment schedules, control diagrams and wiring diagrams of controllers.
 6. List shall give system number, unit number, manufacturer's model number, and manufacturer's drawing numbers.
 7. Step by step operating instructions for each system including preparation for starting, re-starting after power failure, or re-setting after overcurrent or short-circuit operation.
 8. Maintenance instructions for each type of equipment.
 9. Possible breakdowns and repairs for each type of equipment.
 10. List of nearest local suppliers for equipment.
 11. Manufacturer's literature describing each piece of equipment listed on the fixture, panel and equipment schedules and in the specifications including wiring diagrams and a copy of any applicable test reports.
 12. As-installed control diagrams by the control manufacturer.
 13. Recommended trouble shooting procedures in the event of foreseeable electrical system failure.
 14. Complete "As-Installed" color coded wiring diagrams of systems.
 15. Copies of the security system test reports.

1.07 GUARANTEES AND SERVICES

- A. Workmanship, installation materials, and equipment shall be guaranteed as specified in

the General Conditions and Division 1.

- B. Contractor shall leave entire system installed under this Contract in proper working order, and shall replace any work or material which develops defects within the 1 year guarantee period, including other work damaged as a result of such defects, without additional cost.

1.08 PERMITS AND CERTIFICATES

- A. Prior to proceeding with any installation, the Contractor shall prepare and submit to the proper authorities for their approval working drawings required by them, and shall give necessary notices, obtain permits, and pay local, state and federal taxes, fees and other costs in connection with this work.

PART 2 - PRODUCTS

2.01 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Materials and equipment and systems shall be new, bear manufacturer's name and trademark, and comply with applicable standards specified.
- B. The UL label shall be borne on each piece of applicable material or equipment.
- C. Equipment shall be provided with required hardware for proper installation, assembly, and operation.
- D. The descriptions cover basic equipment and operation but not complete details of design and construction. The use of singular in descriptions does not limit the quantities of items to be furnished to provide the operation specified. Furnish equipment required to produce specified performance under installed conditions. Provide trim, enclosures and accessories required to make a complete installation.
- E. Follow manufacturers' directions in delivery, storage, protection and installation of equipment and materials. Notify Architect promptly, in writing, of any conflict between requirements of the contract documents and manufacturers' directions, and obtain Architect's written instructions before proceeding with work. Bear any costs to correct deficiencies arising from failure to comply with the manufacturers' directions and instructions.
- F. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements. Store items subject to moisture damage in dry, heated spaces. Tightly cover and protect equipment against dirt, water, chemical, and mechanical injury, and against theft.
- G. Equipment and materials of the same general type shall be of the same manufacturer, make and model throughout the work to provide uniform appearance, operation and maintenance.
- H. Where new products or components are indicated to be installed or connected to existing systems or equipment, verify compatibility and performance with the manufacturer of the existing systems or equipment prior to purchase and installation.

2.02 EQUIPMENT DEVIATIONS

- A. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, and which requires any additional utilities or redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical or electrical layouts, such redesign and new drawings required thereby, with approval of the Architect, shall be prepared by the Contractor without additional cost. Any changes in the project required to support alternates or substitutions shall be fully identified and submitted on the shop drawings for the substitute or alternate product. Such changes shall be reflected in the coordination drawings and shall be approved by the affected trades.

- B. Where such approved deviation requires a different quantity or arrangement of equipment from that specified or indicated on the drawings, the Contractor shall provide any structural supports, controllers, motors, starters, wiring, conduit, and any other additional equipment required by the deviation, at no additional cost.
- C. It is the intent of these specifications that wherever a manufacturer of a product or a catalog number is specified, and terms "or equal" or "or approved equal" are used, a substituted item must conform to the specified item. Consideration will not be given to claims that a substituted item meets performance requirements with lesser construction. Performance as indicated in schedules and in specifications shall be interpreted as minimum acceptable performance.

PART 3 - EXECUTION

3.01 SITE INVESTIGATION

- A. Examine drawings, specifications, and site, and be responsible for the nature and location of work and the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, electric power, roads, etc.

3.02 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of systems and work required. Do not scale the drawings. Consult the Mechanical and Architectural drawings and details for exact locations of equipment.
- B. Drawings shall be used in layout of work. Check reference drawings to verify spaces in which work will be installed, and maintain maximum headroom and space conditions. Where headroom, working clearance or space conditions appear inadequate, Architect shall be notified before proceeding with installation.
- C. If directed by the Architect, make minor modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

3.03 COORDINATION WITH OTHER TRADES

- A. Closely schedule the work so that the work will be installed at the proper time and without delaying the project's completion.
- B. Where the work of this Division is to be installed in close proximity to the work of other trades, or where there is evidence that the work will interfere with the work of other trades, assist in working out space conditions to make a satisfactory arrangement. If the work is installed before such coordination with other trades, make necessary changes in the work as directed by the Architect to correct any conflicts or interferences, without additional cost to the Owner.

3.04 COORDINATION AND LAYOUT

- A. Study drawings and specifications to ensure completeness of work required. Include supplementary items normal to manufacturers' requirements or standard accepted trade practices as necessary to complete the work, even if not explicitly shown or specified.
- B. Verify measurements and conditions in field before starting work.
- C. Examine materials, surfaces, and structures to which work is to be applied and notify the Architect, in writing, of any conditions that are detrimental to proper and expeditious installation of work. Starting of work shall be construed as acceptance of conditions.
- D. Confer with other trades to install work to avoid interference with other trades. The necessary adjustments to conform to structural conditions and work of other trades, particularly ductwork and piping layouts, is included under this section. Assist other trades in the preparation of coordinated layout drawings.

3.05 CONNECTIONS TO EQUIPMENT FURNISHED UNDER OTHER DIVISIONS OR BY OWNER

- A. Provide electrical connections to equipment and fixtures requiring such connections which are supplied by Owner or under other Divisions.
- B. Provide conduit, wire, lugs, fittings, accessories, and trim for final connection of each item of equipment as required for complete assembly and specified operation.

3.06 WORKMANSHIP

- A. Perform work in practical, neat, and workmanlike manner, with electricians skilled in the work they are performing, and using the best generally recognized trade practices.
- B. No work shall be covered or hidden from view until it has been inspected and approved by the required Building Department personnel and the Architect.
- C. Workmanship or materials not meeting with requirements of the specifications or drawings, or the satisfaction of the Architect, shall be rejected and shall be immediately replaced in an acceptable manner without additional cost.

3.07 TESTS

- A. Notify Architect, in writing, at least one week prior to tests, of the proposed testing timetables. Perform tests with the approval of and in the presence of the Architect or his representative.
- B. Provide temporary connections, necessary testing equipment, labor and materials, required for the testing of the systems and equipment. Systems shall be prepared for testing and protected from damage. Measuring instruments shall be properly calibrated. The cost of tests shall be included in the contract price.
- C. Prior to energizing, test for continuity and identification of each conductor. Identify both ends of each conductor.
- D. Perform additional tests required by Owner, Architect or any other authorities having jurisdiction.
- E. Correct or replace any circuit, material or equipment that is found to be defective by these tests. Correct defects, whether due to faulty workmanship or material furnished, in a manner acceptable to Architect without additional cost.

3.08 SLEEVES AND SEALING

- A. Install sleeves of Schedule 40 galvanized steel pipe for conduits and cables penetrating above-grade floor slabs, and any concrete or masonry walls. Sleeves through walls shall terminate flush with wall surface on each side. Sleeves through floors shall terminate 2 inches above finished floor. Neatly and completely grout sleeves in place.
- B. Sleeves shall be adequately sized for the conduits and cables to be installed, with sufficient free space to install sealing caulk or putty.
- C. Sleeved conduits through slab-on-grade floors, below-grade foundation walls, shafts, and the like shall be provided with sealing bushings to seal against fluid and gas pressure and installed in accordance with UL and manufacturer's instructions.
- D. Where penetrating floor slabs and fire-rated partitions, pack the annular space between the sleeves and the conduits and cables with reusable fire-retardant modules, putty, sealant, or caulk. The sealant material shall be intumescent, asbestos free, and installed in accordance with UL and manufacturer's instructions. Sealant materials shall be easily removed and replaced for addition or deletion of cables.

1. Penetrations with annular space greater than 1/2" shall be provided with approved backing material.
 2. Fire-retardant sealer and system shall be UL listed for the application and meet ASTM E-84, ASTM E-814, and UL-1479 requirements. Use Hilti Firestop Systems, CSD Sealing Systems, Nelson "FSP", Carborundum Co. "Fyre Putty", 3M "CP-25", IPC "Flamesafe", ROX System or approved equal.
 3. Retrofit cable installation products: STI EZ-Path Series 22, 33 and 44 or approved equal by Wiremold or Hilti.
- E. Contractor shall photographically document that proper sealing bushings, fire stopping and sleeving have been performed before locations are hidden from view.

END OF SECTION

SECTION 281100

SECURITY SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Work of this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install work of this section as shown on the drawings, as specified herein, and/or as required by job conditions.

1.02 REFERENCES

- A. Perform the work of this section in accordance with the requirements of Section 260000 General Provisions, Section 260500 Basic Materials, Section 283100 Addressable Fire Alarm, and architectural Sections for Door Hardware.

1.03 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Factory wiring of components shall conform to state and local codes and laws.
- B. The criteria of design and performance to produce the required operation is based on equipment of the named manufacturers. Equipment of other manufacturers may be considered, subject to acceptability in the Commissioner's judgment and opinion. The equipment must conform to the dimensions established by the drawings for mechanical spaces and other clearances.
- C. Materials and products shall be suitable for, and where applicable UL listed and labeled for, the intended use or application.

