CONSTRUCTION CONTRACT

New York City
Department of
Environmental Protection
59-17 Junction Boulevard
Flushing, New York 11373

Rohit Aggarwala
Commissioner

Joseph Vaicels
Assistant Commissioner
Agency Chief Contracting
Officer

Invitation for Bids for Furnishing all Labor and Material Necessary and Required for:

Contract(s):

CRO-624G – STRUCTURES AND EQUIPMENT

CRO-624H – HVAC

CRO-624P – PLUMBING

CRO-624E – ELECTRICAL

Description:

Repurposing of the Kensico Laboratory as the Kensico Regional Headquarters

CAT-423 Reconstruction of Facilities Located in the Upstate Watershed

Volume 2 of 2
Contract Terms and Specifications
(with separate Bid Booklets)

April 2023

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CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF ENGINEERING DESIGN & CONSTRUCTION

REPUROSING OF THE KENSICO LABORATORY AS
THE KENSICO REGIONAL HEADQUARTERS
CONTRACT CRO-624G, H, P, E

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SECTION 01120
Multiple Contract Summary

PART 1 GENERAL

NOTE: Division 01 -- General Requirements are applicable to all Related Construction Contracts as listed below in this Section. For multiple contract projects, the words "the Contractor" shall be taken to mean "each Contractor". Where an individual Contractor is responsible for a particular item of work, the Contractor will be named in the Specifications.

1.01 SECTION INCLUDES

A. Location and Description of Work

B. Work Included in the Contract

C. Related Construction Contracts

D. Inspection before Bidding

E. Site Characterization Reports and Information

F. Hazardous Soils Investigation

G. Datum Plane

1.02 LOCATION OF WORK

A. Work is to be performed under this Contract at the following Site(s):

1. Site #1: Kensico Reservoir Shaft 18 Campus, at location of existing Kensico Laboratory structure. The site is owned by the City of New York and operated and maintained by the NYCDEP.

2. The Site is located in the Town of Mt. Pleasant, NY in Westchester County and is bounded by Columbus Avenue and Westlake Drive. Refer to the Contract Drawings for the site location map.

3. Work Access to the Site will be from Westlake Drive.

1.03 RELATED CONTRACTS

A. The Contractor is advised that the work for this project is described and incorporated in the following related Contracts:

	Contract No.	Contract Name
1.	CRO-624G	Structures and Equipment
2.	CRO-624H (HVAC)	Heating, Ventilation and Air Conditioning
3.	CRO-624P	Plumbing
4.	CRO-624E	Electrical

B. Each Contractor shall coordinate its Work for the Primary Contractors for the related Contracts as listed herein before and as outlined in Article 11 - of the General Conditions - Coordination among Contractors.

C. Sets of Contract Drawings and Specifications for the related Contracts will be available for inspection at the New York City Environmental Protection, 17th Floor, High Rise, Bid Room, 59-17 Junction Boulevard, Flushing, New York 11373.

D. Work performed under these Contracts is to be interconnected with the Work done or in progress under other related Contracts so that a complete, functioning facility is achieved at the scheduled completion of the Project. Contractors for the related Contracts have the responsibility for starting up the completed facilities.

1.04 WORK INCLUDED IN THE RELATED CONTRACTS

A. Contract Names: Structures and Equipment, HVAC, Plumbing, and Electrical

B. The following is a general description of Work under this Contract only and shall not be construed as a complete description of the work to be performed.

C. Principal Items of Work:

1. Structural/General Work: Existing Kensico Laboratory building will be renovated, and the space converted for use by DEP EOH BWS Operations. Scope of work includes hazardous material abatement/removal, demolition of all interior non-load bearing walls (down to studs), demolition and replacement of the existing staircase, relocation and maintenance of operation of the existing UPS and server equipment throughout construction, and installation of new UPS and server equipment at end of construction (see Other Work).

2. Civil Work: Sedimentation and erosion control, disposal of spoils, water supply piping, sanitary piping, foundation drain, roof drain connection to storm water system, natural gas piping, electrical

ductbanks, lighting poles, HVAC equipment pads, site grading, landscaping, and driveway work including removal and replacement of asphalt pavement, new curbs, new bike rack, parking and cross walk striping (35 parking spaces), and new concrete sidewalk.

3. Architectural Work: Demo and remove existing flooring, acoustical ceiling tiles, and interior walls/panels. Reconfigure existing interior rooms to provide office space for 22 employees, provide 20-person conference room, kitchen with adjacent break area, bathrooms with locker room and showers, new server room, and reconfigure attic for installation of mechanical equipment (see HVAC). Replace interior and exterior doors, windows, lintels, and overhead garage doors. Install new drop ceilings and flooring systems. Install new office furniture, computers, printers and office equipment. Clean and repair existing slate roof, repair roof membrane, install waterproofing, install flashing, repair chimney flashing, replace window trim, install insulation on interior of exterior walls, clean and repair (repoint) exterior walls.

4. Mechanical/Plumbing Work: Remove and dispose of existing oil-fired boilers (oil tank has been removed). Install new indirect-fired gas hot water heater, baseboard heaters, unit heaters, hot/cold water service, potable water service, vent piping, new waste piping (to connection at exiting drains), bathroom sinks, shower stalls, urinals, wall toilets and mop sink.

5. HVAC Work: Remove and dispose of existing window air conditioning units, exhaust fans and ventilation ducts. Install new multi-zone HVAC system with condenser units, direct expansion (DX) air handling units (AHUs), rooftop exhaust fan, mini-spit system for electrical/IT closet, and ductwork w/insulation.

6. Electrical Work: Install new underground service to building from pole north of existing Kensico Laboratory, 208V to 240V step-up transformer, move main electric panel/equipment from the basement to dedicated electrical room in garage, and replace all electrical equipment in building including power panels, cable, receptacles and conduit as necessary within the building. Install lighting, fire alarm system, security system (with UPS backup) and PA system. Backup power will be provided via new plug in electrical room for connection to trailer backup supply.

7. Other Work: Renovation of the existing Kensico Laboratory will require temporary relocation of the UPS and server to a trailer outside the structure while minimizing loss of data communication with the Kensico Campus. At end of construction, new UPS and server equipment will be installed in a new server room within the

renovated building, and existing UPS and server equipment will be handed over to DEP BWS and the trailer removed from the site. Material in garage will temporarily be relocated prior to construction.

1.05 OTHER CONSTRUCTION CONTRACTS

Contracts in Progress: The following Contracts are scheduled to be in progress on the starting date of the Contract.

Contract No.	Contract Name
CRO-557	Waterfowl Management Program Building and Paving
CRO-543	Shoreline Stabilization
DEL-260	Electrical and HV Upgrades

A. Contracts to be Started: The following Contracts are scheduled to be started while this Contract is in progress:

Contract No.	Contract Name
KENS-EAST-DES	KEC Tunnel and Screen Chamber

B. The Contractor shall coordinate its work with the Contractor for the Contract listed hereinbefore, as required, and as outlined in Article 11 - of the General Conditions -Coordination among Contractors.

C. For contracts in progress, drawings, specifications and schedules will be available for inspection at the Bureau of Engineering Design and Construction, 5th Floor, Low Rise, 96-05 Horace Harding Expressway, Corona, New York 11368-5107.

D. For contracts to be started while this Project is in progress, the contract documents, when completed for bidding purposes, will be available for inspection by the Contractor at the above address.

1.06 INSPECTION BEFORE BIDDING

A. Before bidding, the Contractor is advised to visit the Site of the work. The Contractor shall obtain all necessary information of any and all conditions which may affect in any way the performance of their work and their bid prices under their Contracts. All pertinent data and dimensions with regard to existing construction shall be verified by the Contractor.

B. The Contractor may examine the drawings of existing facilities used in preparation of the Contract Drawings which will be available at NYCDEP

C. Bid Room, 59-17 Junction Boulevard, 17 Floor, Flushing New York 11373 Access to the site for inspection purposes prior to bidding will only be on the date advertised for the pre-bid tour.

1.07 SITE CHARACTERIZATION REPORTS

A. For the purposes of design, a topographical survey has been made at the proposed Site. The following documents are available for inspection by bidders:

1. Existing Condition Survey, Prepare by Hirani Group

B. All such material and information relating to boring records and subsurface conditions are expressly excluded from and are not a part of this Contract and are available for information purposes only.

C. Copies of these reports are also available for purchase at the DEP Division of Contract Services.

1.08 DATUM PLANE

A. All elevations indicated or specified refer to the site datum plane of NAVD88 (North American Vertical Datum 1988).

PART 2 PRODUCTION (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01140
Work Restrictions

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Normal Project Working Hours

B. Emission Control Technology for Non-Road Vehicles

C. Vehicle Idling Time

D. Compliance with Quality of Life Requirements

1.02 PAYMENT

A. No separate payment will be made for performing any work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01513 – Temporary Electrical System

B. Detailed Specification 01410 – Regulatory Requirements

1.04 REFERENCE STANDARDS

A. New York City Administrative Code, Section 24-163

1.05 WORKING HOURS

A. "Normal Project Working Hours" for this Contract are between the hours of 7:00 AM through 4:00 PM, Monday through Friday (except for holidays). The Contractor shall have the management, labor, equipment and subcontracted capabilities needed to complete the Work within the Period of Performance indicated in the General Conditions – Schedule A, by working only during "Normal Project Working Hours".

B. The Contractor shall abide by all federal, state and local laws, rules and regulations governing or restricting the performance of the Work, both during and outside Normal Project Working Hours.

C. The Contractor is advised that strict adherence to the local noise control code is mandatory, and that the Contractor shall be responsible for assuring that any required variance(s) from restrictions on construction hours are obtained.

D. The Work shall be substantially completed (as defined where applicable in Article 14 of the Standard Construction Contract) within the period of performance specified in Schedule "A" of the General Conditions; all in strict accordance with the Contract Documents. The Contractor will make no claim for extra compensation solely because of additional costs to meet the scheduled dates.

E. If the Contractor for any reason fails to adhere to the official project schedule, the Contractor shall promptly adopt such other or additional means and methods of construction sufficient to make up for the time lost and assure completion of the Work in accordance with said schedule. The City may require the Contractor to adopt such corrective measures as the Engineer deems necessary, appropriate and adequate to recover lost time; and may also direct the Contractor to propose corrective measures for consideration (without any obligation by City to adopt the same), at no additional cost to the City.

F. The Contractor is advised that it has the option to work a second shift or additional scheduled overtime, as needed, to complete all intermediate activities, contract milestones and to meet the date of substantial completion of the Work as defined by Article 14 of the Standard Construction Contract and not exceed the period of performance as shown in Schedule A of the General Conditions.

G. The Contractor shall have sufficient forms, shoring and other construction materials; labor; permanent materials; equipment; tools and supervision available to support a second shift and/or scheduled overtime.

H. When work is scheduled to be performed beyond the Normal Project Working H ours, a second shift, at night or during weekends, the Engineer shall be informed a minimum of 5 business days or other reasonable length of time specified by the Engineer in advance of the beginning of such work. The Contractor shall adhere to any local laws or ordinances that may govern or restrict the performance of such work. Requirements for the provision and use of temporary light and power outside Normal Project Working Hours are included in Section 01513 – Temporary Electrical System.

1.06 EMISSION CONTROL TECHNOLOGY FOR NON-ROAD VEHICLES

A. The Contractor's attention is called to Title 24 of the administrative code of the City of New York, Section 24-163.3 (enacted via Local Law 77 on December 22, 2003) and Articles 5.4 and 5.5 of the Standard Construction Contract. The Contractor shall comply with all technical requirements of these documents for the entire duration of the project.

B. The Contractor shall complete and submit to the Engineer the attached Local Law 77: DEP Monthly Reporting Forms (Exhibit A, attached to this

Section) to report on usage of Ultra Low Sulfur Diesel (ULSD) fuel and Best Available Technology in diesel-powered non-road vehicles for reducing emission of pollutants on a monthly basis.

1.07 VEHICLE IDLING TIME

A. Idling time shall be limited to three consecutive minutes for all delivery, concrete and materials trucks as well as all other diesel powered equipment (hereinafter referred to as a mobile source) except as follows:

1. When a mobile source is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control.

2. When it is necessary to operate heating, cooling or auxiliary equipment installed on the mobile source when such equipment is necessary to accomplish the intended use of the mobile source.