1.04 SUBMITTALS

- A. Submit manufacturers' technical product data for security system equipment and devices, and including description of operation, specifications, dimensions and finishes. Clearly mark options and features furnished, and strike out items, options, and features not being furnished.
- B. Submit complete drawings covering the following for the proposed system:
 - 1. Floor plans showing initiating devices, surveillance and indicating appliances, and control panels.
 - 2. Wiring diagrams showing points of connection and terminals used for electrical connections to the existing system devices and panels.
 - 3. Submit project-specific riser, wiring diagrams and floor plans indicating and specifying field wiring and connections required for the project.
- C. Submit a schedule of initiating devices, listing device type, location, zone (if applicable), and software address.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide necessary products, equipment, devices, wiring, software, and programming for a complete operating security system, as indicated and specified.
- B. The electronic security system shall generally consist of two separate, but related, subsystems - door and room intrusion monitoring; and closed-circuit television (CCTV) monitoring.
- C. Security system devices are indicated generically on the drawings. Specific product and component selections, locations, and quantities shall be determined by a qualified vendor of commercial security systems of equivalent size and type. Product selections shall be coordinated with the architecture, door hardware, and other field conditions affecting such selections.
- D. The system shall be microprocessor-controlled, intelligent reporting with individual device addresses, electrically supervised, low-voltage, power-limited.
- E. Subject to compliance with requirements, provide a complete security system as manufactured by one of the following:
 - 1. GE Security
 - 2. Honeywell
 - 3. Bosch

2.02 BASIC OPERATION

- A. Intrusion Monitoring
 - 1. Provide acoustic glassbreak sensors as indicated.
 - 2. Activation of door sensors and glassbreak sensors shall initiate a specifically identified alarm at the security panel. Provide door status switches on exterior doors as indicated.
 - 3. Provide dual-technology passive infrared motion detectors as indicated.
 - 4. Provide electric door strike as indicated on plans.
 - 5. The monitoring and alarm system shall include 24 hour, 365 day, time-of-day programming to permit automatic scheduling of activation and deactivation times for each device or room.
- B. CCTV
 - 1. Provide compact, visually unobtrusive, charged coupled device (CCD), color cameras, complete with appropriate lenses, housings, mounts, power supplies, controllers, and other necessary accessories at locations as indicated on drawings. Each camera shall connect to display and recording equipment. Provide cameras with the following principal features:

- a. Suitable for indoor or outdoor applications.
 - b. Camera housing to be constructed of heavy-duty aluminum with a polycarbonate dome.
 - c. Image capturing device to be 1/3" interline transfer Super HAD CCD image sensor.
 - d. Overall resolution shall be 540 television lines.
 - e. Sensitivity shall be 0.5 lux at f1.2, 30IRE.
 - f. Signal system shall be NTSC or PAL standard.
 - g. Universal input voltage of 12VDC or 24 VAC.
2. Provided with one 16-channel time-lapse professional digital video recorder, with the following principal features:
- a. 320GB hard drive.
 - b. Triplex – MPEG4.
 - c. View, record, and playback simultaneously.
 - d. Remote software allows live viewing or playback of video over LAN, WAN or Internet.
 - e. Motion detection; Digital activity detector;
3. Provide 19" LCD Monitor, with the following principal features:
- a. 2/6 ms of fast response time.
 - b. 500:1 high contrast ratio
 - c. Multiple inputs including 1 X BNC In/Out, 1 x S-video In/Out, HDMI, VGA input
4. Include a custom rack assembly for Security Control Center equipment. Equipment will be located in the administrative area.

2.03 SECURITY SYSTEM CONTROL PANEL

- A. Provide security system control panel including enclosures for housing modules, boards, devices, and circuits necessary to perform required functions, and to service as test points and trouble-signal points.
- B. Modules, boards, and devices shall be modular, plug-in design and construction.
- C. Provide control panel for operation on 120-volts AC supply, and for 24-volts DC system operation with battery stand-by power source.
- D. Equip control panel for number of active points indicated, plus minimum 50% future. Equip any remaining blank spaces in the enclosures for future installation of modules.
- E. Control panel enclosures shall be surface mounted, with hinged lockable door, suitable for the location.
- F. Provide UPS as secondary power supply, minimum 90 minutes full load capability.
- G. Provide remote signal receiver, electrically supervised, capable of receiving signals from remote station transmitter over telephone lines and visually annunciating alarm signals and common trouble signal.
- H. Provide remote signal transmitter, electrically supervised, capable of transmitting alarm

and trouble signals over telephone lines to remote station receiver.

2.04 PROGRAMMING AND CONTROL

- A. The system shall be programmable, configurable, and expandable in the field without the need for special tools or electronic equipment, and shall not require replacement of electronic circuits.
- B. Programming shall be accomplished through the main control panel operator interface.
- C. At least two levels of user-defined password protection shall be provided to prevent unauthorized changes in status levels or in program information.
- D. Any device in the system may be enabled or disabled, and any output may be turned on or off, from the control panel or video display terminal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install, connect, and program security system in accordance with equipment manufacturer's written instructions and The Commissioner's requirements.

3.02 RACEWAY

- A. Furnish and install dedicated conduit system for the Security System. All cabling and conduit to be run concealed including within new concrete slab construction where required. All cabling to be run in conduit. Raceways and cables shall be neatly arranged on hangers and supports, with fittings designed for the purpose, and shall be installed parallel and perpendicular to walls, floors, structure and ceilings in a neat and workmanlike manner.
- B. Provide dedicated security cable pathways as follows:
 - 1. Accessible ceilings: Provide empty electrical conduit and outlet boxes with pullstring from outlets to accessible ceiling spaces. Provide cable /pathways above accessible ceilings via non-compressing cable hangers to the local designated security panel/sub-panel. Cable hangers shall be 4-inch capacity minimum, galvanized steel, suitable for Category 6, fiber optic, innerduct, and low voltage cabling with UL listing for structured cabling systems; B-Line or approved equivalent.
 - 2. In-accessible ceilings: Provide empty electrical conduit and outlet boxes with pullstring from outlets to designated security panel/sub-panel.
 - 3. Vertical: Provide cable pathways via empty EMT conduit between security panels/sub-panels at each level. Use conduit for exposed runs through floors to height of 7' above floor and in shaftways. Conduit sizes as shown on the drawings.
 - 4. Provide metal pullboxes in conduit runs as follows:
 - a. Length over 100 feet.
 - b. More than two (2) 90-degree bends.
 - c. After every reverse bend.

- C. Refer to other paragraphs in this Section for raceway installation with the following supplemental information or exceptions:
1. Conduit, flexible cable tray and cable hanger fill shall not exceed 40 percent.
 2. Provide minimum inside bending radius of ten (10) times the inside diameter of the conduit for security raceways.
 3. Provide cable hangers at minimum intervals of three (3) feet and seismically braced. Provide additional hangers if cable sag exceeds 12 inches.
 4. Provide a drag line in each conduit run and terminate in a bushed elbow.
 5. When completed the conduit systems shall be ready for the installation of wiring and equipment.
- D. Security cable installation shall comply with the following minimum criteria:
1. Maintain minimum 6 inches separation from power distribution cables unless in conduit.
 2. Power and security cables shall cross perpendicularly where crossings are needed.
 3. Maintain minimum 12 inches separation between security cables and fluorescent light ballasts.
 4. Cable bend radii shall be a minimum of eight (8) times the outside cable diameter.
- E. Provide shop drawings of security system conduit routing for the Commissioner, security system vendor and review.

3.03 WIRING

- A. Provide wire and cable sizes, quantities, and construction characteristics in accordance with requirements of manufacturer. Conductors shall be copper. Cable jackets shall be UL listed for use in plenum spaces.
- B. Wiring of security system is work of this section, but is not specifically detailed on drawings. Complete wiring in accordance with manufacturer's requirements. Color code or label wiring and install per manufacturer's point-to-point wiring diagram. Connect each device with sufficient wiring to complete its intended operation.
1. Do not exceed manufacturer's maximum circuit lengths.
- C. Install wiring of power-limited circuits in accordance with NEC Article 800. Use conduit for runs through floors, or in shaftways, to height of 7' above floor.
- D. Install wires and cables without splices. Make connections at terminal strips in cabinets or at equipment terminals.
- E. Install wiring in strict accordance with manufacturer's written instructions and approved shop drawings.

- F. Unless otherwise indicated, backboxes shall be recessed, and conduits and cable shall be concealed.
- G. Make connections to panel under supervision of the manufacturer's authorized representative.

3.04 GROUNDING

- A. Provide a #4 AWG ground conductor riser in 1" EMT conduit bonded at each end the security closet grounding busbar from the security main grounding busbar and to main service grounding electrode system.
- B. Connect the ground riser per ANSI J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- C. Provide additional #4 AWG ground cable connections from the security closet grounding busbar to the closest building steel and to the ground bus in the electric panel feeding the outlets and equipment in the associated security closet.
- D. Ground the security control panel to the associated security closet grounding busbar with a #4 AWG conductor per ANSI J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- E. Control equipment must have transient protection devices to comply with UL864 requirements. Provide an isolated loop protector device on any circuit including power, telephone, signal, initiating device, or notification appliance device circuit that extends beyond the main building by either aerial, underground, or other method.

3.05 TESTING AND DEMONSTRATION

- A. Upon completion of the installation, test wiring for continuity and for the absence of shorts and grounds; then energize the system and demonstrate compliance with requirements in the presence of the manufacturer's representative and Commissioner's representatives.
- B. Correct, repair, or replace any malfunctioning software, programming, wiring, or devices, and re-demonstrate until proper functioning is achieved.
- C. In addition to the testing and demonstration specified above, the manufacturer's authorized representative shall provide one (1) full day of orientation and training for The City of New York's personnel, at a time to be scheduled by the The City of New York.

END OF SECTION

SECTION 28 31 00

ADDRESSABLE FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 SCOPE & RELATED DOCUMENTS

- A. The work covered by this section of the specifications includes the furnishing of labor, equipment, materials, and performance of each operation in connection with the installation of the Fire Alarm System as shown on the drawings and as herein specified.
- B. The work covered by this section of the specifications includes the furnishing of labor, equipment, materials, and performance of operations in connection with the additions and modifications to the existing Fire Alarm System as shown on the drawings and as herein specified.
- C. The requirements of the conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.
- D. The complete installation is to conform to the applicable sections of NFPA-72, Local Code Requirements and National Electrical Code with particular attention to Article 760.
- E. The work covered by this section of the specifications is to be coordinated with the related work as specified elsewhere under the project specifications.
- F. Additionally, the entire installed system and integrated system operations shall be within the guidelines of the New York City Building Code, including Chapter 9 and Appendix Q.
- G. Products, components and assemblies furnished by the manufacturer shall be approved by the New York City Board of Standards and Appeals (BSA) and/or the New York City Building Department Materials and Equipment Acceptance (MEA) and the New York City Fire Department (FDNY). Submittal documents for these products, components and assemblies shall have their respective BSA and/or COA Approval Calendar Numbers clearly indicated or the submittals shall be rejected by the Commissioner.
- H. Additionally, the entire installed system and integrated system operations shall be within the guidelines of the New York City Building Code, including Chapter 9 and Appendix Q.
- I. The existing building will be in operation throughout construction. The existing fire alarm system shall remain in operation until the new system has been installed and tested. The existing building has an emergency voice alarm communications system. The digitized voice message shall notify occupants of this project that a fire condition has been reported. The new fire alarm control panel for the Theaters shall report to the existing base building fire alarm panel. Refer to Section 260050 and coordinate with Building Property Manager, Commissioner and Construction Manager.

1.2 QUALITY ASSURANCE

- A. Each item of the Fire Alarm System shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L." label. Equipment provided shall be listed under UL 864 9th Edition to insure the latest revision of control equipment. Equipment that does not have UL 864 9th

Edition or has 9th Edition pending will not be approved. Manufacturer shall provide copy of UL 9th Authorization letter if requested. Control equipment is to be listed under UL category UOJZ as a single control unit. Partial listing shall not be acceptable.

- B. The equipment and installation supervision furnished under this specification is to be provided by a manufacturer who has been engaged in production and/or installation of this type (software driven) of equipment for at least three (3) years, and has a fully-equipped service organization within proximity too the installation.
- C. Before commencing work, submit data showing that Contractor #4 has successfully installed fire alarm system of the same type and design as specified or that they have a firm contractual agreement with a subcontractor having the required manufacture's instruction and experience. Contractor #4 will include the names and location of installations of similar size and complexity where Contractor #4, or his subcontractor have installed such systems.
- D. Control equipment must have transient protection devices to comply with UL864 requirements. Provide an isolated loop protector device on any circuit including power, telephone, signal, initiating device, or notification appliance device circuit that extends beyond the main building by either aerial, underground, or other method.

1.3 SHOP DRAWINGS

- A. Prior to submittal of drawings:
 - 1. First: Obtain Commissioner's approval for revisions to layouts shown on Contract Documents.
 - 2. Second: Submit shop drawings to the FDNY for review and approval prior to commencing construction.
- B. Submit shop drawings for the following:
 - 1. Intelligent addressable fire alarm control panel, manual pull stations, heat detectors, analog smoke detectors, alarm monitoring modules, supervised control modules and accessories.
 - 2. Conventional non-addressable devices as required for performance to this specification.
 - 3. Audible and visual evacuation signals and devices.
 - 4. Wiring and conduit to include circuit load and spare capacity.
 - 5. Detailed sequence of operation.
- C. Data describing more than one type of item shall be clearly marked to indicate the type Contractor #4 intends to provide for a given application. The reviewing authority will assume that options not crossed out in submittal material will be furnished for the project. Submittal

material shall be complete. Partial submittals will not be accepted. Submit copies of UL listing or FM approval data showing compatibility of the proposed device or appliance and the panel being provided.

- D. Complete drawings covering the following shall be submitted for the proposed system:
1. Floor plans showing initiating, end of line, supervisory, notification appliances, and output control devices.
 2. Wiring diagrams showing points of connection and terminals used for electrical connections to the existing system devices and panels.
 3. Submit project-specific, complete riser diagram showing interconnections of panels, modules, and point-to-point wiring between devices including wire types and major junction boxes required for the project.
 4. A complete proposed system database including a description of logic strings, control by event programming and point identification labels on a compact disk (CD) and in a formatted printed form, required for off site editing, uploading and downloading shall be submitted for evaluation by the Commissioner. A programming manual shall accompany the submitted program and shall be adequate to allow understanding, operation and editing by the system Commissioner.
- E. Submit a schedule of initiating devices, listing device type, location, zone (if applicable), and software address.
- F. Submit a matrix or table listing each output control function (e.g. fan shutdown, door release) and its corresponding initiating addresses.
- G. Submit calculations for the sizing of power supplies, batteries, and audio amplifiers (where applicable).
- H. Submit a copy of the field installer's NICET certificate in Fire Protection Engineering Technology, Fire Alarm Systems.
- I. For use in system test, a complete operation and maintenance manual with two sets of proposed installation drawings shall be submitted.
1. The following information shall be inscribed on the cover:
 - a. "OPERATION AND MAINTENANCE MANUAL"
 - b. Building location.
 - c. The name of the Contractor #4, system manufacturer and system subcontractor.
 - d. The name and phone number of the fire department required to respond to alarms at the project location.
 2. The manual shall be legible and easily read with large drawings folded and contained in pockets. Included in the manual shall be circuit drawings, wiring and control diagrams with data to explain detailed operation and control of each item of equipment and a control sequence describing start up instructions. Included shall be installation instructions, maintenance instructions, safety precautions, test procedures, performance data, and software documentation.
- J. Upon completion of the installation, "as-built" record drawings shall be submitted on each system before final acceptance of the work. Furnish to the Commissioner a set of "as-built" record drawings including updated system riser diagrams for each system. The record

drawings masters shall be on reproducible vellum uniformly sized as required for legibility and reproduction and on a compact disk (CD) in a DXF format suitable for use in a CAD drafting program. Record drawings shall additionally be annotated with the following:

1. Voltage drop calculations on a dedicated sheet.
2. Battery calculations on a dedicated sheet.
3. Amplifier power calculations on a dedicated sheet.

1.4 SUBMITTALS

- A. Submit manufacturers' technical product data for fire alarm system equipment and devices, and including description of operation, specifications, dimensions and finishes. Clearly mark options and features furnished, and strike out items, options, and features not being furnished.
- B. Submit a minimum of (2) additional Factory Authorized Independent Distributors within proximity too the project that can maintain, service, and add to the proposed system.

1.5 GENERAL

- A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. The system shall be microprocessor-controlled, intelligent reporting, electrically supervised, low-voltage, power-limited, non-coded, utilizing one-way voice communication with individually addressable manual and automatic initiating devices and circuits, and individually addressable output control functions. The system shall use closed loop initiating device circuits with individual zone supervision, individual notification appliance circuit supervision, incoming and standby power supervision.
 1. Include a control panel, manual pull stations, automatic fire detectors, audible devices, flashing lights, remote annunciator, remote control devices, conduit and wiring, connections to devices, outlet boxes, junction boxes, and other necessary material for a complete operating system.
 2. The Theaters shall have an emergency voice alarm communications system. The digitized voice message shall notify occupants that a fire condition has been reported. Provide emergency manual voice override. The base building FACP digitized voice message shall notify occupants that a fire condition has been reported to either the Theater or existing base building FACP.
 3. The fire alarm control panel shall allow for loading or editing special instructions and operating sequences as required. The system is to be capable of on site programming to accommodate and facilitate expansion, building parameter changes or changes as required by local codes. Software operations are to be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.
- B. To accommodate and facilitate job site changes, initiation circuits shall be individually configurable on site to provide either alarm/trouble operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non-latching circuit or a alarm verification circuit.

- C. Panels and peripheral devices shall be the standard product of a single manufacturer (unless otherwise specifically noted) and shall display the manufacturer's name on each component. The materials specified under this section are those of Siemens Fire Safety, UTC Fire & Security/Edwards, Tyco/Simplex Grinnell and Honeywell/Notifier FireCom, Inc. and constitute the type, product quality, material, and desired operating features.
- D. If equipment of another manufacturer is submitted for approval, Contractor #4 shall state what, if any, specific points of system operation differ from the specified points of the system operation. This differentiation report is to reference every paragraph of this specification. The following manufacturers are pre-approved for bidding purposes on this project:
 - 1. UTC Fire & Security/Edwards
 - 2. Siemens Fire Safety
 - 3. Honeywell/Notifier
 - 4. Tyco/Simplex Grinnell

1.6 OPERATION

- A. Provide system with the following operation and control features:
 - 1. Alarm reporting to remote supervising station (coordinate exact requirements with the Commissioner or local Fire Department).
 - 2. Alarm verification for automatic smoke detectors.
 - 3. Subsequent alarm (second zone in alarm re-sounds the audible signals after silencing of the first alarm).
 - 4. Control of auxiliary services:
 - a. Fan shut down relays, with key-operated or key-accessible H-O-A switches for complete override control of all fan systems 2000 cfm and larger. Provide "Status" indication for all smoke control system equipment, obtained by monitoring differential pressure switches provided and installed by Division 23.
 - b. Start-up and status indication of smoke exhaust fans.
 - c. Magnetic door holder release.
 - d. Release of magnetic door locks.
 - e. Close smoke dampers.
 - f. Operation of automatic smoke vents.
 - g. Stage water deluge system.
 - h. Close fire shutter doors and motorized fire-rated doors.
 - i. Close proscenium curtains.
 - j. Operation of motorized doors for make-up air.
 - 5. Detector sensitivity, status, adjustment, and testing from the control panel and day/night sensitivity control.
 - 6. Alarm initiation and bell activation from sprinkler flow switches.
 - 7. Alarm initiation from smoke detector operated doors and smoke hatches.
 - 8. Supervisory indication from sprinkler valve tamper switches, with ring back upon correction.