3. To bring the mobile source to the manufacturer's recommended operating temperature.

4. When the outdoor temperature is below twenty (20) degrees Fahrenheit.

5. When the mobile source is being repaired.

B. The Contractor shall meet the requirements of the Section 24-163 (f) of the NYC Administrative Code, regarding vehicle idling time adjacent to schools.

1.08 COMPLIANCE WITH QUALITY OF LIFE REQUIREMENTS

A. The Contractor is strongly advised that the City regards the preservation of "Quality of Life" as a high priority for the community near a DEP construction project. The Contractor, therefore, will be held to the strictest account in its adherence to Contract requirements and all applicable ordinances, rules, and regulations that relate to "Quality of Life". These include: noise control, vibration control, dust control, particulate control, rodent control, cleanliness and maintenance of the site and surrounding areas, and adherence to traffic and parking stipulations.

1. The Contractor shall submit a "Quality of Life" Compliance Plan for review and approval by the Engineer. This plan shall address all work required by the Contractor to satisfy the "Quality of Life" requirements.

2. Work at the Site shall not commence until the Contractor's "Quality of Life" Compliance Plan is approved.

B. When the Contractor is determined to be noncompliant with "Quality of Life" requirements, as described in the paragraph above, the Contractor shall be subject to the following measures:

1. Where non-compliance with a "Quality of Life" requirement is not corrected within a timeframe specified by the City, work may be ordered to stop until such measures as the City deems satisfactory are taken to resolve the problem and prevent future occurrence. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for additional costs or damages by the Contractor.

C. The Contractor shall cooperate fully with the Engineer to prevent, address and resolve any and all "Quality of Life" issues, which may arise from time to time, by whatever means necessary, all at no additional cost to the City.

D. The Contractor's record of compliance with "Quality of Life" requirements for this project and its efforts to coordinate with the Engineer and comply with his/her directions in this regard will be reflected in the Contractor's Evaluation. This Evaluation will become a part of the Contractor's record of doing business with the City of New York and may affect the Contractor's ability to be awarded future projects.

1.09 ATTACHMENTS

A. Exhibit A - Local Law 77: DEP Monthly Reporting Forms

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

FORM LL-77

LOCAL LAW 77: DEP MONTHLY REPORTING FORM 1

Contractor: _____ Report # _____ Covering the Mo/Yr of: _____

Contractor Address: _____ Contractor's Phone: _____

Project Name: _____ Project # _____ Address: _____

DEP Representative or PM Contact Name: _____ DEP Representative or PM Contact Number: _____

The New York City of Environmental Protection requires its contractors to file this form so that it can repor to the DEP on USAGE of Ultra Low Sulfur Diesel (ULSD) fuel in diesel powered non-road vehicles, and the use of Best Available Technology (BAT) for reducing emissions of pollutants, as required by NYC Local Law 77 of 2003.

									DEP approved BAT installed (DEP sticker must be applied to vehicle indicating BAT type and date installed)					
Prior Months Used On Site	Days Used This Month	Est. Future Usage Months	Type	Make	Year	Model #	VIN #	HP Rating	Date Installed	Make	Model	LL-77 Category I(a),I(b),I(c), II, III	DEP waiver* required	DEP Decal No.

* Attach copy of DEP Waiver if BAT requirement is waived for any reason during all or part of the contract period.

LOCAL LAW 77: DEP MONTHLY REPORTING FORM 2

Contractor: _____ Report # _____ Covering the Mo/Yr of: _____

Project Name: _____ Project # _____ Address:_____

DEP Representative or PM Contact Name: _____ DEP Representative or PM Contact Number: _____

SUMMARY OF LISTED EQUIPMENT AND BAT

Total pieces of Equipment used on site this Month = _____ **Total that used BAT this Month = _____**

Total pieces of equipment used on site this Calender Year = _____ **Total that used BAT this Year = _____**

DECLARATION OF COMPLIANCE

By signing this document, I certify that the information provided is accurate, and that all non-road diesel-powered vehicles used on the project during the reporting period by my employees and subcontractors are included, and that all BAT retrofits have been selected and installed in accordance with LL 77, including the Use of ULSD (Ultra Low Sulfur Diesel) fuel.
Note 1: Diesel fuel powered nonroad vehicles/equipment's used for fewer than twenty calendar days on the contract are exempt from BAT requirement.
Note 2: DEP will audit sites to ensure forms are accurate. Fines for non-compliance and fraud will be levied by DEP against the Contractor according to the terms of the Law.

Signed: _____ **Date:** _____

Print: _____

Contractor Name and Title

☐ **There are other Prime Contractors on this site whose equipment is not included here.**

SECTION 01270
Measurement and Payment

PART 1 GENERAL

1.1 SUMMARY

A. The Total Bid Price for the Contract CRO-624G Structures and Equipment, CRO-624H HVAC, CRO-624P Plumbing, and CRO-624E Electrical shall include the following items in the bid schedule of prices.

1. Lump Sum Prices Contract Items G-LS-1 through G-LS-4
2. Unit Price Items Contract Items G-UP-1 through G-UP-3
3. Allowances Contract Items G-A-1 through G-A-2
4. Lump Sum Prices Contract Item H-LS-1
5. Lump Sum Prices Contract Item P-LS-1
6. Lump Sum Prices Contract Items E-LS-1 and E-LS-2

B. Excluding the Allowance and Unit Price items specified in this Section, no separate payment will be made for the Work. All costs thereof shall be included by the Contractor in its lump sum prices bid for the Contract.

C. Payment of the total bid price shall be in accordance with the requirements of the Contract Documents.

1.2 PAYMENT

A. There is no payment provision for this Section.

1.3 RELATED SECTIONS

A. Detailed Specification 01355 – Hazardous Materials Control

1.4 LUMP SUM PRICE CONTRACT ITEMS

A. Contract Item G-LS-1 – Work Result

1. Contract Item G-LS-1 has been provided on the Schedule of Bid Prices as a lump sum price for all work of the Contract CRO-624G Structures and Equipment, not inclusive of Mobilization, General Contract Activities, De-Mobilization, Unit Prices and Allowance Items.
2. Payment under Contract Items G-LS-1 will constitute full compensation for all labor and materials required to complete all Work under this Contract, with the exception of Mobilization,

General Contract Activities, De-mobilization, the Unit Price Items and Allowances as specified herein and shown on the Bid Schedule of Prices.

B. Contract Item G-LS-2 – Mobilization

1. Under Contract Item G-LS-2 – Mobilization, the Contractor shall offset all costs necessary to commence the Work, including but not limited to staging and production, supervision and prefinancing, as required under this Contract.

2. The value for Mobilization, as indicated in the Schedule of Prices, shall not exceed four percent (4%) of the total bid price for the Contract, excluding the bid values for all Allowance Items. Should the Contractor's bid for Mobilization exceed 4%, the Mobilization Item shall be adjusted to 4% with any overage added to G-LS-1. In no event will the Total Bid Price for the Contract be adjusted because of the re-allocation.

3. The Contractor shall be paid one-half of Mobilization in the first partial payment.

4. The Contractor shall be paid the remainder of Mobilization in a subsequent partial payment after all of the following deliverables are completed to the satisfaction of the Resident Engineer:

   a. Payment and Performance Bonds per Schedule A

   b. Insurance per Schedule A

   c. Preliminary and Final Schedule of Values per Detailed Specification 01291 – Schedule of Values.

   d. Preliminary and Final CPM Schedules per Detailed Specification 01321 – Progress Schedule.

   e. Submittals per Detailed Specification 01356 – Environmental Health and Safety Requirements.

   f. Contractor's Quality Assurance/Quality Control (QA/QC) Plan per Detailed Specification 01432 – Contractor's Work Quality.

   g. Installation of the project information panel and its supports per Detailed Specification 01583 – Construction Site Signs

5. The 5% retainage specified in Schedule A applies to all payments including those for Mobilization.

6. This payment for Mobilization does not apply to costs associated with change orders.

C. Contract Item G-LS-3 – General Contract Activities

1. The amount paid for General Contract Activities, as indicated on the Bid Schedule of Prices, shall not exceed six percent (6%) of the Total Bid Price for the Contract, excluding the bid values for Mobilization and all Allowance items. Should the Contractor's bid for General Contract Activities exceed 6%, the General Contract Activities Item shall be adjusted to 6%, with any overage added to the G-LS-1 Contract Item. In no event will the Total Bid Price for the Contract be adjusted because of this re-allocation.

2. The Contractor shall be paid 3.33% of the G-LS-3 amount for General Contract Activities on a monthly basis with each partial payment, not inclusive of change orders, up to the date of Substantial Completion as defined in Schedule A. Any balance remaining after this date will be paid in the Final Payment for the work, after the Resident Engineer has certified that all Work under this item has been satisfactorily completed.

3. The following shall be compensated by General Contract Activities:

   a. Contractor's Superintendent per Article 5 of the General Conditions.

   b. Surveys per Article 6 of the General Conditions.

   c. Contractor's Daily Reports per Article 7 of the General Conditions.

   d. Activities pertaining to Multiple Contract per Detailed Specification 01120 – Multiple Contract Summary.

   e. Activities pertaining to Work Restrictions per Detailed Specification 01140 – Work Restrictions.

   f. Activities pertaining to Measurement and Payment per Detailed Specification 01270 – Measurement and Payment.

   g. Project Coordination activities per Detailed Specification 01310 – Project Coordination.

   h. Use of the Web-based Project Management Information System per Detailed Specification 01312 – Web-Based Project Management Information System.

   i. Monthly CPM Progress Meetings and Monthly CPM Update Reports per Detailed Specification 01321 – Progress Schedule.

   j. All job photographs and videos per Detailed Specification 01323 – Job Photographs and Videos.

k. All submittals per Detailed Specification 01330 – Submittal Procedures.

l. Records in Paper Formats per Detailed Specification 01333 – Records in Paper Formats.

m. Records in Electronic Formats per Detailed Specification 01335 – Records in Electronic Formats.

n. Activities pertaining to Working in Hazardous Locations per Detailed Specification 01351 – Working in Hazardous (Classified) Locations

o. Activities pertaining to Hazardous Materials Control per Detailed Specification 01355 – Hazardous Materials Control.

p. Activities pertaining to Environmental, Health, and Safety requirements per Detailed Specification 01356 – Environmental Health and Safety (EHS) Requirements except Site Safety Representative efforts. The Contractor shall include the cost for the Site Safety Representative(s) in the lump sum price bid for Lump Sum G-LS-1.

q. Regulatory requirements including obtaining all required Contractor permits per Detailed Specification 01410 – Regulatory Requirements.

r. Activities pertaining to References per Detailed Specification 01420 – Reference Standards.

s. Activities pertaining to Approval of Product Manufacturers per Detailed Specification 01430 - Approval of Product Manufacturers.

t. Activities pertaining to Contractor's Work Quality (excluding Contractor's Quality Assurance/Quality Control (QA/QC) Plan) per Detailed Specification 01432 - Contractor's Work Quality.

u. Activities related to Witness Shop Testing per Detailed Specification 01433 - Witness Shop Testing, not including travel.

v. Activities related to Temporary Water and Sanitary Services per Detailed Specification 01511 - Temporary Water and Sanitary Services, not including removal.

w. Activities related to Temporary Heating and Ventilation Facilities per Detailed Specification 01512 - Temporary Heating and Ventilation Facilities, not including removal.

x. Activities related to Temporary Electrical Systems per Detailed Specification 01513 - Temporary Electrical Systems, not including removal.

y. Activities related to Interim Electrical Systems per Detailed Specification 01514 – Interim Electrical System.

z. All work requirement related to Temporary Field Office Trailers per Detailed Specification 01521 – Temporary Field Office Trailers.

aa. All work requirements related to Temporary Field Office Equipment, Supplies and Services per Detailed Specification 01524 – Temporary Field Office Equipment, Supplies and Services.

bb. All work requirements related to Temporary Guard Booths per Detailed Specification 01525 – Temporary Guard Booths.

cc. Activities pertaining to Vehicular Access and Parking per Detailed Specification 01550 - Vehicular Access and Parking.

dd. Activities pertaining to Traffic Control per 01555 – Maintenance and Protection of Traffic.

ee. All Work Requirements for Temporary Barriers and Enclosures as per Detailed Specification 01560 - Temporary Barriers and Enclosures, not including removal.

ff. All Work Requirements for Site Security as per Detailed Specification 01561 – Site Security

gg. All Work Requirements for Temporary Controls per Detailed Specification 01570 – Temporary Controls.

hh. Pest Control per Detailed Specification 01571 – Temporary Pest Control.

ii. Activities pertaining to General Electrical and Mechanical Requirements per Detailed Specification 01615 – General Electrical and Mechanical Requirements.

jj. Activities pertaining to Transportation and Handling of Materials and Equipment per Detailed Specification 01651 – Transportation and Handling of Materials.

kk. Activities pertaining to Protection of Materials and Equipment per Detailed Specification 01661 – Protection of Materials and Equipment.

ll. Activities pertaining to Maintenance of Operations and Construction Staging per Detailed Specification 01711 – Maintenance of Operations and Construction Staging.

mm. Activities pertaining to General Construction Requirements per Detailed Specification 01715 – General Construction Requirements.

nn. Activities pertaining to Protection and Restoration of Structures per Detailed Specification 01721 - Protection and Restoration of Structures.

oo. Activities pertaining to Installation of Equipment per Detailed Specification 01732 – Installation of Equipment.

pp. Activities pertaining to Construction Waste Management per Detailed Specification 01733 - Construction Waste Management.

qq. Activities pertaining to Cleaning and Site Maintenance per Detailed Specification 01740 - Cleaning and Site Maintenance, except final cleaning.

rr. Activities pertaining to Project Closeout per Detailed Specification 01781 – Project Closeout.

ss. Activities pertaining to Preliminary and Final Field Tests per Detailed Specification 01811 - Preliminary and Final Field Tests.

tt. Activities pertaining to Equipment Start-up and Training per Detailed Specification 01821 – Equipment Start-up and Training.