9. Electrical supervision of output control circuits. System status reports consisting of hard copy, English-language printout, with time and date stamp, of system input and output activity. Digital alarm communication to remote station via telephone line.
- B. Under normal condition the front panel shall display a "SYSTEM NORMAL" message and the current time and date.
 - C. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory, or Trouble) shall flash. The panel audible signal shall sound steadily for alarm conditions and pulse for trouble and supervisory conditions.
 - D. The panel shall display the following information relative to the abnormal condition of a point in the system:
 1. Custom location label (40 characters minimum)
 2. Type of device (i.e. smoke, pull station, waterflow)
 3. Point status (i.e. alarm, trouble)
 4. These three characteristics relative to an abnormal condition of a point shall be displayed simultaneously.
 - E. Pressing the appropriate acknowledge button shall acknowledge the alarm or trouble condition. The acknowledge functions may be passcode protected. Systems not capable of password protected manual command operations shall provide key operated switches for these functions. Function key switches shall be keyed differently from any other keyed switches or locks used within the system.
 - F. After all points have been acknowledged, the LED's shall glow steady and the panel audible signal will be silenced. The total number of alarms, supervisory, and trouble conditions shall be displayed along with a prompt to review each list chronologically. The end of the list shall be indicated. This feature shall be duplicated by the remote annunciator panel(s) with both the main fire alarm control panel and remote annunciator panel(s) responding the same way.
 - G. Alarm Silencing
 1. Alarm silencing shall be duplicated by the remote annunciator panel(s) with both the main fire alarm control panel and remote annunciator panel(s) responding in like manner.
 2. Should the "Alarm Silence" button be pressed alarm signals shall cease operation.
 3. Signals shall not be silenced during alarm silence inhibit mode.
 - H. System Reset
 1. The "System Reset" button shall be used to return the system to its normal state after an alarm condition has been acknowledged and cleared by authorized personnel. The display shall step the user through the reset process with simple English language messages. Messages shall provide operator assurance of the sequential steps (i.e.: "IN PROGRESS", "RESET COMPLETED", and "SYSTEM NORMAL") as they occur, should alarm conditions be cleared.

I. Fan Reset

1. The "Fan Reset" button shall be used to return the previously shutdown mechanical systems to their normal state after an alarm condition has been acknowledged and cleared by authorized personnel. The display shall step the user through the reset process with simple English language messages. Messages shall provide operator assurance of the sequential steps (i.e.: "FAN RESET IN PROGRESS", "FAN RESET COMPLETED", and "FAN SYSTEMS NORMAL") as they occur, should alarm conditions be cleared.

J. Function Keys

1. Additional function keys shall be provided to access status data for system points. As a minimum the status data shall include Disable/Enable Status, Verification Tallies of Initiating Devices, Acknowledge Status, etc.

K. History Logging

1. In addition to any required printer output, the control panel shall have the ability to store a minimum of three hundred (300) events in an alarm log plus a minimum of three hundred (300) events in a separate trouble log. These events shall be stored in a battery protected random access memory (RAM). Systems not having discrete alarm and trouble logging memory shall include an alternative supervised (eg: floppy drive, tape cassette, zip drive) historic recording method with battery backup. Real time and date shall accompany history event recording.

L. Walk Test with History Logging

1. The system shall be capable of being tested by one person. While in testing mode, the alarm activation of an initiating device shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after logging of the alarm.

M. Access Levels

1. There shall be a minimum of four (4) access levels. Passcodes shall consist of up to ten (10) digits. Changes to passcodes shall only be made by authorized personnel. Systems not capable of password protected manual command operations shall provide key operated switches for these functions. Function key switches shall be keyed differently from any other keyed switches or locks used within the system.
2. The following keys/switches shall have access levels associated with them:
3. Alarm Silence
4. System Reset
5. Set Time/Date
6. Manual Control
7. On/Off/Auto Control
8. Disable/Enable
9. Clear Historical Alarm Log

10. Clear Historical Trouble Log
11. Walk Test
12. Change Alarm Verification

N. Detection Operation

1. Smoke sensors shall be smoke density measuring devices having no self contained alarm set point (fixed threshold). The alarm decision for each sensor shall be determined by the control panel. The control panel shall determine the condition of each sensor by comparing the sensor value to the stored values.
2. The control panel shall maintain a moving average of the sensors' smoke chamber value to automatically compensate (move the threshold) for dust and dirty conditions that could affect detection operations. The system shall automatically maintain a constant smoke obscuration sensitivity for each sensor (via the floating threshold) by compensating for environmental factors. The smoke obscuration sensitivity shall be adjustable to within 0.3% of either limit of the UL window (0.5% to 4.0%) to compensate for any environment.
3. The system shall automatically indicate when an individual sensor needs cleaning. When a sensor's average value reaches a predetermined value, a "DIRTY SENSOR" trouble condition shall be audibly and visually indicated at the control panel for the individual sensor. Additionally, the LED on the sensor base shall glow steady giving a visible indication at the sensor location. If a "DIRTY SENSOR" is left unattended, and its average value increases to a second predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control panel for the individual sensor. To prevent false alarms, these "DIRTY" conditions shall in no way decrease the amount of smoke obscuration necessary for system activation. The control panel shall be listed to automatically perform the calibrated test requirements of NFPA 72.
4. The control panel shall continuously perform an automatic self-test routine on each sensor that will functionally check sensor electronics and ensure the accuracy of the values being transmitted to the control panel. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition with the sensor location at the control panel.
5. An operator at the control panel, having a proper access level, shall have the capability to manually access the following information for each sensor:
 - a. primary status
 - b. device type
 - c. present average value
 - d. present sensitivity selected *
 - e. peak detection values *
 - f. sensor range (normal, dirty, etc.)

*Values shall be in "percent of smoke obscuration" format so that no interpretation is required by the operator.

6. An operator at the control panel, having a proper access level, shall have the capability to manually control the following for each sensor:
 - a. clear peak detection values
 - b. enable or disable the point
 - c. clear verification tally
 - d. control a sensor's relay driver output
 7. It shall be possible to program the control panel to automatically change the sensitivity settings of each sensor based on time-of-day and day-of-week (for example, to be more sensitive during unoccupied times and less sensitive during occupied periods). There shall be a minimum of five (5) sensitivity settings available for each sensor.
 8. The control panel shall have the capability of being programmed for a pre-alarm or two-stage function. This function allows an indication to occur when, for example, a 3% sensor reaches a threshold of 1.5% smoke obscuration.
 9. For increased smoke detection assurance, individually addressed smoke sensors shall be provided with alarm verification. Only a verified alarm shall initiate the alarm sequence operation.
- O. RS-232-C Output
1. The Fire Alarm Control Panel shall be capable of operating remote printers. The output shall be paralleled ASCII from an EIA RS-232-C connection.
- P. Building Management System (BMS)/Temperature Control System Interface
1. The FACP shall be capable of transmitting trouble and alarm signals to the BMS. Coordinate with Section 230923 and provide any interfaces, modules, or contacts to communicate with the BMS.

1.7 ALARM SEQUENCE

- A. The system alarm operation subsequent to the alarm activation of any manual station, automatic detection device, or sprinkler flow switch is to be as follows:
1. Audible alarm notification appliances shall sound a non-coded digitized tone and voice message until silenced by the alarm silence switch at the control panel or remote annunciator panel(s).
 2. High Rise: Audible alarm notification appliances on floors other than the alarm floor, floor below and the floor above, shall sound an alert tone and voice message until silenced by the alarm silence switch at the control panel.
 3. Visual alarm notification appliances (xenon strobes) on the floor of alarm, floor below and floor above shall display a continuous synchronized pattern until extinguished by the Alarm Silence Switch.
 4. Visual alarm notification appliances (xenon strobes) shall display a continuous pattern until extinguished by the Alarm Silence Switch.
 5. Doors normally held open by door control devices shall release.

6. A supervised signal to notify an approved central station shall be activated. To accommodate and facilitate job site changes the type of "city connection circuit" is to be on site configurable to provide either a "reverse polarity", "local energy", "shunt" or dry contact connection.
 7. Air handling systems (supply and return) larger than 2000 cfm, shall be automatically shutdown. Other systems and equipment shall also be shut down as indicated on the plans.
 8. The control panel shall provide on/off/auto switch(es). In the automatic mode, the Division 23 mechanical controls shall operate the air handling systems as required. The control panel shall indicate "on" or "off" status of the air handling system via separate and distinct "on" and "off" LED indicators. Manual control is to be provided to override the automatic functions. Manual control shall initiate a system trouble alarm when any air handling system is shut down. A "supervised feedback" input shall be provided to indicate true "on" or "off" status from a contact closure of the air handling system. This positive feedback indication is to take precedence in determining true "on" or "off" status. For smoke control systems, status shall be determined by monitoring the differential pressure switches for each system, provided and installed by Division 23.
 9. Alarms shall be displayed on the panel display. The alarm LED shall flash on the control panel until the alarm has been acknowledged at the control panel. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone after acknowledged shall flash the alarm LED on the control panel and the panel display shall show the new alarm information. A pulsing alarm tone shall occur within the control panel and the remote annunciator until acknowledged.
 10. Dry contact outputs from the fire alarm control panel (FACP) shall disable theater sound, projection and house lighting systems upon any alarm condition. Theater sound and projection systems shall be silenced and disabled to allow audiences to understand the alarm message. Theater lighting levels shall return to egress brightness for safe evacuation.
- B. The control panel is to have a dedicated supervisory service LED and a dedicated supervisory service acknowledge switch.
1. The activation of any standpipe or sprinkler valve tamper switch shall activate the system supervisory service audible signal, illuminate the LED at the control panel and activate the electric sprinkler fire bell outside the building. Provide differentiation between valve tamper activation and opens and/or grounds on fire alarm initiation circuit wiring. Fire bells shall be furnished and installed by Section 210000 and wired by this Contractor #4.
 2. Activating the Supervisory Service Acknowledge Switch will silence the supervisory audible signal while maintaining the Supervisory Service LED on indicating the tamper contact is still in the off-normal state.
 3. Restoring the valve to the normal position shall cause the Supervisory Service LED to extinguish thus indicating restoration to normal position.
- C. Alarm and trouble conditions shall be immediately displayed on the control panel front alphanumeric display. If more alarms or troubles are in the system the operator may scroll to display new alarms.

- D. The system shall have an alarm list key that will allow the operator to display alarms, troubles, and supervisory service conditions with the time of occurrence. This shall allow for the determination of not only the most recent alarm but also may indicate the path that the fire is taking.
- E. The control panel shall be capable of supplying sufficient 24VDC power output to suit job conditions and expansion capability for system growth. Include a minimum of 20 percent spare capacity for 24 VDC notification appliance circuits.

1.8 SUPERVISION

- A. The system shall contain a minimum of 250 Class 'A' independently supervised initiation circuits so that a fault in any one zone shall not affect any other zone. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit.
- B. There shall be sprinkler supervisory initiation device circuits for connection of sprinkler valve tamper switches to perform the Supervisory Service Operation. Wiring methods which affect any fire alarm initiation circuits to perform this function shall be deemed unacceptable; i.e.: sprinkler and standpipe tamper switches (N/C contacts) shall NOT be connected to circuits with fire alarm initiation devices (N/O contacts). This independent initiation circuit shall be labeled Supervisory Service and shall differentiate between tamper switch activation and wiring faults.
- C. Provide independently supervised and independently fused notification appliance circuits for audible alarms and flashing alarm lamps. Disarrangement conditions of any circuit shall not affect the operation of other circuits.
- D. Auxiliary manual controls shall be supervised so that switches must be returned to the normal automatic position to clear system trouble.
- E. Each independently supervised circuit shall include a discrete panel readout to indicate disarrangement conditions per circuit.
- F. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel. A green "power on" LED shall be displayed continuously while incoming power is present.
- G. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel.
- H. The System Expansion Modules shall be electrically supervised for module placement. Should a module become disconnected from the controls, the system trouble indicator must illuminate and audible trouble signal must sound.
- I. The system shall have provisions for disabling and enabling circuits individually for maintenance or testing purposes.

1.9 POWER REQUIREMENTS

- A. The control panel shall receive 120 VAC power (as noted on the plans) via dedicated fused cutout switch(es).

- B. Speaker/Strobe Systems: Shall be connected to the existing base building Edwards FACP. During normal power failures, provide sufficient battery capacity to operate the entire system in a supervisory mode for a period of 24 hours with 45 minutes of entire system alarm operation at the end of this period. Systems shall meet these requirements, including those with an emergency generator. The system shall automatically transfer to the standby batteries upon power failure. Battery charging and recharging operations shall be automatic.
- C. Circuits requiring system operating power shall be 24VDC and shall be individually fused at the control panel.

1.10 TRANSIENT & SURGE PROTECTION

- A. Provide protection against voltage transients and surges as follows:
 1. On AC Input: A feed-through (not a shunt-type) branch circuit transient arrestor such as the EFI HWM-120, Leviton OEM-120EFI, Northern Technologies TCS-HW, Transtector ACP100BWN3, or any approved equivalent UL Listed device. Install suppressor in a listed enclosure near the electrical panelboard, and trim excess lead lengths. Wind small coil in the branch circuit conductor just downstream of the suppressor connection. Coil to be 5 to 10 turns, about 1" diameter, and securely tie-wrapped. This series impedance will improve the effectiveness of the arrestor in suppressing voltage transients.
 2. On DC Circuits Extending Outside Building: Adjacent to the FACP, and also near point of entry to outlying building, provide "pi"-type filter on each leg, consisting of a primary arrestor, series impedance, and a fast acting secondary arrestor that clamps at 30v-40v. Acceptable models: Innovative Technology D2S33-2ML, Simplex 2081-9027 and 2081-9028, Transtector TSP8601, Ditek DTKxLVL series, Citel America B280-24V, and Northern Technologies DLP-42 or approved equivalent. UL 497B listing is a prerequisite for consideration of alternative products. Devices using only MOV active elements are not acceptable.

1.11 ADDRESSABLE NETWORK

- A. Communication with addressable devices: The system must provide communication with initiating and control devices individually. These devices are to be individually annunciated at the control panel. Annunciation shall include the following conditions for each point:

1. Alarm	4. Short
2. Trouble	5. Ground
3. Open	6. Device Fail/or Incorrect Device
- B. Addressable devices are to have the capability of being disabled or enabled individually.
- C. Up to 60 addressable devices may be connected to a single pair of wires. Systems that require factory reprogramming to add or delete devices are unacceptable.
- D. Format: The communication format must be a poll/response protocol to allow t-tapping of the wire to addressable devices and be completely digital. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission protocol. Systems that do not utilize full digital transmission protocol (i.e. that may use time pulse width methods to transmit data etc.) will not be acceptable since they are considered unreliable and prone to errors.

- E. Identification of Addressable Devices: Each addressable device must be uniquely identified by an address code digitally entered on each device at time of installation. The use of jumpers to set address will not be acceptable due to the potential of vibration and poor contact.
- F. Wiring Type, Distances, Survivability and Configurations: Wiring types will be approved by the equipment manufacturer. The system must allow up to 2,500 feet wire length to the furthest addressable device. Provide Class A (Style 6) signaling line circuits as defined by NFPA-72 for initiation with no "T" taps and Class A (Style Y) for notification appliance circuits with no "T" taps. The load connected to each notification appliance circuit shall not exceed 80% of rated module output. The voltage drop during alarm must not exceed 14% of the voltage measured across the batteries at that time. To achieve this, the installation shall consider wire size, length of circuit, device load, inherent voltage loss within the FACP's power supply, etc. The Contractor #4 shall use power outage testing to verify that the NAC circuit was designed and installed properly.

1.12 ONE-WAY VOICE COMMUNICATION

- A. The system shall incorporate one-way voice communication and tone generating capabilities. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions. Provide two (2) amplifiers minimum and connect speakers to alternate circuits and arrange control equipment such that a loss of a portion of the wiring on a floor will not render more than 60% of the devices of each type inoperative, and the devices shall remain so connected to circuitry (i.e. by means of alternate circuits) as to maintain at least partial audibility/visibility throughout the entire floor.
- B. A central audio control module shall be provided for the necessary alarm message/tone generation, main and remote microphone connections, music inputs, and mixer/pre-amplifier circuits. Continuous supervision shall be provided along with specific information as to the type of failure should a problem occur (i.e. main microphone trouble, tone trouble, etc.). Audio outputs shall have individual gain control.
- C. A hand-held, push-to-talk microphone shall be provided, recessed within a protective panel-mounted enclosure. The microphone shall be a noise-canceling communication type with a frequency range of 200 Hz to 4000 Hz and shall be equipped with a self-winding five foot coiled cable. An LED indicator shall be provided to indicate the microphone push-to-talk button has been pressed and speaker circuits are ready for transmission. The microphone shall be supervised for disconnection.
- D. An audio control switch module shall be furnished to provide manual access to audio operations for authorized personnel. The module shall include an "ALL Circuits" switch, "Aux Tone 1" switch, "Aux Tone 2" switch, tone generator stop switch, and "Audio Trouble Reset" switch. These switches and associated LED indicators shall be supervised for disarrangement or failure.
- E. Audio power amplifiers shall be furnished with a self-contained filtered 24VDC power supply, transformer, and amplifier monitor circuits. The amplifiers shall provide a 25 Volt or 70 Volt RMS output with a frequency response of 120 Hz to 12,000 Hz. Provide sufficient amplification to operate system speakers simultaneously plus fifty (50) percent spare capacity. Size amplifiers based on 2 watts minimum per speaker with 100% of speakers adjusted to the 2 watt tap setting.

- F. High Rise: Alarm speaker amplifiers shall be paired to provide 100% redundancy. One back-up alarm speaker amplifier shall be provided for each primary alarm speaker amplifier. If any primary alarm speaker amplifier fails, its function shall be taken over by its backup amplifier. Alarm tone and alert tone oscillators and pre-amplifiers shall be paired to provide 100% redundancy. No more than half the speakers serving any floor or zone shall be connected to the same riser circuit. Speakers shall be alternately wired to ensure that the loss of one circuit will not impair audibility throughout a large area of a single floor.
- G. Provide remote microphone/annunciator command sub-systems as shown on the plans shall to duplicate the manual voice transmission capability of the main fire alarm control panel. The sub-system microphone shall communicate only to the respective area speakers. The main FACP microphone shall override sub-system voice evacuation microphones and transmit the message throughout the main system and sub systems.
- H. Automatic Voice Evacuation Sequence
 - 1. The audio alarm signal shall consist of an alarm tone for a maximum of 15 seconds followed by automatic pre-selected voice evacuation messages. At the end of each voice evacuation message, the alarm tone shall resume. The alarm tones shall sound alternately until the alarm silence switch at the fire alarm control panel has been operated.
 - 2. Audio alarm operations (speaker circuit selection and alarm tone/voice message timing variations) shall be activated by the system software so that any required future changes to the evacuation sequence can be facilitated by authorized personnel without any component rewiring.
- I. Voice Evacuation Zones
 - 1. Provide a minimum of two (2) independent audio circuits from independent amplifiers to each voice evacuation zone as scheduled on the drawings.
 - 2. Each floor, stairway, elevator bank, and assembly space (>300 persons) shall be a separate communication zone.
 - 3. Strobe lights shall not be installed in elevator cars, stairways, or photo darkrooms.