4. The 5% retainage specified in Schedule A applies to all payments including those for this item G-LS-3 - General Contract Activities.

5. This payment for G-LS-3 - General Contract Activities does not apply to costs associated with change orders.

D. Contract Item G-LS-4 – De-mobilization

1. Under Contract Item G-LS-4 – De-mobilization, the Contractor shall offset all costs necessary to de-mobilize the Work, including but not limited to removal of all temporary facilities, materials and equipment from the Site, as well as removal of all Contractor's facilities in the staging area, as required under this Contract. The following Work shall be compensated by Contract Item G-LS-4 – De-Mobilization:

a. Removals pertaining to Temporary Water and Sanitary Services per Detailed Specification 01511 - Temporary Water and Sanitary Services.

b. Removals pertaining to Temporary Heating and Ventilation Facilities per Detailed Specification 01512 - Temporary Heating and Ventilation Facilities.

c. Removals pertaining to Temporary Electrical System per Detailed Specification 01513 - Temporary Electrical System.

d. Removals pertaining to Temporary Field Office Trailers per Detailed Specification 01521 - Temporary Field Office Trailers.

e. Removals pertaining to Temporary Guard Booths per Detailed Specification 01525 - Temporary Guard Booths.

f. Removals pertaining to Temporary Barriers and Enclosures per Detailed Specification 01560 - Temporary Barriers and Enclosures.

g. Removals of the project information panel and its supports per Detailed Specification 01583 – Construction Site Signs.

h. Final Cleaning per Detailed Specification 01740 - Cleaning and Site Maintenance.

i. Providing all Operations and Manuals as required under this Contract per Detailed Specification 01831 – Operation and Maintenance Manuals.

j. Final Record Documents per Detailed Specification 01332 - Final Record Documents

2. The value for De-Mobilization shall be equal to one-half of the total value of G-LS-2 Mobilization, in accordance with Section 1.4.B.2. above. Should the Contractor's bid for De-Mobilization exceed one-half of the total value of G-LS-2 Mobilization, the De-Mobilization Item will be adjusted to one-half of the total value of G-LS-2 Mobilization, with any overage added to G-LS-1. In no event will the Total Bid Price for the Contract be adjusted because of this re-allocation. Notwithstanding any other Contract Item, Contract Item G-LS-4 shall not be considered to pay for Work to be paid under other Contract Items included elsewhere in the Contract, and shall be considered in addition to any such other Contract Items. The Contractor shall be paid the De-Mobilization Price in the Final Payment for the Work, after the Resident Engineer has certified.

E. Contract Item H-LS-1 has been provided on the Schedule of Bid Prices as a lump sum price for the Contract CRO-624H, HVAC.

1. Payment under Contract Items H-LS-1 will constitute full compensation for all labor and materials required to complete all Work under this Contract.

F. Contract Item P-LS-1 has been provided on the Schedule of Bid Prices as a lump sum price for the Contract CRO-624P, Plumbing.

1. Payment under Contract Items P-LS-1 will constitute full compensation for all labor and materials required to complete all Work under this Contract.

G. Contract Item E-LS-1 has been provided on the Schedule of Bid Prices as a lump sum price for the Contract CRO-624E, Electrical.

1. Payment under Contract Items E-LS-1 will constitute full compensation for all labor and materials required to complete all Work under this Contract, with the exception of General Contact Activities.

H. Contract Item E-LS-2 – General Contract Activities

1. The amount paid for General Contract Activities, as indicated on the Bid Schedule of Prices, shall not exceed six percent (6%) of the Total Bid Price for the Contract. Should the Contractor's bid for General Contract Activities exceed 6%, the General Contract Activities Item shall be adjusted to 6%, with any overage added to the E-LS-1 Contract Item. In no event will the Total Bid Price for the Contract be adjusted because of this re-allocation.

2. The Contractor shall be paid 3.33% of the E-LS-2 amount for General Contract Activities on a monthly basis with each partial payment, not inclusive of change orders, up to the date of Substantial Completion as defined in Schedule A. Any balance remaining after this date will be paid in the Final Payment for the work, after the Resident Engineer has certified that all Work under this item has been satisfactorily completed.

3. The following shall be compensated by General Contract Activities:

   a. Contractor's Superintendent per Article 5 of the General Conditions.

   b. Surveys per Article 6 of the General Conditions.

   c. Contractor's Daily Reports per Article 7 of the General Conditions.

d. Activities pertaining to Multiple Contract per Detailed Specification 01120 – Multiple Contract Summary.

e. Activities pertaining to Work Restrictions per Detailed Specification 01140 – Work Restrictions.

f. Activities pertaining to Measurement and Payment per Detailed Specification 01270 – Measurement and Payment.

g. Project Coordination activities per Detailed Specification 01310 – Project Coordination.

h. Use of the Web-based Project Management Information System per Detailed Specification 01312 – Web-Based Project Management Information System.

i. Monthly CPM Progress Meetings and Monthly CPM Update Reports per Detailed Specification 01321 – Progress Schedule.

j. All job photographs and videos per Detailed Specification 01323 – Job Photographs and Videos.

k. All submittals per Detailed Specification 01330 – Submittal Procedures.

l. Records in Paper Formats per Detailed Specification 01333 – Records in Paper Formats.

m. Records in Electronic Formats per Detailed Specification 01335 – Records in Electronic Formats.

n. Activities pertaining to Working in Hazardous Locations per Detailed Specification 01351 – Working in Hazardous (Classified) Locations.

o. Activities pertaining to Hazardous Materials Control per Detailed Specification 01355 – Hazardous Materials Control.

p. Activities pertaining to Environmental, Health, and Safety requirements per Detailed Specification 01356 – Environmental Health and Safety (EHS) Requirements except Site Safety Representative efforts.

q. Regulatory requirements including obtaining all required Contractor permits per Detailed Specification 01410 – Regulatory Requirements.

r. Activities pertaining to References per Detailed Specification 01420 – Reference Standards.

s. Activities pertaining to Approval of Product Manufacturers per Detailed Specification 01430 - Approval of Product Manufacturers.

t. Activities pertaining to Contractor's Work Quality (excluding Contractor's Quality Assurance/Quality Control (QA/QC) Plan) per Detailed Specification 01432 - Contractor's Work Quality.

u. Activities related to Witness Shop Testing per Detailed Specification 01433 - Witness Shop Testing, not including travel.

v. Activities related to Temporary Water and Sanitary Services per Detailed Specification 01511 - Temporary Water and Sanitary Services, not including removal.

w. Activities related to Temporary Heating and Ventilation Facilities per Detailed Specification 01512 - Temporary Heating and Ventilation Facilities, not including removal.

x. Activities related to Temporary Electrical Systems per Detailed Specification 01513 - Temporary Electrical Systems, not including removal.

y. Activities related to Interim Electrical Systems per Detailed Specification 01514 – Interim Electrical System.

z. All work requirement related to Temporary Field Office Trailers per 01521 – Temporary Field Office Trailers.

aa. Activities pertaining to Vehicular Access and Parking per Detailed Specification 01550 - Vehicular Access and Parking.

bb. Activities pertaining to Traffic Control per 01555 – Maintenance and Protection of Traffic.

cc. All Work Requirements for Temporary Barriers and Enclosures as per Detailed Specification 01560 - Temporary Barriers and Enclosures, not including removal.

dd. All Work Requirements for Site Security as per 01561 – Site Security

ee. All Work Requirements for Temporary Controls per Detailed Specification 01570 – Temporary Controls.

ff. Activities pertaining to General Electrical and Mechanical Requirements per Detailed Specification 01615 – General Electrical and Mechanical Requirements.

gg. Activities pertaining to Transportation and Handling of Materials and Equipment per Detailed Specification 01651 – General Electrical and Mechanical Requirements.

hh. Activities pertaining to Protection of Materials and Equipment per Detailed Specification 01661 – General Electrical and Mechanical Requirements.

ii. Activities pertaining to Maintenance of Operations and Construction Staging per Section 01711 – Maintenance of Operations and Construction Staging.

jj. Activities pertaining to General Construction Requirements per Detailed Specification 01715 – General Construction Requirements.

kk. Activities pertaining to Protection and Restoration of Structures per Detailed Specification 01721 - Protection and Restoration of Structures.

ll. Activities pertaining to Installation of Equipment per Detailed Specification 01732 – Installation of Equipment.

mm. Activities pertaining to Construction Waste Management per Detailed Specification 01733 - Construction Waste Management.

nn. Activities pertaining to Cleaning and Site Maintenance per Detailed Specification 01740 - Cleaning and Site Maintenance, except final cleaning.

oo. Activities pertaining to Project Closeout per Detailed Specification 01781 – Project Closeout.

pp. Activities pertaining to Preliminary and Final Field Tests per Detailed Specification 01811 - Preliminary and Final Field Tests.

qq. Activities pertaining to Equipment Start-up and Training per Detailed Specification 01821 – Equipment Start-up and Training.

4. The 5% retainage specified in Schedule A applies to all payments including those for this item E-LS-2 - General Contract Activities.

5. This payment for E-LS-2 - General Contract Activities does not apply to costs associated with change orders.

1.5 UNIT PRICE ITEMS

A. Contract Item G-UP-1

1. Description: Under Contract Item G-UP-1, the Contractor shall remove all confirmed asbestos-containing caulk behind door frames in numerous locations identified in Table 2 attached to Detailed Specification 13281G, in accordance with Detailed Specification 13281G – Asbestos Management.

2. Measurement for Payment: Under Contract Item G-UP-1, the Contractor shall be paid on a per linear foot basis in accordance with Detailed Specification 13281G – Asbestos Management.

B. Contract Item G-UP-2

1. Description: Under Contract Item G-UP-2, the Contractor shall remove all confirmed asbestos-containing brown wire wrap in radiators in numerous locations identified in Table 2 attached to Detailed Specification 13281G, in accordance with Detailed Specification 13281G – Asbestos Management.

2. Measurement for Payment: Under Contract Item G-UP-2, the Contractor shall be paid on a per linear foot basis in accordance with Detailed Specification 13281G – Asbestos Management.

C. Contract Item G-UP-3

1. Description: Under Contract Item G-UP-3, the Contractor shall remove all confirmed asbestos-containing arc panels in electrical panels in numerous locations identified in Table 2 attached to Detailed Specification 13281G, in accordance with Detailed Specification 13281G – Asbestos Management.

2. Measurement for Payment: Under Contract Item G-UP-3, the Contractor shall be paid on a per square foot basis in accordance with Detailed Specification 13281G – Asbestos Management.

1.6 ALLOWANCES

A. Descriptions of the Work to be performed under the Allowances are found in the related Sections referenced herein. The amounts of the Allowances are given in the Bid Schedule of Prices. The Allowances will be included, as listed under this Article, in the total bid for the Contract.

1. Contract Item G-A-1: Allowance for any unforeseen hazardous material remediation, material sampling and laboratory analysis undertaken as per Detailed Specification 01355 - Hazardous Materials Control.

2. Contract Item G-A-2: Allowance for Electrical Energy charges for the temporary power for the Engineer's field office trailer, in the amount as indicated in the Bid Schedule of prices.

3. There is no allowance for Contract CRO-624H, HVAC
4. There is no allowance for Contract CRO-624P, Plumbing
5. There is no allowance for Contract CRO-624E, Electrical

B. All work under the Allowance items set forth above shall be performed on a Time and Material basis. Price to be paid shall be the actual and reasonable cost, calculated in accordance with Articles 26.2.1 through 26.2.13 (excluding Article 26.2.10) and Article 26.3 of the City of New York Standard Construction Contract. The words "Extra Work" in the above referenced Articles shall be substituted with "Allowances" as outlined in this Specification.

C. The Allowance will remain with DEP as a credit until payment of the Allowance item is requisitioned. If the Allowance is exceeded, the excess will be paid to the Contractor through the Change Order procedure.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01291
Schedule of Values

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Preliminary Schedule of Values
2. Final Schedule of Values
3. Cross Reference Listing
4. Changes to Schedule of Values
5. Table 1 – Preliminary Schedule of Values (Major Work Results)
6. Table 2 – Final Schedule of Values (Minimum Detail Required)

1.02 PAYMENT

A. There is no separate payment provision for this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01270 – Measurement and Payment

B. Detailed Specification 01321 – Progress Schedule

1.04 DEFINITIONS

A. Schedule of Values: A breakdown of the (Contractor's) lump sum bid price for the Contract or of lump sums bid for items of the Contract, excluding any values associated with mobilization, showing the various operations to be performed under the Contract and the value of each operation, in accordance with Article 41 of the Standard Construction Contract. The Contractor shall also submit such other information relating to the bid breakdown as directed by the Resident Engineer.

B. Logic and Duration Schedule: See Section 01321 – Progress Schedule for a definition of the term and details of what it requires.

C. Work Result: Permanent or temporary aspect of a construction project achieved in the production stage or by subsequent alteration, maintenance or demolition processes, through the application of a particular skill or trade to construction resources.

1.05 DESCRIPTION

A. The SOV shall be developed in parallel and in coordination with the development of the Logic and Duration Schedule in accordance with the requirements of Section 01321 – Progress Schedule.

B. Partial payments, in accordance with Article 42 of the Standard Construction Contract, will be determined from the Final SOV.

C. Preliminary Schedule of Values

1. The Contractor shall submit a preliminary SOV for the Engineer's approval within 15 days after the commencement date given in the Notice to Proceed. The preliminary SOV shall include, as a minimum, the proposed values estimated by the Contractor for the major Work Results of the Contract which shall be indicated in Table 1 – Preliminary Schedule of Values, attached to this Section. The SOV shall not include any values for General Conditions requirements, including but not limited to insurance, bonding, supervision, pre-financing and any other cost included in Mobilization. All General Contract Activities values listed in the SOV are included solely for purposes of withholding should the Contractor fail to perform any General Contract Activity; payment for General Contract Activities shall be as detailed in the Measurement and Payment Specification – Detailed Specification 01270.

2. The Contractor and Engineer shall meet and jointly review the preliminary SOV and make adjustments in value allocations if, in the opinion of the Engineer, these are necessary to establish fair and reasonable allocation of values to the major Work Results spread over the term of the Contract. Unbalanced allocations weighted towards the commencement of the Contract term or a specific Contract item will not be permitted. Within 14 days of joint review, the Contractor shall submit a revised SOV for DEP approval. The Engineer shall review and approve (or return for any necessary revisions) within 14 days from the date of the resubmittal.

D. Final Schedule of Values

1. The Contractor shall prepare and submit a final SOV to the Engineer within 90 days after the commencement date given in the Notice to Proceed. The final SOV shall be based on the accepted preliminary SOV for major Work Results and must be in sufficient detail to determine monthly progress payments related to the Work performed as shown in the monthly progress schedule update. The SOV shall not include any values for General Conditions requirements, including but not limited to insurance, bonding,

supervision, pre-financing and any other cost included in Mobilization as those values shall be deemed to be subsumed in the Mobilization Bid Item for the Contract and within the various listed Work Results provided pursuant to this Section. The Engineer shall be the sole judge of acceptable SOV figures, details and description of the values established. If, directed by the Engineer, a greater number of items is required, the Contractor shall add the additional items to the SOV as requested by the Engineer and resubmit within 14 days of notification. The Engineer shall review and approve submission (or return for any additional revisions) within 14 days of receipt of revised SOV. All General Contract Activities values listed in the SOV are included solely for purposes of withholding should the Contractor fail to perform any General Contract Activity; payment for General Contract Activities shall be as detailed in the Measurement and Payment Specification – Detailed Specification 01270.

2. The minimum required detail of breakdown of the major Work Results of this Contract is indicated in Table 2 – Final Schedule of Values, attached to this Section. This list is not intended to be an exhaustive list of work to be performed or items to be installed. Greater detail shall be provided if requested by the Engineer.

3. Approved change orders reflected in the Logic and Duration Schedule shall each be incorporated into the SOV as a single unit identified by the change order number. Depending on the magnitude and duration of the change order work, the unit may require further breakdown for payment as required by the Engineer. The Contractor shall resubmit within 14 days of change order approval. The Engineer shall review and approve submission (or return for any additional revisions) within 14 days of receipt of revised SOV.

E. Cross Reference Listing

1. To assist in the correlation of the SOV, proposed monthly cash flow (per Article 9 of the Standard Construction Contract), and the Logic and Duration Schedule, the Contractor shall provide a cross reference listing which shall be furnished in two (2) parts. The first part shall list each scheduled activity with the breakdown of the respective valued items making up the total cost of the activity. The second part shall list the valued item with the respective scheduled activity or activities that make up the total cost indicated. These listings shall be updated and submitted in conjunction with the Logic and Duration Schedule monthly submittals as specified in Specification 01321 – Progress Schedule.

F. Changes to the Schedule of Values

1. Changes to the Logic and Duration Schedule which add activities not included in the original schedule, but included in the original scope of Work (schedule omissions or errors) shall have values assigned in the SOV as approved by the Engineer. Necessary revisions will incorporate the Cross Reference Listing.

1.06 ATTACHMENTS

A. Table 1 – Preliminary Schedule of Values (Major Work Results)

B. Table 2 – Final Schedule of Values (Minimum Detail Required)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

TABLE 1
PRELIMINARY SCHEDULE OF VALUES
(Major Work Results)

I. CONTRACT CRO-624 G

A. G-LS-1 – Work Result

1.	General Conditions	(Division 01)
2.	Site Construction	(Division 02)
3.	Concrete	(Division 03)
4.	Masonry	(Division 04)
5.	Metals	(Division 05)
6.	Wood and Plastics	(Division 06)
7.	Thermal & Moisture Protection	(Division 07)
8.	Doors and Windows	(Division 08)
9.	Finishes	(Division 09)
10.	Specialties	(Division 10)
11.	Equipment	(Division 11)
12.	Furnishings	(Division 12)
13.	Special Construction	(Division 13)
16.	Electrical	(Division 16)
17.	Instrumentation and Controls	(Division 17)

B. G-LS-2 – Mobilization

C. G-LS-3 – General Contract Activities

1. General Contract Activities (General Conditions and Division 01)

D. G-LS-4 – Demobilization

II. CONTRACT CRO-624 H

A. H-LS-1 Work Result

1.	General Conditions, Mobilization, General Contract Activities, and Demobilization	(Division 01)
15.	Mechanical	(Division 15)

III. CONTRACT CRO-624 P

A. P-LS-1 Work Result

13.	General Conditions, Mobilization, General Contract Activities, and Demobilization	(Division 01)
15.	Mechanical	(Division 15)

IV. CONTRACT CRO-624 E

A. E-LS-1 Work Result

1. General Conditions, Mobilization, and Demobilization (Division 01)
13. Special Construction (Division 13)
16. Electrical (Division 16)

B. E-LS-2 General Contract Activities

1. General Contract Activities (General Conditions and Division 01)

TABLE 2
FINAL DETAILED ESTIMATE BREAKDOWN
(Minimum Detail Required for Contracts CRO-624G, H, P, and E)

I. CONTRACT CRO-624 G

A. G-LS-1 – Work Result

1. General Conditions (Division 01)
   a. Relocation and Maintenance of Operation of Existing UPS and Server to Temporary Trailer
   b. Site security
   c. Scaffolding
2. Site Construction (Division 02)
   a. Erosion control fencing, mats, and blankets
   b. Stabilized construction entrance and washout
   c. Existing pavement and curb demolition
   d. Existing fence and gate demolition
   e. Selective building demolition
   f. Utility excavation
   g. Fill
   h. Gas line installation
   i. Drainage pipe installation
   j. Manhole and catch basin installation
   k. Stormwater storage and treatment manhole installation
   l. Geotextile soil stabilization
   m. Concrete sidewalk installation
   n. Concrete curb installation
   o. Asphalt paving
   p. Concrete bollards
   q. Pavement markings
   r. Finish grading
   s. Landscaping – Planting Beds
   t. Landscaping – Mulching
   u. Landscaping – Seeding
   v. Landscaping –Perennials
   w. Landscaping – Shrubs
   x. Landscaping – Trees
3. Concrete (Division 03)
   a. Concrete slab and foundation
   b. Concrete walkway and stairs
4. Masonry (Division 04)
   a. Brick Masonry Repair
   b. Brick Masonry Repointing
   c. Stone Masonry Units
   d. Masonry and Stonework Restoration and Cleaning

5. Metals (Division 05)
   a. Structural steel
   b. Welded pipe railing
   c. Steel floor gratings and checkered plates
   d. Aluminum floor gratings and checkered plates
6. Wood and Plastics (Division 06)
   a. Sheathing
   b. Plastic laminate clad cabinets
7. Thermal & Moisture Protection (Division 07)
   a. Bentonite waterproofing
   b. Building insulation
   c. Slate shingles
   d. PVC roof membrane
   e. Flashing and trim
   f. Gutters and downspouts
   g. Caulking and sealants
8. Doors and Windows (Division 08)
   a. Sectional overhead doors
   b. Access doors
   c. Aluminum framed entrances and storefronts
   d. Aluminum windows and frames
   e. Finish hardware and hardware sets
   f. Glass, plastic and glazing
9. Finishes (Division 09)
   a. Metal furring and lathing
   b. Gypsum board systems
   c. Suspended acoustical ceilings
   d. Resilient flooring
   e. Painting
10. Specialties (Division 10)
    a. Louvers
    b. Identifying devices
    c. Lockers and benches
    d. Fire extinguishers
    e. Toilet and bath accessories
    f. Submersible pumping units
12. Furnishings (Division 12)
    a. Storage Equipment
13. Special Construction (Division 13)
    a. Asbestos management
    b. Mercury management
    c. Lead management
    d. PCB management
16. Electrical (Division 16)

a. Electrical Conduit for Security Features
b. Closed Circuit Television System

17. Instrumentation and Controls (Division 17)
    a. Control Panels and Enclosures
    b. Mounted Instruments and Devices
    c. Access Control and Intrusion Alarm System
    d. Communications Equipment

B. G-LS-2 – Mobilization

C. G-LS-3 – General Contract Activities
1. Contractor's Superintendent per Article 5 of the General Conditions.
2. Surveys per Article 6 of the General Conditions.
3. Contractor's Daily Reports per Article 7 of the General Conditions.
4. Activities Pertaining to Multiple Contracts
5. Activities Pertaining to Payment and Measurement
6. Work Restrictions
7. Project Coordination and Meetings
8. Web-based Project Management Information System
9. Progress Schedule
10. Job Photographs and Videos
11. Submittal Procedures
12. Final Record Documents
13. Records in Paper Formats
14. Records in Electronic Formats
15. Hazardous Materials Control
16. Environmental Health and Safety Requirements
17. Regulatory Requirements
18. Reference Standards
19. Approval of Product Manufacturers – Named or Equal
20. Contractor's Work Quality
21. Witness Shop Testing (not including travel)
22. Temporary Water and Sanitary Services
23. Temporary Heating and Ventilation Facilities
24. Temporary Electrical System
25. Interim Electrical System
26. Temporary Field Office Trailers
27. Temporary Guard Booths
28. Vehicular Access and Parking
29. Maintenance and Protection of Traffic
30. Temporary Barriers and Enclosures
31. Site Security
32. Temporary Controls