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANEL (FACP)

- A. Modify the existing FACU: Edwards Model EST2 Audio as required to accept the new devices. Subject to compliance with requirements, provide Fire Alarm Control Units manufactured by one of the following:
 - 1. Siemens Fire Safety Model XLSV FireFinder
 - 2. Tyco Simplex-Grinnell Model 4100ES Voice
 - 3. UTC Fire & Security/Edwards Model EST 3/EXT 3X Audio
 - 4. Honeywell Notifier Model NFS2-3030
 - 5. Honeywell Gamewell-FCI E3 Series Broadband

- B. Construction shall be modular with solid state, microprocessor based electronics. The FAC shall display only those primary controls and displays essential to operation during a fire alarm condition. Although the keypad/keyboard can be used for control (firefighter/emergency) of the entire system, it shall only be used for maintenance purposes.
- C. Keyboards or keypads shall not be visible or required to operate the system during fire alarm conditions.
- D. A local audible device shall sound during Alarm, Trouble, or Supervisory conditions. This audible device shall sound differently during each condition to distinguish one condition from another without having to view the panel. This audible device shall also sound differently during each keypress to provide an audible feedback (chirp) to ensure that the key has been pressed properly
- E. Primary Keys & Panel Display
 - 1. The Control Panel's display shall be backlit for enhanced readability. So as to conserve battery standby power, it shall not be lit during an AC power failure unless an alarm condition occurs or there should be keypad activity. The display shall support both upper and lower case letters. Lowercase letters shall be used for softkey titles and prompting the user. Uppercase letters shall be used for System Status Information. A cursor shall be visible when entering information. The display shall include a back-lit alphanumeric Liquid Crystal Display (LCD). It shall include LED indications for Pwr, Test, CPU Fail, Gmd. Fault, Disable, Reset, Alarm Silence, Panel Silence, Drill, as well as individual Ques for alarm, trouble, supervisory, and monitor events.
- F. Equipment Enclosures
 - 1. For system expansion, if required, provide cabinet(s) of sufficient size to accommodate the aforementioned equipment. The cabinet(s) shall be equipped with locks and transparent door panel(s) providing freedom from tampering yet allowing full view of the various lights and controls. Provide a separate enclosure for batteries larger than 15 ah. Enclosures shall be flush or semi-flush mounting unless otherwise indicated on the drawings.

2.2 PERIPHERAL DEVICES

- A. Evacuation Signals, Voice Reproducing
 - 1. Voice reproducing and visual alarm signals shall meet Americans with Disabilities Act (ADA) and UL Standard 1971 requirements shall have the following characteristics and capacities with provisions for speaker only and strobe only installations as required:
 - 2. Field selectable taps at 3db increments between 1/8 watt and 8 watts, driven at 25 volts rms or 70 volts rms, as shown on the drawings.
 - 3. Sound output rating of 96 db at full power tap.
 - 4. Visual intensity: Field-selectable 15/30/75/110 or 135/185 candela for wall-mounted units; field-selectable 15/30/75/95 or 115/177 candela for ceiling-mounted units; xenon strobe, synchronized repetition of 1-3 Hz, 0.2 second pulse duration, clear white light (FIRE), white color housing, and back box. The LEXAN lens shall be pyramidal in shape to allow better visibility, labeled "FIRE" complying with ADA guidelines.

5. Signals to be suitable for installation in audible only, audible/visual, and visual only in combinations described above and below:
 - B. Wheelock ET-Series, Siemens S-HP series; Notifier SpectraAlert SP2 series; System Sensor SpectraAlert series; Simplex TrueAlert 4906 series; Edwards Genesis series or approved equal. Provide mounting (wall and/or ceiling) as required by plans. Flush mount with 4-inch square outlet boxes; surface mount with manufacturer's factory finished backbox. Set candela ratings as indicated on plans. All appliances and associated wall plates shall be white except in Theater 1 and Theater 2 which will be red.
 1. Unless otherwise indicated on the drawings, alarm speaker taps shall be set, as a minimum, to provide the following wattage levels for each location type of alarm speaker:
 - a. Each floor alarm speaker: Provide 1 watt of input power.
 - b. Each toilet alarm speaker: Provide 1/2 watt of input power.
 - c. Each mechanical room alarm speaker: Provide 2 watts of input power.
 - d. Each stairwell alarm speaker: Provide 1/2 watt of input power.
 - C. Waterflow Alarm Bells – Furnished under Section 21000; power supply and installation and connection by this Contractor #4.
 - D. Door Holders: Magnetic door holders shall have a minimum holding force of 25 lbs. The door portion shall have an adjustable stainless steel pivotal mounted armature and contact plate with shock absorbing nylon bearing. Unit shall be capable of being either surface, flush, semi-flush or floor mounted as required. Door holders shall be UL-listed for their intended purpose. Operation: 24 volts unless indicated as 120 volts on drawings. Edwards 1500 series or approved equivalent. Coordinate final locations and hardware with Commissioner.

2.3 ADDRESSABLE DEVICE TYPES

- A. General: The system control panel, over its two wire multi-drop channel, must be capable of communicating with the types of addressable devices specified below. Each device shall be electronically addressed, tested and programmed prior to installation using a UL-listed programmer/tester. Detectors shall be operational with relay bases, audible bases, and remote indicating LED's and programmable by the control panel. Devices shall be located as shown on the drawings. Devices shall be electronically addressed and not require mechanical means of setting individual address's for ease of service and replacement.
- B. Smoke Detector, Photoelectric: Pulsed infrared light source, photodiode, self-compensating for ambient temperature and humidity, in-place sensitivity readout from the control panel, two wire operation, dual LED alarm indication for 360° viewing angle, UL (UROX) Listed for open area coverage. Notifier FSP series, Siemens Fire Safety FP-11 FirePrint series, Edwards Signature series, Simplex 4098-9714, Gamewell Velociti series or approved equal.
- C. Smoke Detector, Photoelectric, Duct Mounted: Analog HVAC duct smoke detectors listed for installation in air duct sampling housings for the detection of smoke in HVAC system ducts, with RF suppression and insect screen. Auxiliary SPDT relays or remote LED alarm indicators shall be installed where indicated. Provide remote LED alarm indicators and test stations in accessible locations for duct detectors. Notifier FSD series, Siemens Fire Safety AD-11XPR housing and Series 11 intelligent detector, Edwards Signature series, Gamewell Velociti series, System Sensor Model DNRHS series with RTS151 remote key test station or approved equal.

- D. Heat Detector, Rate Compensated: Combination fixed temperature (135°F) and rate of rise, LED alarm indication, automatically restorable, 900 square foot coverage. Provide higher fixed-temperature-only, 200°F rated detectors where indicated on plans. Edwards Signature series, Siemens Fire Safety FPT-11 (for 135°F) or DT-200F (for 200°F), each with addressable CZM interface, Notifier FST series, Simplex 4098-9733 (for 135°F) or Fire Detection Devices Model CR 200 (for 200°F), Gamewell Velociti series or approved equal.
- E. Heat Detector, Fixed Temperature, Non-addressable, Non-conditioned Spaces: Mechanical fixed temperature (135°F) 625 square foot coverage. Provide higher fixed-temperature-only, 200°F rated detectors where indicated on plans. System Sensor 5600 series, Edwards 104 series or approved equivalent. Connect to system interface module in conditioned space as indicated on plans.
- F. Fire Detector Bases, Universal: Low profile twist lock type with screw clamp terminals and self-wiping contacts, with EMI and RFI immunization. Bases shall be installed on 4" square or octagonal electrical outlet box. Where selective localized control of electrical devices is required for system operation, provide software programmed addressable relay integral to the base. The relay shall switch electrical loads, as indicated on the drawings for controlled release of smoke hatches and shaft vents, and for shunt-trip of elevator power disconnect. Detector bases shall be compatible with, and allow the installation of, detectors operating on the flame, ionization, photoelectric, or rate compensated heat principles of detection. Siemens Fire Safety DB-11 and DB-X11RS, Simplex 4098-9792, Edwards SIGA-SB, Notifier B224RB or approved equal. Heat Detector, Rate Compensated: Combination fixed temperature (135°F) and rate of rise, LED alarm indication, automatically restorable, 900 square foot coverage. Provide higher fixed-temperature-only, 200°F rated detectors where indicated on plans. Edwards Signature series, Siemens Fire Safety FPT-11 (for 135°F) or DT-200F (for 200°F), each with addressable CZM interface or approved equal.
- G. Manual Station: Double action and identifiable by the master fire alarm control panel. Manufactured from high impact red Lexan with white raised lettering, mechanical latch upon operation, FACP-key operated manual reset. Flush or surface mounted as required, include manufacturer's back box, red baked enamel finish. Reliable Security Group (RSG) RMS series, Edwards SIGA series or approved equal. Section 27-973: Provide manual stations marked with a 1-inch diagonal white stripe to indicate Central Station reporting. Manual stations shall be furnished with a tamper proof, clear Lexan polycarbonate shield and frame where indicated. An integral battery powered warning horn shall sound when shield is lifted. STI #STI-1000 series or approved equal.
- H. Remote Zone Module: Zone modules shall be used to interface normally open direct contact (non-addressable) devices to an addressable signaling line circuit. The module shall be identifiable by the master fire alarm control panel and contain an on board LED alarm indicator. Mounting: standard 4-inch outlet box, flush, surface and weatherproof as shown for the area indicated.
- I. System Interface Module: Interface modules shall be used to interface normally open direct contact non-addressable devices to an addressable signaling line circuit to monitor alarm, trouble, supervisory or security devices. The module shall have Form C programmable control contacts for the management of specified electrical loads as shown on the drawings. The module shall be identifiable by the master fire alarm control panel and contain an on board LED alarm indicator. Mounting: standard 4-inch outlet box, flush, surface and weatherproof as shown for the area indicated. Siemens Fire Safety TRI-B6 series, Simplex 4090-9001 or 4090-9101, Notifier FMM-1, Edwards Signature series, Gamewell Velociti series or approved equal.