33. Temporary Pest Control
34. Construction Site Signs
35. General Electrical and Mechanical Requirements
36. Transportation and Handling of Materials and Equipment
37. Protection of Materials and Equipment
38. General Construction Requirements
39. Protection and Restoration of Structures
40. Installation of Equipment
41. Construction Waste Management
42. Cleaning and Site Maintenance
43. Activities pertaining to Spare Parts and Maintenance Materials
44. Project Closeout
45. Preliminary and Final Field Tests
46. Equipment Start-up and Training

D. G-LS-4 – Demobilization

II. CONTRACT CRO-624 H

A. H-LS-1 – Work Result

1. General Conditions and General Contract Activities (Division 01) including:
    a. Mobilization
    b. Contractor's Superintendent per Article 5 of the General Conditions.
    c. Surveys per Article 6 of the General Conditions.
    d. Contractor's Daily Reports per Article 7 of the General Conditions.
    e. Activities Pertaining to Multiple Contracts
    f. Activities Pertaining to Payment and Measurement
    g. Work Restrictions
    h. Project Coordination and Meetings
    i. Web-based Project Management Information System
    j. Progress Schedule
    k. Submittal Procedures
    l. Final Record Documents
    m. Records in Paper Formats
    n. Records in Electronic Formats
    o. Hazardous Materials Control
    p. Environmental Health and Safety Requirements
    q. Regulatory Requirements
    r. Reference Standards
    s. Approval of Product Manufacturers – Named or Equal
    t. Contractor's Work Quality
    u. Witness Shop Testing (not including travel)

v. Temporary Electrical System
w. Temporary Field Office Trailers
x. Vehicular Access and Parking
y. Maintenance and Protection of Traffic
z. Temporary Barriers and Enclosures
aa. Site Security
bb. Temporary Controls
cc. General Electrical and Mechanical Requirements
dd. Transportation and Handling of Materials and Equipment
ee. Protection of Materials and Equipment
ff. General Construction Requirements
gg. Protection and Restoration of Structures
hh. Construction Waste Management
ii. Cleaning and Site Maintenance
jj. Activities pertaining to Spare Parts and Maintenance Materials
kk. Project Closeout
ll. Preliminary and Final Field Tests
mm. Equipment Start-up and Training
nn. Demobilization

2. Mechanical (Division 15)
   a. Aluminum, Brass and Copper Pipe
   b. Hangers and Supports
   c. Piping Insulation
   d. Valves Smaller than 4 Inches
   e. Hot Water Boilers
   f. HVAC Pumps
   g. HVAC Electric Control Systems
   h. Split System Air Conditioners
   i. Dehumidifiers
   j. Unit Heaters – Hot Water
   k. Electric Heaters
   l. Finned Tube Radiation
   m. Ductwork and Duct Accessories
   n. Fans

III. CONTRACT CRO-624 P
   A. P-LS-1 – Work Result
      1. General Conditions and General Contract Activities (Division 01) including:
         a. Contractor's Superintendent per Article 5 of the General Conditions.
         b. Surveys per Article 6 of the General Conditions.

c. Contractor's Daily Reports per Article 7 of the General Conditions.
d. Mobilization
e. Activities Pertaining to Multiple Contracts
f. Activities Pertaining to Payment and Measurement
g. Work Restrictions
h. Project Coordination and Meetings
i. Web-based Project Management Information System
j. Progress Schedule
k. Submittal Procedures
l. Final Record Documents
m. Records in Paper Formats
n. Records in Electronic Formats
o. Hazardous Materials Control
p. Environmental Health and Safety Requirements
q. Regulatory Requirements
r. Reference Standards
s. Approval of Product Manufacturers – Named or Equal
t. Contractor's Work Quality
u. Witness Shop Testing (not including travel)
v. Temporary Electrical System
w. Temporary Field Office Trailers
x. Vehicular Access and Parking
y. Maintenance and Protection of Traffic
z. Temporary Barriers and Enclosures
aa. Site Security
bb. Temporary Controls
cc. General Electrical and Mechanical Requirements
dd. Transportation and Handling of Materials and Equipment
ee. Protection of Materials and Equipment
ff. General Construction Requirements
gg. Protection and Restoration of Structures
hh. Construction Waste Management
ii. Cleaning and Site Maintenance
jj. Activities pertaining to Spare Parts and Maintenance Materials
kk. Project Closeout
ll. Preliminary and Final Field Tests
mm. Equipment Start-up and Training
nn. Demobilization

15. Mechanical (Division 15)
a. High Density Polyethylene (HDPE) Pipe
b. Hangers and Supports
c. Piping Insulation

d. Valves Smaller than 4 Inches
e. Disinfection
f. Plumbing Equipment
g. Plumbing Fixtures

IV. CONTRACT CRO-624 E

A. E-LS-1 – Work Result

1. General Conditions (Division 01)
   a. Mobilization
   b. Temporary Power to Temporary Server Trailer
13. Special Construction (Division 13)
   a. Lightning Protection System
   b. Fire Detection and Alarm System
16. Electrical (Division 16)
   a. Electrical Conduit
   b. Underground Ducts – Ducts in Concrete
   c. Electrical Service Entrance
   d. Electric Motors
   e. Standby Power
   f. Electric Vehicle Charging Stations
   g. Dry Type Transformers
   h. Transfer Switches
   i. Panelboards
   j. Lighting Fixtures and Devises
   k. Outdoor Lighting
   l. Demobilization

B. E-LS-2 – General Contract Activities

1. Contractor's Superintendent per Article 5 of the General Conditions.
2. Surveys per Article 6 of the General Conditions.
3. Contractor's Daily Reports per Article 7 of the General Conditions.
4. Activities Pertaining to Multiple Contracts
5. Activities Pertaining to Payment and Measurement
6. Work Restrictions
7. Project Coordination and Meetings
8. Web-based Project Management Information System
9. Progress Schedule
10. Submittal Procedures
11. Final Record Documents
12. Records in Paper Formats
13. Records in Electronic Formats

14. Hazardous Materials Control
15. Environmental Health and Safety Requirements
16. Regulatory Requirements
17. Reference Standards
18. Approval of Product Manufacturers – Named or Equal
19. Contractor's Work Quality
20. Witness Shop Testing (not including travel)
21. Temporary Electrical System
22. Interim Electrical System
23. Temporary Field Office Trailers
24. Vehicular Access and Parking
25. Maintenance and Protection of Traffic
26. Temporary Barriers and Enclosures
27. Site Security
28. Temporary Controls
29. General Electrical and Mechanical Requirements
30. Transportation and Handling of Materials and Equipment
31. Protection of Materials and Equipment
32. General Construction Requirements
33. Protection and Restoration of Structures
34. Construction Waste Management
35. Cleaning and Site Maintenance
36. Activities pertaining to Spare Parts and Maintenance Materials
37. Project Closeout
38. Preliminary and Final Field Tests
39. Equipment Start-up and Training

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SECTION 01310
Project Coordination and Meetings

1.01 SECTION INCLUDES

A. Contractor Cooperation

B. Coordination Drawings

C. Final Coordination Drawings

D. Project Meetings

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

B. No compensation will be made by the City to any Contractor for installing or relocating any duct, pipe, conduit or other equipment or material without coordination among all the trades involved in a Contract or related Contracts. If any improperly coordinated Work necessitates additional Work by the other Contractors, the costs of such work shall be assessed to the Contractor responsible, as determined by the Engineer.

1.03 RELATED SECTIONS

A. Detailed Specification 01321 – Progress Schedule

B. Detailed Specification Section 01355 – Hazardous Materials Control

C. Detailed Specification Section 01356 – Environmental, Health and Safety Requirements

1.04 CONTRACTOR COOPERATION

A. The Contractor shall not interfere with DEP or its contractors, consultants, or agents from entering the Work Site for the purpose of constructing, operating, maintaining, removing, repairing, altering or replacin g such pipes, sewers, conduits, manholes, wires, poles, or other structures and appliances which may be required to be installed at or in the Work. The Contractor shall cooperate with all the aforesaid parties and shall allow reasonable provisions for the prosecution of any other work by the City, or others, to be done in connection with the Work, or in connection with normal use of the facilities.

B. The Contractor shall cooperate fully with the City, the Engineer, and any other contractors employed on the work, to effect proper coordination and progress to complete the project on schedule and in proper sequence. Insofar as possible, decisions of all kinds required from the Engineer shall be anticipated by the Contractor to provide ample time for inspection, or the preparation of instructions.

1.05 COORDINATION DRAWINGS

A. Coordination Drawings, including point-to-point field wiring diagrams, shall be completed by all Contractors, within 120 days from the date for the start of work given in the Notice to Proceed for the General, HVAC, Plumbing, and Electrical Contracts.

B. Coordination Drawings, including point-to-point field wiring diagrams, shall be initiated, completed and submitted for distribution so as not to delay the construction.

C. In addition to any reproducible prints required to be furnished or submitted, the Contractor shall submit CDs containing electronic AutoCAD (latest version) drawings. This shall also include all pertinent files relating to the drawings such that the drawings can be replicated or edited on any computer that uses AutoCAD (latest version).

D. The General Contractor shall initiate coordinating the installations of all the Contractors (HVAC, Electrical, Plumbing, and General) by means of Coordination Drawings, as specified herein. The Coordination Drawings may lack complete data in certain instances pending receipt of shop drawings, but sufficient space shall be allotted for the items affected. When final information is received, such data shall be promptly inserted on the Coordination Drawings.

E. The Electrical Contractor shall initiate coordinating the electrical installations of all the Contractors (General, HVAC, Plumbing, and Electrical) by means of the Point-to-Point Field Wiring Diagrams. In certain instances, these diagrams may lack complete data on all conduits and wiring pending receipt of shop drawings, but sufficient conduits and wiring shall be allocated for the items affected. When final information is received, such data shall be promptly inserted on the Point-to-Point Field Wiring Diagrams.

F. The General Contractor shall prepare a set of mylar transparencies, indicating equipment and appurtenances, at not less than 3/8-inch scale. The drawings shall also show beams, ceiling heights, walls, floor-to-floor dimensions, floors, partitions, columns, windows, doors and other major architectural and structural features as shown on the General Drawings. Site

coordination drawings shall be at not less than 1"=20' scale. Two sets of prints from the transparencies shall be furnished to the Engineer for review for conformance with the intent of this Section. Corrections, if required, shall be made to the transparencies.

G. The Electrical Contractor shall prepare a set of mylar transparencies indicating equipment and appurtenances requiring point-to-point wiring and conduit. Two sets of prints shall be furnished to the General Contractor for delivery to the Engineer for conformance review with the intent of the Coordination Drawing requirements. Corrections, if required, shall be made to the transparencies.

H. From this set of transparencies, including transparencies prepared by the Electrical Contractor, the General Contractor shall make four (4) sets of reproducible copies. The General Contractor shall deliver one set of the reproducible copies to each of the following: the HVAC Contractor, and the Electrical Contractor. Each of these Prime Contractors shall draw his work to scale on the set of transparencies furnished to him.

I. In preparation of all the Coordination Drawings, composite drawings, large-scale details as well as cross and longitudinal sections shall be made as required, or as directed by the Engineer, to fully delineate all conditions. Particular attention shall be given to the locations, size and clearance dimensions of equipment items, shafts, sleeves, and similar features. In preparing the Coordination Drawings, minor changes in duct, pipe or conduit routings that do not affect the intended function may be made as required to avoid space conflicts, when mutually agreed, but items may not be resized or exposed items relocated without the Engineer's approval. No changes shall be made in any wall or chase locations, ceiling heights, door swings or locations, windows or other openings, or other features affecting the function or aesthetic effect of the building. If conflicts or interferences cannot be satisfactorily resolved, the City shall be notified, and its decision obtained.

J. No preference or advantage shall be given to any Contractor in considering resolution of conflicts nor priority granted to any one Contractor in the allocation of space and point-to-point wiring. If the Contractors are unable to reach agreement on a matter of interference, the matter shall be submitted to the City for its binding decision. Should any problems of coordination require architectural or structural change of design, the change shall be submitted to the City for resolution. At the completion of this phase of the Coordination Drawings preparation, the Engineer shall hold coordination meetings with all Prime Contractors. At these meetings the work of each Prime will be overlaid on top of the mylars of the General Contractor in order to identify and to eliminate any interference among the trades that the

Drawings indicate and to avoid any conflicts during installation of the work. At these coordination meetings the work of the General, HVAC, and Electrical Contractors shall be transferred by the respective Contractors onto the mylar transparencies supplied by the General and Electrical Contractors.

K. At the completion of these meetings, and after the General and Electrical Contractors set of mylars has been coordinated and all necessary changes have been made, the Engineer will hold a final coordination meeting where these Drawings shall then be signed-off by each of the Contractors, indicating their awareness of, and agreement with, the indicated routings, layouts and wiring and their inter-relationship with the adjoining or contiguous work of all Contracts. Thereafter no unauthorized deviations will be permitted and if made without the knowledge or agreement of the Engineer or other affected Contractors, will be subject to removal and correction at no additional cost to the City.

1.06 PROJECT MEETINGS

A. The Contractor shall attend Project meetings, including but not limited to the following:

1. Preconstruction Meeting

a. Upon receipt of a copy of the Notice to Proceed, or at an earlier time if agreeable to the Contractor, the Engineer will arrange a preconstruction meeting. Attendees shall include: the Contractor's project representative authorized to act on behalf of the Contractor and to direct the performance of Work by the Contractor’s employees and agents; the Contractor's superintendent; major subcontractors; the Engineer; DEP representatives; and others involved in the execution of the Work.

b. The purpose of this meeting will be to establish a working relationship and understanding between the parties and to discuss project organization, job communications, construction schedule, submittals and processing, detailed estimate breakdown, payment procedures, Extra Work procedures, safety requirements, permits and inspections, and such other subjects as may be pertinent for the execution of the Work.

2. Monthly Status Meetings

a. Upon commencement of work at the Site or earlier as directed by the Engineer, the Contractor shall attend the project status meetings on a monthly basis (or as required by the Engineer). The Engineer will arrange and conduct these meetings and will prepare and circulate an agenda for each meeting. A representative of the Contractor approved by the Engineer shall attend these meetings.

b. The status of outstanding submittals will be reviewed to determine anticipated dates of any submittals yet to be provided, and the status of those submittals under review by DEP. The status and progress on resolving any outstanding requests for change orders. The status of any other items that could have a significant impact upon the course of the work will also be reviewed and discussed.

3. Monthly and CPM Progress Meetings: These meetings shall be carried out in accordance with Section 01321 – Progress Schedule.

4. EHS Coordination Meetings: These meetings shall be carried out in accordance with Section 01356 – Environmental, Health and Safety Requirements.

5. Special Coordination Meetings

a. During the course of performing the Work, attend special coordination meetings in advance of commencing certain work activities as specified or directed by the Engineer, including but not limited to the following:

i. Specific requirements for coordination meetings are included in Section 01355 – Hazardous Materials Control.

b. DEP will determine the need for additional special coordination meetings and convene such meetings with written notice to the Contractor.

c. The Contractor shall attend and participate in these special coordination meetings at no additional cost to the City.

PART 2 PRODUCTS

2.01 FINAL COORDINATION DRAWINGS

A. After the final Coordination Drawings have been agreed upon and signed by all Contractors, the General Contractor shall provide and distribute four

(4) copies to each of the Contractors and fifteen (15) copies to the Engineer, for reference and record purposes. Contractors desiring additional copies of such drawings, beyond the basic distribution indicated above, shall arrange and pay for cost of same.

B. The record copies of final Coordination Drawings shall be retained by each Contractor as a working reference. All working drawings, prior to their submittal to the Engineer, shall be compared with the Coordination Drawings and developed accordingly by the Contractor responsible. Any revisions to the Coordination Drawings which may become necessary during the progress of the work shall be noted by all Contractors and shall be neatly and accurately recorded on the record copies. Each Contractor shall be responsible for the up-to-date maintenance of his own record copies of the Coordination Drawings and to keep one copy available at the Site.

PART 3 EXECUTION

3.01 WORK ON COORDINATION DRAWINGS

A. All work on the Coordination Drawings shall be performed by competent drafters, in a clear, legible manner. The Engineer shall be the sole judge of the acceptability of the Coordination Drawings.

B. All changes in the work on any Contract, whether a change in price is given or not, shall be shown on the Coordination Drawings.

END OF SECTION

SECTION 01312
Web-based Project Management Information System

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for the Contractor's use of DEP's web-based Enterprise Project Management Information System ("EPMIS" or "the System") to manage all project communications, workflows and document submittals.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

B. There will be no licensing cost incurred by the Contractor. The DEP will determine and provide the appropriate number of user registrations to the Contractor to access and utilize the System.

1.03 RELATED SPECIFICATIONS

A. Detailed Specification 01321 – Progress Schedule

B. Detailed Specification 01330 – Submittal Procedures

C. Detailed Specification 01335 – Records in Electronic Formats.

1.04 DESCRIPTION

A. Use and Operation of the System:

1. The Contractor shall utilize EPMIS for electronic submittal of all data and documents throughout the duration of the Contract.

2. The System is required for use by all participants in the Project including DEP, the Construction Manager, Engineer, Contractor, and all other users authorized by DEP.

3. The System will operate primarily on an e-Builder, Inc. (www.e-builder.net) platform that will be administered by DEP and the Construction Manager. Joint use of the System will facilitate electronic exchange of information, automation of key processes, and overall management of the Contract.

4. The System shall be the primary means of Project information submission and management. When required by DEP or its representatives, paper documents shall also be provided.

B. User Access Limitations and Data Ownership

1. DEP, the Construction Manager and the Engineer will control access to the System by allowing access and assigning user profiles to authorized Contractor and Project personnel. User roles will define levels of access to the System, and determine assigned role-based authorizations and user privileges. Subcontractors and suppliers will be given access to the System through the Contractor. Entry of information exchanged and transferred between the Contractor and its Sub-contractors and suppliers through the System shall be the responsibility of the Contractor.

2. Secure username and password will be required for controlled access to the System for all authorized participants via a web URL address. The Contractor shall designate its staff to be granted access to the System.

3. Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the System) by DEP and its representatives and the Contractor will be owned by DEP.

C. Automated System Notification and Audit Log Tracking

1. Any review comments made (or the failure to make review comments) by DEP and its representatives on Contractor-submitted documentation shall not relieve the Contractor of responsibility for compliance with the requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. The City's acceptance through automated System notifications or audit logs extends only to the fact that the documentation was submitted and does not constitute substantive approval of the Contractor's submitted information.

D. Computer Requirements

1. The System will have a minimum bandwidth of 4MB/s download and 1MB/s upload. A faster connection is recommended (1.5MB per concurrent user should be used as a planning factor) and may be used, but uploading time considerations by the Contractor when uploading pictures and files to the System shall be based on the bandwidth defined herein.

2. Once implemented on the project, if the System does not meet its minimum performance standards, as listed below, the Contractor shall make the corrections necessary to its computers or network until the standards are met.

3. The required minimum PMIS performance standards, and the higher, recommended levels of performance, are as follows:

    a. File download speed

        i. One (1) second per MB of data recommended (e.g. one (1) 20MB file should download in less than 20 seconds)

        ii. Five (5) seconds per MB of data minimum (e.g. one (1) 20MB file must download in less than 100 seconds)

    b. File upload speed

        i. One (1) second per MB of data recommended (e.g. one (1) 20MB file should upload in less than 20 seconds)

        ii. Five (5) seconds per MB of data minimum (e.g. one (1) 20MB file must upload in less than 100 seconds)

4. The Contractor shall use computer hardware and software that meets the requirements of the System. Computers shall be less than three (3) years old. As recommendations are modified by the System provider, the System will be upgraded to meet those recommendations or better. Any need for upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract.

5. The Contractor shall ensure that its authorized System users have access to the public internet from a computer system running a currently supported Microsoft Windows operating system and Microsoft Internet Explorer web browser. The connection to the internet should be high speed (broadband) as described under "Computer Requirements," above. The Contractor shall ensure that anti-virus and anti-malware software is installed and maintained on all computers given access to PMIS.

E. Contractor Responsibilities

1. The Contractor shall be responsible for the validity of its information placed in the System and for the abilities of its personnel to use the System. Accepted users shall be knowledgeable in the use of computers, including internet browsers, email programs, CAD drawing applications, and Adobe portable document format (PDF) document conversion programs. The Contractor shall utilize the existing forms and processes in the System to the maximum extent possible. If an additional form is required that does not exist in the System, the Contractor shall

request approval to develop such form or for one (1) to be provided by DEP. Adobe PDF documents will be created through electronic conversion rather than optically scanned. The Contractor, in coordination with the construction manager, is responsible for the training of its personnel in the use of the System (beyond what is provided by DEP) and of the other programs indicated above, as needed.

2. DEP owns EPMIS, and will provide initial training and rollout services after Contract award. DEP will provide overall System administration during the Contract period. The Construction Manager will have a System administrator for the project with limited System administration support responsibilities, including ongoing training of the Contractor team.

3. The Contractor shall provide a list of its key personnel designated for access to the System for the City's approval. The Contractor is responsible for timely notifying the City and the Engineer of any changes in personnel that require adding or removing authorized users from the System. DEP reserves the right to perform a security check on all potential users. The Contractor may be given the rights to provide System access to additional personnel or subcontractors.

4. The System user license fees will be paid by DEP.

F. Connectivity

1. PMIS is a web-based environment and therefore subject to the inherent speed and connectivity problems of the internet. The Contractor is responsible for its own connectivity to the Internet. The System's response time is dependent on the equipment used to access it, including processor speed, internet access speed, etc. and current traffic on the internet. The City will not be liable for damages resulting from any delays associated with the use of the System including, but not limited to: slow response time, downtime periods, connectivity problems, or loss of information. Moreover, such delay shall not be deemed a sufficient basis for a time extension of or cost adjustment to the Contract.

G. Training

1. DEP, through the System vendor or the System vendor's qualified representative, will provide on-site training in the use and functionality of the System. Training sessions will be provided for employees of the Construction Manager, Engineer, the City, and the Contractor. Each training session will be for a duration of eight (8) hours. The Contractor shall have two (2) qualified persons attend the

training. One (1) refresher training session will be provided upon request.

1.05 QUALITY ASSURANCE

A. All Contractor representatives participating in workflows and PMIS processes (e.g. RFIs, submittals, Non Conformance Reports, etc.) shall have a minimum of three (3) years of experience in the use of Microsoft Word, Excel, and Internet Explorer. The Contractor's Document Control Specialist shall be experienced and trained in the use of entering and monitoring documentation into a web-based document management system, e.g., e-Builder, Meridian Prolog, Oracle-Primavera Contract Manager, or an equivalent system. The Document Control Specialist shall be knowledgeable of the status of all Contract documentation aspects of the work throughout the term of the Contract.

1.06 SUBMITTALS

A. Within thirty (30) days of issuance of the Notice to Proceed (NTP), the Contractor shall submit for approval by the Engineer a list of the Contractor's and its Subcontractors' key personnel who have been designated to have access to the System. The list shall include descriptions of the designated individual's roles and responsibilities for this Project. The Contractor should also identify its organization's System administrator on the list.

B. The Contractor shall submit the name and qualifications of its designated Document Control Specialist. Any change in the individual serving as Document Control Specialist shall be submitted to and coordinated with the Construction Manager.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SYSTEM UTILIZATION

A. The System shall be utilized in connection with all submittal preparation and information management required under this Contract. Requirements contained in this Article are in addition to the applicable submittal and documentation requirements of other Sections of the Specifications, including without limitation, Detailed Specification 01330 – Submittal Procedures and Detailed Specification 01335 – Records in Electronic Formats.

B. All submittals detailed in design drawings and related specifications shall be submitted by the Contractor as CAD files (in .dwg format) and PDF files through the System submittal workflow process.

C. Shop drawing and design data documents shall be submitted as CAD files (in .dwg format) and PDF files through the System submittal work flow process. Examples of shop drawings include, but are not limited to:

1. Standard manufacturers' installation drawings;
2. Drawings prepared to illustrate portions of the Work designed or developed by the Contractor;
3. Steel fabrication, piece, and erection drawings.