- J. Supervised Control Module: Control modules shall be used to supervise relays, contactors, audible signal circuits, visual signal circuits, distributed speaker circuits and two way fire fighters communication circuits. Controlled circuits shall be power limited at 1.5 amperes. The module shall be identifiable by the master fire alarm control panel and contain an on board LED alarm indicator. Mounting: standard 4-inch x 2-inch deep or double gang x 3-inch deep outlet box, semi-flush or surface.
- K. Controllable Relay Module: Controllable relay modules shall be used to provide auxiliary control of building functions such as door holder release, elevator capture, smoke control, lock release, shunt trip, etc. Each relay shall be supervised and include one set of SPDT contacts rated at 2 amperes, 30 VDC/120 VAC resistive minimum. Siemens Fire Safety CRM-4, Edwards Signature series, Simplex 4090-9002, Notifier FCM-1 series, Gamewell Velociti series or approved equal.
- L. Control Relay: Provide remote relays where required for relay contact requirements above the approved rating of addressable relay modules for remote control of fans, dampers, door releases, motor controls, or status feedback. Relay shall be SPDT contacts rated at 10 amperes, 24 VDC/115VAC. A red LED shall indicate the relay is energized. PAM series or approved equal.

2.4 REMOTE ALPHANUMERIC ANNUNCIATORS

- A. Where shown on the plans, provide supervised, remote alphanumeric annunciators with features and characteristics as follows:
 1. Any activity supported at the main control panel shall be enabled at the remote annunciator.
 2. Active poll response communications with the master fire alarm control panel using the local system communications network.
 3. Minimum 80 character alphanumeric display for fire alarms, supervisory reports, and system troubles. The number of characters shall mimic the number of characters on the main panel display.
 4. Individual fire alarm, supervisory, security and trouble acknowledge momentary switches and power "ON", each with LED indicators showing acknowledgement status by flashing and steady states.
 5. Remote paging capability consisting of dynamic push to talk microphone with enclosure.
 6. Scroll switch for the alarm display. Switch shall enable scrolling backward or forward through the alarm queue.
 7. Integral audible signal with audible signaling silence switch with LED indicating the state of the evacuation signals.
 8. Key menu driven keypad for the entry of passcodes, request for reports, setting time, and bypassing points.
 9. Twelve software programmable function key commands. These commands shall be capable of utilizing any and system logic functions resident within the system programming or of being an input into any of the logic functions.

10. Locked cabinet, factory finished enamel with viewing window. Cabinet shall not exceed 14 inches in width and height, or 3.5 inches in depth.
11. The annunciator shall be capable of supporting a supervised system printer, system CRT control terminal with keyboard or system color graphics alarm display terminal.
12. Remote annunciator shall be Siemens Fire Safety remote command center #RCC series or Edwards LSRA-C or 3-LCDANN series, Notifier FDU 80 series, or Simplex 4603-9101 or approved equal.

2.5 WIRING

- A. Fire alarm cable shall be "Teflon" jacketed, or the equivalent, conforming with the requirements for type FPLP "Power-Limited Fire Protective-Signaling Circuits," having a temperature rating of 150°C or higher, solid conductor insulation with a minimum average thickness of 15 mils, protected with a sheath and an outer jacket of 25 mils minimum, colored either red, or clear with red cable tape visible underneath. Cable shall be labeled for its entire length per UL 1424 and UL Tunnel Test 910, labeled "Also Classified NYC Cert." with the BS&A/MEA/VOTC approval number and the temperature rating.
- B. Provide and install two #14 AWG minimum twisted pair, shielded for initiating device analog loop circuits.
- C. Provide and install two #14 AWG minimum twisted pair, shielded for strobes, and non-shielded for speakers and analog audible device loop circuits.
- D. Provide and install two #14 AWG minimum twisted pair, non-shielded for each waterflow alarm bell.
- E. Provide and install two #16 AWG minimum twisted pair, shielded for each remote annunciator.
- F. Verify conductor sizes and quantities with system manufacturer, prior to installation.
- G. Increase wire size to accommodate voltage drop per manufacturer's recommendations. Design circuits to a maximum of 75% rated capacity to accommodate future device additions and sound level changes. Do not exceed manufacturer's maximum circuit lengths.
- H. Provide permanent wire markers to identify connections at the FACP and other control equipment, at power supplies, and in terminal cabinets.
- I. In multi-story buildings, circuits leaving the riser on each floor shall feed through a labeled terminal block in a hinged enclosure accessible from the floor. Terminal block screws shall have pressure wire connectors of the self-lifting or box lug type.
- J. Notification appliance circuit booster ("ADA") power supplies shall be individually monitored by the FACP and protected by a smoke detector per NFPA 72. Do not locate above ceilings or in non-conditioned space. Note: A 24VDC power circuit service addressable control relays shall also be monitored for integrity.

2.6 ISOLATOR MODULE

- A. Provide isolator modules to automatically isolate wire-to-wire short circuits on a signaling line circuit (SLC) loop. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop after each 25 initiating devices and control points or a lesser number where recommended by the manufacturer. Modules must be readily accessible (not above ceiling) and clearly labeled.
- B. Operation: Isolator modules shall operate such that if a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section. The isolator module shall not require any address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
- C. Mounting: The isolator module shall mount in standard 4-inch square, 2-1/8" deep electrical boxes. It shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.
- D. Labeling: Each isolation module must be clearly labeled, readily accessible for convenient inspection (not above a lay-in ceiling), and shown on as-built system drawings.

PART 3 - EXECUTION

3.1 INSTALLATION DRAWINGS

- A. Show a general layout of the complete system including equipment arrangement. Verify dimensions and assure compatibility with other systems interfacing with the fire alarm system.
 - 1. Identify on the drawings, conduit and conductor sizes and types with number of conductors in each conduit. Provide each conduit and device with a unique identification.
 - 2. For addressable alarm initiation devices, the system identifier shall be, as minimum, the system address for that device. Signals shall be sequentially numbered as the address of the controlling module. Provide additional identification labels, room name, number and area, etc., as required by the Commissioner and coordinated with the Commissioner prior to final programming of the FACP.
 - 3. Indicate on the point to point wiring diagrams, interconnecting wiring within the panel between modules, and connecting wiring to the field device terminals.

3.2 INSTALLATION

- A. Field installer shall be NICET Level 3 certified in Fire Protection Engineering Technology, Fire Alarm Systems. Perform work in accordance with the requirements of NYCEC, NFPA 70, NFPA 72, and other requirements of local authority having jurisdiction.
- B. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.
 - 1. Use clamping devices for attaching to structural steel, or when clamping is impractical, obtain written authority to weld or to drill.

2. Fasten equipment to concrete or masonry with expansion anchors.
 3. Fasten equipment to drywall by screws into studs, and to metal wall panels by weld studs, bolts or self-tapping metal screws.
 4. Do not install conduit raceways and boxes in positions that interfere with the work of other trades.
 5. Attach nameplates on panels or other components as specified.
- C. Install equipment and devices where indicated; refer to architectural drawings for exact locations and mounting heights.
- D. Refer to HVAC drawings and specifications (Division 23) for exact locations of duct-mounted smoke detectors. Coordinate with appropriate trade for the cutting of ducts and mounting of housings and sampling tubes.
- E. Provide remote indicators for concealed smoke detectors and install in a readily visible location as close as possible to the location of the associated detector, either flush wall mounted 5'-0" AFF, or flush ceiling mounted. Provide remote indicators for duct smoke detectors located outside of mechanical equipment rooms. Coordinate exact mounting locations of remote indicators with Commissioner in field.
- F. Smoke detectors shall not be located in a direct air flow nor be closer than three (3) feet from an air supply diffuser or return air opening. Increase separation as required per NFPA 72.
- G. Conduit requirements for running of multi-conductor fire alarm and voice communications system wiring shall be as follows:
1. Multi-conductor cables may be installed without raceway protection where cable is protected by building construction, or located 8 feet or greater above the finished floor and not subject to physical tampering or hazard in accordance with the NYCEC. Support multi-conductor cables as required by the NYCEC.
 2. Wiring shall be run in EMT in all cases where stubbed down into walls and run below 8 feet.
 3. All wiring within mechanical and elevator equipment rooms shall be run in raceway.
 4. Exposed raceways run within 8' of finished floor in garages, mechanical rooms, elevator machine rooms, loading docks and elsewhere where subject to mechanical damage shall be rigid galvanized steel conduit.
 5. Flexible metal conduit, up to 36 inches in length, shall be permitted where approved by the Commissioner for final connections to initiating and notification devices.
 6. In any suppression and extinguishing system activated by automatic fire detection, including, but not limited to, pre-action sprinkler, deluge sprinkler, clean air agent, range hood, CO₂, and/or dry chemical, multi-conductor cables shall be installed in rigid galvanized conduit or EMT, in accordance with the requirements of locations in item c above.
 7. Power shall not be installed in raceways with low voltage wiring.
 8. Raceway shall have a maximum 40% fill. Refer to Section 260500 for raceway and installation requirements.
 9. Telephone wiring between digital alarm communicator and telephone system shall be run in rigid galvanized steel conduit.

- H. Provide a separate raceway system for fire alarm wiring. Power shall not be installed in raceways with low voltage wiring. Raceway shall be electrical metallic tubing (EMT), minimum 3/4-inch size, maximum 40% fill and as indicated on drawings. Refer to Section 260500 for raceway and installation requirements.
- I. Unless otherwise indicated, backboxes shall be recessed, and conduits and cable shall be concealed.
- J. "Fire alarm system" decal shall be applied to junction box covers. Junction box covers shall be painted "fire department red".
- K. Each conductor shall be identified with wire markers at every splice and terminal point. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.
- L. Splices shall not be made other than at terminal blocks or on terminal blocks at cabinets. Wire nuts and crimp splices shall not be permitted. Connectors shall be installed in conformance with the manufacturer's recommendations.
- M. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.
- N. Permanently label or mark each conductor at both ends with permanent alpha-numeric wire markers.
- O. Use a consistent color code for fire alarm system conductors throughout the installation.
- P. Smoke detectors shall not be installed until final construction clean-up has been completed. Replace detectors contaminated during construction. Caution: Covers supplied with smoke detector head do not provide protection against heavy construction dust, spray painting, etc., and shall not be used for that purpose. Covers are suitable only during final, minor clean-up or touch-up operations.
- Q. The Contractor #4 shall clean dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.
- R. The manufacturer's authorized representative shall provide on-site supervision of installation. Power shall not be applied to the system until a manufacturer's factory trained representative is present.
- S. Identify individual devices. Assign each a unique number as follows, in sequence starting at the FACP: (Addressable Loop # – Device # – Room/Space #). Show on the record drawings, and also permanently mount on each device's base so that the identification is readable standing on the floor below without having to remove the device. Exception: For detectors with housings (air duct, projected beam, air sampling) apply the identification to a suitable location on the exterior of the device housing. Addressable device descriptors shall utilize room/space designations and numbers that will be used by the facility after occupancy. Descriptors shall be approved by the Commissioner.
- T. For each duct/plenum detector provide remote alarm indicator lamp/test switch installed in the nearest corridor or as shown on plans. Identify each location by an engraved label affixed to the wall or ceiling.
- U. The Contractor #4 shall provide up to three fire alarm system reprogramming revisions as directed by the Commissioner.

- V. Provide supervisory alarm wiring from the fire pump controller to the fire alarm system. Supervisory alarms to be wired are: power failure alarm, phase reversal alarm, and pump running alarm. Coordinate all alarm contact voltages, ratings, and types (NO/NC) with the equipment being supplied.
- W. The fire alarm voice evacuation system messages shall be as approved by the Commissioner and custom messages shall be provided as directed.
- X. Label locations of duct smoke detectors to indicate "Duct Smoke Detector Access".

3.3 WIRING OF COMBINATION FIRE/SMOKE AND SMOKE DAMPERS

- A. The Division 26 electrical Contractor #4 shall be responsible for all 120 volt wiring of combination fire/smoke, smoke dampers and damper power via step down transformers. The Division 23 contractor shall be responsible for all damper control wiring from secondary of step down transformers.
- B. Obtain sources of electrical power as directed on the electrical plans, in the electrical specifications, and herein. Provide such power wiring from the source of power to the dampers and associated controls as required for a complete system installation.
- C. Confer with the Division 23 temperature control Contractor to ensure damper control sequences are in accordance with the sequences of operation outlined in Section 230923.
- D. The Division 23 mechanical and temperature control contractors shall be responsible for ALL damper control – this includes life safety shut-down and control, smoke purge / exhaust sequence control, as well as standard operation for specified temperature control sequences.
- E. Refer to Section 230923 for additional requirements.

3.4 FIELD QUALITY CONTROL

- A. General Testing
 - 1. Intelligent analog devices shall be tested for correct address and sensitivity using test equipment specifically designed for that purpose. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the system address, initials of the installing technician and date.
 - 2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance, current and voltage readings shall be made as work progresses.
 - a. A systematic record shall be maintained of readings using schedules or charts of tests and measurements. Areas shall be provided on the logging form for readings, dates and witnesses.
 - b. The acceptance inspector shall be notified before the start of the required tests. Items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector shall be corrected.
 - c. Test reports shall be delivered to the acceptance inspector as completed.

Test equipment, instruments, tools and labor required to conduct the system tests shall be made available by the Contractor #4. The following equipment shall be a minimum for conducting the tests:

- a. Ladders and scaffolds as required to access installed equipment.
 - b. Multi-meter for reading voltage (current and resistance).
 - c. Intelligent device programmer/tester (if required to set device addresses).
 - d. Laptop computer with programming software for any required program revisions.
 - e. Two way radios, flashlights, smoke generation devices and supplies.
 - f. A manufacturer recommended device for measuring air flow through air duct smoke detector sampling assemblies.
 - g. Decibel meter.
 - h. Provide a testing kit for testing CO detectors in accordance with manufacturer's requirements.
4. In addition to the testing specified to be performed by the Contractor #4, the installation shall be subject to test by the acceptance inspector.
 5. System wiring: Fire alarm circuits shall be tested for continuity, grounds, and short circuits.

B. Acceptance Testing

1. A written acceptance test procedure (ATP) for testing the fire alarm system components and installation will be prepared by the manufacturer in accordance with NFPA 72, and this specification. Contractor #4 shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of system components, circuits, and programming.
2. Contractor #4 shall prepare a program matrix referencing each alarm input to every output function affected as a result of an alarm condition on that input. In the case of outputs programmed using more complex logic functions involving "any", "or", "not", "count", "time", and "timer" statements; the complete output equation shall be referenced in the matrix.
3. A complete listing of device labels for alpha-numeric annunciator displays shall be prepared by Contractor #4 prior to the ATP.
4. The acceptance inspector shall use the system record drawings in combination with the documents specified under paragraph 3.01 during the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request demonstration of any or input and output functions. The items tested shall include but not be limited to the following:
 - a. System wiring shall be tested to demonstrate correct system response and correct subsequent system operation in the event of:
 - 1) Open, shorted and grounded intelligent analog signaling circuit.

- 2) Open, shorted and grounded network signaling circuit.
 - 3) Open and grounded conventional zone circuits.
 - 4) Open and grounded signal and telephone circuits.
 - 5) Intelligent device removal.
 - 6) Primary power or battery disconnected.
 - 7) Incorrect device at address.
- b. System evacuation alarm notification appliances shall be demonstrated as follows:
- 1) Alarm notification appliances actuate as programmed.
 - 2) Audibility and visibility at required levels.
- c. System indications shall be demonstrated as follows:
- 1) Correct message display for each alarm input at the base building control panel and each remote alpha-numeric display.
 - 2) Correct annunciator light for each alarm input at each annunciator as shown on the drawings.
5. After Contractor #4 has completed his own acceptance test following the ATP procedure, and after the authorized fire alarm equipment representative has performed a 100% complete test of the system, an acceptance test of the fire alarm system will be conducted by Contractor #4 as directed by the Commissioner or his authorized representative.
6. In the event of system failure to perform as specified and programmed during the ATP procedure, at the discretion of the acceptance inspector, the test shall be terminated.
- a. Contractor #4 shall retest the system, correcting deficiencies and providing test documentation to the acceptance inspector.
 - b. The acceptance inspector may elect to require the complete ATP to be performed again if, in his opinion, modifications to the system hardware or software warrant complete re-testing.
7. Before completion, the System Supplier shall turn over, to the City of New York, a disc copy and hard copy of the approved system custom program. Information shall be complete to allow for an alternate Factory Authorized Distributor to service, maintain, add, or delete devices as required.

3.5 SERVICES

- A. Contractor #4 shall warrant the entire system against mechanical and electrical defects for a period described in the contract general conditions. This period shall begin upon completed certification and test of the system or upon first beneficial use of the system, whichever is earlier.
- B. Furnish instruction as follows for a minimum of four employees of the system user:
 1. Instruction in the receipt, handling and acknowledgement of alarms.
 2. Instruction in the system operation including manual control of output functions from the system control panel.
 3. Instruction in the testing of the system including logging of detector sensitivity, field

test of devices and response to common troubles.

4. The total instruction requirement shall be a minimum of 24 hours or as required by the City of New York, conducted on three successive days, but shall be sufficient to cover the items specified.

C. Prepare and start systems as directed by the Commissioner.

1. Include services of a certified technician to supervise adjustments and final connections, if required by the local authority having jurisdiction, to include: speaker tap setting, strobe intensity, detector sensitivity and door release adjustment.

3.6 WARRANTY

- A. Contractor #4 shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.

3.7 EXISTING CONDITIONS

- A. Where work consists of additions or extensions to an existing system, prior to starting work, establish that system is in proper working order. If condition exists which prevents normal operation of specified additions and extensions, bring this fact to Commissioner's attention prior to doing work affecting existing system.
- B. Where work is done without such notification, it shall be assumed that connections have been made to a working system, and performance requirements and guarantee will apply to entire system.
- C. The existing building will be in operation continuously. Refer to notes on drawings, Section 260050, and elsewhere in this specification regarding system shutdowns.

END OF SECTION

FMS ID: PV467-CRG



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

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