D. Product catalog data and manufacturers' instructions shall be submitted as PDF files through the System submittal workflow process. The PDF files should be the original, searchable PDF files from the manufacturer and not scanned files which are not searchable. Examples of product data include, but are not limited to:

1. Manufacturers' printed literature;
2. Preprinted product specification data and installation instructions.

E. All correspondence and pre-construction administrative submittals shall be submitted using the System. Examples of administrative submittals include, but are not limited to the following:

1. Digging permits and notices for excavation;
2. Requests for Deviation (RFDs) for product substitutions;
3. List of contact personnel;
4. Notices for roadway interruption, Work outside regular hours, and utility cut overs;
5. Requests for Information (RFIs);
6. Network Analysis Schedules and associated reports and updates;
7. Each schedule submittal specified in Detailed Specification 01321 – Progress Schedule shall be submitted as a native backed-up file (.PRX or XER) of the scheduling program being used. The schedule will also be posted as a PDF file in the format specified in Detailed Specification 01321 – Progress Schedule.
8. Plans for safety, demolition, environmental protection, and similar activities;
9. Quality control plan(s), testing plan and log, quality control reports, production reports, quality control specialist reports, preparatory

phase checklist, initial phase checklist, field test reports, summary reports, rework items list, etc.;

10. Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.;

11. Any general correspondence submitted.

F. Compliance submittals such as test reports, certificates, and manufacturer's field report submittals shall be submitted through the System as PDF attachments. Examples of compliance submittals include, but are not limited to:

1. Field test reports;

2. Quality control certifications;

3. Manufacturers' documentation and certifications for quality of products and materials provided.

G. Record submittals such as operation and maintenance data and closeout submittals shall be submitted through the System as PDF documents during the approval and review stage as specified, with a hard copy (paper) set of documents submitted for final. Examples of record submittals include, but are not limited to:

1. Operation and maintenance manuals: final documents shall be submitted as specified;

2. As-Built Drawings: final documents shall be submitted as specified;

3. Extra materials, spare stock, etc.: submittal forms shall indicate when actual materials are to be submitted;

H. Financial submittals such as schedule of value, pay estimates and change order request proposals shall be submitted through the System. Supporting material for pay estimates and change order requests shall be submitted through the System as PDF attachments. Upon acceptance of corrected "pencil copies" of payment estimates, hard copies shall be submitted for processing. Examples of financial submittals include, but are not limited to, the following:

1. Contractor's schedule of values;

2. Contractor's monthly progress payment requests

3. Contract change order proposals requested by the City.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01321
Progress Schedule

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. CPM and Project Schedule Software
2. Work Breakdown Structure (WBS)
3. Activities and Activity Code Structure
4. Sequence and Interdependence of Work Activities
5. Project Calendars
6. Activity Labor and Resource Data
7. CPM Progress Meeting and Reports
8. Remedial Measures and Recovery Schedule

B. For convenience, an index of this Section is presented below:

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 DEFINITIONS

A. For the purposes of this Specification, the following terms shall have the meanings assigned to them in the table below.

Term	**Definition**
Activity	A representation of a discrete portion of the overall scope of Work or an event through Duration and description.
Baseline Construction Schedule	The planned, detailed Critical Path Method (CPM) schedule of activities, including all Logic, Durations, Resource and Cost Loading, and showing the entire scope of Work, which has been accepted by DEP.
Critical Path Method (CPM)	A management technique used to plan and control a project which combines all relevant information into a single plan defining the sequence and Duration of operations, and depicting the interrelationship of the Work elements required to complete the project. The critical path is defined as the longest sequence of activities in a network which establishes the minimum length of time for accomplishment of the end event of the project.
Current Construction Schedule	The most recently updated schedule that captures progress to date and forecasts the Early Start/Early Finish for each Activity and the remaining cash flow, depicted with the open bar chart activity line with corresponding schedule dates shown.
Data Date	The date used as a starting point for scheduling calculations. The Data Date is changed to the current end of period date when a schedule is updated for progress.
Duration	The amount of time, in workdays, an Activity will take to perform once begun and continuously performed until complete.

Term	**Definition**
Early Finish	The earliest estimated date an Activity is calculated to be complete, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Early Start	The earliest estimated date an Activity is calculated to begin, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Float	The calculated amount of time that the estimated start or finish of an Activity can be delayed without impacting the start or finish of other downstream Activities logically connected in a progressive relationship.
Fragmentary Network (Fragnet)	A portion of the project schedule detailing impacts of an event on specific Activities in the broader schedule.
Late Finish	An estimate of the latest plausible date an Activity's completion can be postponed until without rendering as unachievable the required completion of any downstream milestones to which the Activity is Logically connected to in a progressive relationship.
Late Start	An estimate of the latest plausible date an Activity's start can be postponed until without rendering as unachievable the required completion of any downstream milestones to which the Activity is Logically connected to in a progressive relationship.
Logic	A direct progressive relationship between Activities where one Activity's performance restricts the performance of another Activity
Original Duration	The estimated amount of time, in workdays, an Activity is expected to take to complete at the beginning of a project as anticipated by the Contractor based on its planned means and methods at time of bid and documented in the Baseline Construction Schedule.
Percent Complete	The percentage of the scope of Work represented by an Activity completed as of the Data Date calculated by dividing the progress earned by the budgeted value.

Term	**Definition**
Remaining Duration	The amount of time, in workdays, the remaining scope of Work represented by an Activity is expected to take to complete at the current Data Date
Resource and Cost Loading	Values assigned for estimated manpower, equipment and/or materials necessary to complete the scope of Work represented by a specific Activity.
Total Float	The amount of time the start or finish of an Activity can be delayed without affecting the project completion date.
Work Breakdown Structure (WBS)	A deliverable-oriented decomposition of a project into smaller components which provides the necessary framework for detailed cost estimating and control, along with guidance for schedule development and control.

1.04 CPM & PROJECT SCHEDULE SOFTWARE

A. The CPM type construction schedule will be used to monitor Contract progress. The Contractor shall be responsible for providing all information concerning the sequencing, Logic and Duration of all Activities as well as providing the electronic schedule file produced in the Primavera Project Management (.xer) format. Once the initial Baseline Construction Schedule is accepted by the Engineer, the Structures and Equipment Contractor shall be responsible for preparing and submitting monthly update information regarding schedule Logic, physical Percent Complete, actual start and finish dates, Duration changes, added and deleted Activities, change orders and related reports and schedules, including the updated Primavera Project Management (.xer) format electronic file.

1.05 WORK BREAKDOWN STRUCTURE (WBS)

A. The WBS depicted in Exhibit 1, attached to this Section, reflects the minimum structure needed for reporting and the Contractor is expected to define and add additional lower levels as needed.

1.06 ACTIVITIES

A. Activities included in the CPM schedule shall be of sufficient detail to assure adequate planning and execution of the Work, such that, in the judgment of the Engineer, it provides an appropriate basis for forecasting, monitoring and evaluating the progress of the Work.

1. Activities shall conform to the following requirements:

a. Subdivide the total scope of Contract Work into Activities of Duration no longer than twenty working days each, except as to non-construction activities (such as purchase of materials, delivery of materials, delivery of equipment and concrete curing) and any other Activities for which the Engineer may approve longer Duration. The Duration of the Activities representing the Engineer's approval of items such as shop drawing submittals, drawing submittals, requests for manufacturer approval, requests for Subcontractor approval, etc. shall not be less than twenty calendar days but may be longer if the detail and complexity of the submittal warrant.

b. The construction time as determined by the CPM schedule from Early Start to Late Finish for any sub-phase, phase or the entire project shall not exceed the Contract time specified or shown in the Contract Documents.

c. One day shall be the smallest time unit shown unless otherwise directed by the Engineer.

d. Activity descriptions shall contain consistent terminology such that the scope of Work represented is readily identifiable for assessment of completion.

e. Activities labeled "start," "continue," or "complete," will not be allowed. Lead and lags will be acceptable only if the description accurately identifies such a restraint and if they are realistic with respect to the scheduling and sequencing of the Work and overall control of the project.

f. Show the following on each Activity, as directed by the Engineer:

   i. Activity number consistent with Engineer's provided template and in accordance with Exhibit 2, attached to this Section;

   ii. Complete (self-explanatory) description of the Work represented by the Activity stated in a verb, noun, and location format.

   iii. Duration in days and number of shifts;

   iv. Labor hours required to accomplish scope represented by the Activities. Labor hours are to include all direct labor, by trade, required for Activities representing construction.

   v. Physical quantity of material to be installed (cubic yard of concrete, linear feet of pipe, etc.) for items directed by the Engineer and in accordance with this Section.

vi. Other Activity coding as directed by the Engineer to define the Activity's scope, constraints, responsibility or other requirements.

vii. Completed coding and organization of data and schedule information in accordance with the Activity Code Structure requirements provided in this Section and approved by the Engineer.

B. All Activities, with the exception of the Notice to Proceed (NTP) and Substantial Completion, shall have a predecessor and successor. No open-ended Activities will be permitted.

C. The construction schedule shall contain Activities representing contractual and non-contractual milestones as designated by the Engineer and detailed in Exhibit 3, attached to this Section.

1.07 ACTIVITY CODE STRUCTURE

A. Activity codes proposed for scheduling Work progress under the Contract are shown in Exhibit 4**,** attached to this Section.

B. Activity codes should be defined as project Activity codes, not global Activity codes.

C. The Contractor shall break the Work into Activities in accordance with the specified coding structure and in accordance with the Contract Drawings and Specifications. The selection of Activities and the coding structure shall be subject to review and acceptance by the Engineer.

D. The coding shall follow the designation conventions outlined above and shall include identification of subcontractors, suppliers/vendors and fabricators, and other parties reporting to the Contractor.

1. The Contractor is required to develop other Activity codes and values needed to comply with the reporting requirements listed in this Section, subject to acceptance by the Engineer.

E. The Engineer will provide the Contractor with a system of identification numbers that shall be used for CPM schedule numbering system and project coding. Additional coding required by the Contractor may be added to the network to supplement that supplied by the Engineer.

F. Activity IDs will conform to the format detailed in Exhibit 2, attached to this Section, or as directed by the Engineer.

1.08 SEQUENCE AND INTERDEPENDENCE OF WORK ACTIVITIES

A. The CPM schedule shall indicate the Logic of Activities. It shall include, but not be limited to, the following items as appropriate to the Contract:

1. Contractor working drawing preparation and review by the Engineer;

2. Materials, Equipment, and Systems:
    a. Vendor submittal/approval;
    b. Shop drawing submittal/approval;
    c. Release for fabrication;
    d. Fabrication period;
    e. Witness shop test;
    f. Delivery;
    g. Installation;
    h. Preliminary test;
    i. Final test;
    j. Operation and Maintenance (O&M) manuals submittal/approval;
    k. Equipment training plans and procedures submittal/approval;
    l. Equipment training;
    m. Systems training plans and procedures submittal/approval;
    n. Systems training.
3. Shop and field performance tests and supervisory service Activities;
4. Mobilization and move-in;
5. Preparing and coordinating drawings;
6. Obtaining all required permits;
7. Inspections;
8. Specific Work activities, such as, but not limited to:
    a. Sitework;
    b. Underground piping;
    c. Electrical ductbanks;
    d. Structural excavation;
    e. Soil testing;
    f. Backfill;
    g. Placement of sheeting;
    h. Pile driving;
    i. Formwork erection;
    j. Rebar placement;

k. Placing of concrete;

l. Stripping forms;

m. Concrete curing;

n. Installation of process piping and valves;

o. Electrical conduits and wiring;

p. Instrumentation and controls conduits and wiring;

q. Terminations;

r. Maintenance and exercising activities;

s. Other materials and plant equipment;

t. Cleanup.

9. Construction of all facilities outlined in the Contract Documents;

10. Subcontractors' items of Work;

11. Time allowance for inclement weather per National Oceanographic and Atmospheric Administration (NOAA) information for local area;

12. Delivery, installation, and check-out/testing of City-supplied equipment;

13. Punch lists;

14. Final cleanup;

15. Time allowance for checkout and startup;

16. Contract coordination with Other Contractors, substantial completion and final completion dates and maintenance of existing operations;

17. Indicate all coordination activities from related construction contracts;

18. Interruption and shut down requests of plant utilities to allow for new connections;

19. Connection to all existing plant systems and equipment;

20. Preparation of final copies of Contractor working drawings;

21. Specific information required by or from the Engineer;

22. All temporary utilities and construction;

23. Required inspections by the Contractor or Engineer;

24. Submittal of Contract record drawings at project completion, or as directed by the Engineer.

1.09 PROJECT CALENDARS

A. All Activities should have a project calendar assigned, not a global calendar. This allows the calendars to easily travel with the Project when exported and more importantly, when imported.

B. Each calendar should also identify all other days considered non-work days, including but not limited to observed holidays.

C. Each calendar should be adjusted for months beginning in the year of NTP and lasting three years beyond the Contract completion date.

D. Each calendar should be named using the format "@-### _X", where "@-### _" represents the project and X summarizes the nature of the calendar. Typically, the number of days per week and number of shifts per day are included as the balance of the description. See examples in Exhibit 5, attached to this Section.

1.10 ACTIVITY LABOR AND RESOURCE DATA

A. The Contractor shall accurately labor load by craft or trade all Activities requiring direct field labor. All labor loading shall be in hours. At the direction of the Engineer, and at no additional cost to the City, the Contractor may be required to include additional resource loading, such as, but not limited to, major pieces of construction equipment, in order to track major critical Activities and measure progress.

B. When required by the Engineer, and at no additional cost to the City, the Contractor shall accurately quantity load specific Activities or groups of Activities. The quantity amount shall equal the total quantity to be installed for each specific Activity. Quantity loading may be required for major Activities with Durations dependent on daily production, such as mass excavation (cubic yards), piling (linear feet of piles), concrete formwork (square feet of forms), concrete pours (cubic yards of concrete), piping installation (linear feet of pipe), electrical duct banks (linear feet), electrical conduit and wire (linear feet), and terminations (number of terminations).

C. All resource loading shall be coded to the Contract identifier under a "root." Since resource loading cannot be project-specific, this root heading is needed to keep the database segregated.

1.11 QUALITY ASSURANCE

A. The, Contractor shall retain a CPM scheduling consultant, or utilize its own qualified CPM scheduler in lieu of a CPM consultant, to develop and maintain the update of the CPM schedule plan for the Work for the duration of the Contract. This consultant, along with the Contractor, is expected to work closely with the Engineer to deliver acceptable work products as outlined in this Section. The purpose of this Section is to expand and further clarify the requirements for the CPM schedule under Article 9 of the Standard Construction Contract.

B. The Contractor must submit qualifications of the proposed CPM scheduler must be submitted for review and approval within seven days of the NTP.

1. The Contractor may submit to the Engineer for approval a written request to provide its own qualified CPM scheduler or a CPM consultant. In the case of a Contractor's scheduler, the Contractor is responsible for performing all Work described in this Section as being performed by the CPM consultant.

2. If, after approval, the Engineer determines that the Contractor's CPM scheduler or CPM scheduling consultant is unable to adequately perform the CPM requirements of this Specification, the Engineer will require the Contractor to provide a new qualified CPM consultant at no additional cost to the City.

C. Upon issuance of the NTP, the Contractor shall meet with its CPM scheduling consultant at least weekly for the purpose of developing the information required by this Section. These meetings will continue until a minimum status of "Accepted" has been achieved on the Baseline Construction Schedule.

D. The Contractor will be responsible for coordinating its scheduling of Activities with the CPM scheduling consultant. If, in the judgment of the Engineer, the Contractor is deemed uncooperative in providing the required information to the CPM scheduling consultant necessary to develop the preliminary CPM, Baseline Schedule, or monthly schedule updates, then the Engineer may withhold partial payments or a portion thereof.

E. The monthly CPM schedule update payment item for any specific month will not be earned until the Contractor submits the required monthly CPM progress schedule. In the event the Contractor fails to submit a monthly CPM progress schedule and the Engineer determines that the Contractor is the cause for the delay in submitting the monthly update or update information per Monthly Progress Meeting and Reports described herein, liquidated damages will be assessed against the Contractor in the amount fixed in Schedule A of the General Conditions. The Contractor shall be notified within one week of said delinquency that the liquidated damages are being assessed against its Contract.

F. Monthly Progress Meeting and Reports, including the use of Contractor Daily Quality Control Reports, shall be used as the basis for updating progress schedules.

1.12 SUBMITTALS

A. The qualifications of the CPM consultant shall be submitted to the Engineer for approval within seven (7) calendar days after the NTP. The Engineer will respond to the submittal within seven (7) calendar days of submittal receipt.

B. The preliminary CPM Schedule shall be submitted **fifteen (15) calendar days** after NTP in accordance with Article 9 of the Standard Construction Contract and this Section. The preliminary CPM Schedule shall include:

1. All critical mobilization, Project set-up, procurement, and construction activities in each of the major Work areas required during the first 180 calendar days of Contract time after the NTP, including submittals and permitting;

2. The balance of the Work depicted in summary activities by MLS (milestone), AREA (area), SYS (system) and RESP (responsibility). (See Activity Code Structures for MLS, AREA, SYS and RESP in Exhibit 1 of this Section);

3. All submittal and procurement activities for long lead items necessary to meet all Project milestones;

4. The Project's overall critical path and each milestone's critical path.

5. An electronic copy of the schedule in Primavera Project Planner (.xer) format.

C. Within fourteen (14) calendar days after submittal of the preliminary CPM Schedule, the Engineer will notify the Contractor of the acceptance, rejection, or acceptance with comments of the preliminary CPM Schedule. If the preliminary CPM Schedule has been rejected, or accepted with comments, the Contractor shall address all comments and re-submit within 14 calendar days for review. The submittal process shall continue until the Engineer accepts the preliminary CPM schedule with no comments.

D. The final, complete and detailed CPM Schedule required for submittal under this Section shall be composed of two parts, with each part due as follows:

1. Part 1 -- Logic and Duration Schedule is due within **sixty (60)** calendar days after NTP.

   a. Submit an electronic copy of the schedule in Primavera Project Planner (.xer) format, schedule reports, and the narrative report as specified in this Section.

   b. This schedule is at the final level of detail for each Activity, containing the required relationships completely identified and the Duration of each Activity correctly depicted and coded in accordance with this Section.

   c. This Baseline Construction Schedule shall identify all Contract milestones.

      i. If the schedule reflects completion of a milestone or completion of Contract Work earlier than specified in the General Conditions, this in no way revises or

voids the dates set forth in the Contract. The dates specified in the Contract govern.

ii. Where the schedule reflects such an early completion date, and the schedule is accepted by the Engineer, the Contractor shall have no claim against the City for additional Contract time or an increase in the Contract price if the Contractor fails to complete the Work by the early completion date shown on the schedule.

d. This schedule shall show the overall schedule requirements as set forth in Schedule "A" of the General Conditions being met.

i. This detailed CPM Schedule shall not reflect any Contract changes or delays that may have occurred during the interim schedule development period.

ii. Any such changes and all progress through the time of Baseline Schedule acceptance will be entered at the first update after the schedule has been accepted.

2. Part 2 - Resource and Cost Loaded Schedule

a. At the direction of the Engineer and at no additional cost to the City, a Resource and Cost Loaded Schedule is due within **30 calendar days** after acceptance of the Logic and Duration Schedule.

b. Submit an electronic copy of the schedule in Primavera Project Planner (.xer) format, schedule reports and other reports as specified in this Section.

c. Each Activity shall be resource and cost loaded to permit initial and monthly generation of a resource and cost curve and to assess the progress of the Work.

d. Cost loading of the schedule is required on a summary level and is not required to the Activity level. The intent of the cost loading is to facilitate forecasting, tracking, and reporting of overall cash flow by major work areas or systems, and Specifications. The summary level cost loading requirements will be determined and agreed to by the Engineer during the development of the project-specific schedule coding developed for the Baseline Logic and Duration Schedule and used to track the construction progress.

E. Once the Logic and Duration Schedule is accepted by the Engineer, it shall become the basis for future updates until acceptance of the Resource and Cost Loaded Schedule. The Resource and Cost Loaded Schedule, once accepted, may only contain changes to the Logic and Duration Baseline that are necessitated by

resource issues identified during the preparation of the Resource and Cost Loaded Schedule.

F. Once the Resource and Cost Loaded Schedule is accepted, it shall become the Baseline Schedule of record and the basis for future updates. All subsequent monthly updates shall be compared to the Baseline Schedule. In addition, each current monthly update shall be compared to the last accepted update. Each update shall be labeled by period with the Data Date and report date identified on the hard copy and electronic file label.

G. After the acceptance of the Baseline Schedule in accordance with this Section, no changes shall be made to Logic, Duration, or description of Activities therein without acceptance by the Engineer.

H. The Contractor shall have no claim for damages by reason of the failure of the Engineer to give timely acceptance or comments on any progress schedule under this Section.

I. The monthly update schedule submittal to the Engineer shall include the following:

1. An electronic copy of the schedule in Primavera Project Planner (.xer) format, with Data Date and monthly period clearly marked.

2. Electronic (.pdf) format copy of the CPM computer printouts in bar chart form, including:

   a. A comparison of the Baseline Schedule Activities against current update Activities organized and summarized by milestone, AREA, and DIV according to the requirements for Activity codes in this Section, or as otherwise directed by the Engineer. Each Activity shall have two bars with different colors (one showing the current schedule and one showing the Baseline Schedule).

   b. A comparison of current Activities against the prior month's Activities organized and summarized by milestone, AREA, and DIV according to the requirements for Activity codes in this Section, or as otherwise directed by the Engineer. Each Activity summary shall have two bars with different colors (one showing the current schedule and one showing the prior month's update schedule).

   c. A clear presentation of the specific detailed Activities making up the critical path(s) for the Project and for each milestone.

3. Electronic (.pdf) format copy of the Narrative Report as outlined in this Section.

J. Comments made by the Engineer on the initial and monthly updated Current Construction Schedule will not relieve the Contractor from compliance with

the requirements of the Contract Documents. This review is only for general conformance with the schedule concept of the Project and general compliance with the information given in the Contract Documents.

1.13 NARRATIVE REPORTS

A. Schedule Basis Narrative shall be submitted to the Engineer with each Baseline Schedule submittal to memorialize assumptions made in development of the schedule and shall include the following:

1. A description of scope of the Project and how the Work is represented in the schedule Activities;
2. A description of the overall sequence of major components of Work;
3. Planned work week;
4. Description of the critical path in the proposed Work plan;
5. Basis of Activity Durations;
6. How weather will be accommodated in the schedule;
7. How, regulatory, operational or third party constraints are accommodated in the schedule;
8. Description of key Project coordination points or events;
9. Discussion of long lead items and basis of time frames for submittals;
10. Description of anticipated means and methods for large quantity production Activities;
11. Potential opportunities and risks and quantify the schedule reduction or expansion; and
12. Assumptions/exclusions made in the schedule.

B. Update Narrative Report shall be submitted to the Engineer each month with the monthly update submission, and shall include the following:

1. The Contractor's transmittal letter;
2. Contract complete date status by milestone:
    a. Ahead of schedule and number of calendar days;
    b. Behind schedule and number of calendar days;
    c. Calendar days lost/gained compared with the previous update.
3. Schedule change report organized by milestone and area listing each Activity in the CPM schedule that has been/ will be:
    a. Completed during this reporting period;
    b. In progress during this reporting period;

c. Scheduled to be performed during the next reporting period.

4. Analysis, organized by milestone and area, of the critical and near critical path(s) describing:
   a. The nature of the critical/near critical path;
   b. Impact on other Activities, milestones and completion dates;
   c. Risks and opportunities impacting the critical/near critical paths.
5. List of current and anticipated delays by milestone:
   a. Cause of the delay;
   b. Corrective actions and schedule adjustments to correct the delay;
   c. Impact of the delay on other Activities, milestones and completion dates;
   d. Weather delays – when applicable, the Contractor shall describe how the impacts of weather conditions and constraints were absorbed and accounted for in the schedule and documentation showing they were beyond normal for the area or those provided for in the baseline.
6. Changes in Activity description, Logic, or Duration shall be grouped and organized in the report in a manner that communicates in detail the rationale associated with each change and the impact upon construction sequence, relationships and the critical path.
7. Added/deleted Activities and the rationale associated with each action;
8. Pending issues and status of other items:
   a. Permits;
   b. Contract modifications;
   c. Change orders;
   d. Long lead procurement items;
   e. Other.
9. Out of Sequence Report describing the necessity of each Activity relationship shown therein, as described within this Section;
10. Illogical Progress/Restraint Reports (if any);
11. Other Project or scheduling concerns;

12. Electronic copy of the latest CPM schedule update file in Primavera (.xer) format;

13. Primavera scheduling error report.

1.14 CPM PROGRESS MEETING AND REPORTS

A. A CPM Progress Meeting will be held monthly, on a date established by the Engineer, at which time the schedule will be reviewed. The meeting shall be attended by the Engineer, and representative(s) of the Contractor to include the scheduling consultant. The Contractor's representative(s) at the meetings shall have the competence and authority to make any necessary decisions on behalf of the Contractor and their statements shall commit the Contractor to the procedures, sequencing of Work, coordination and time schedules that were agreed upon during the meeting.

B. Prior to the monthly CPM Meeting, the CPM scheduling consultant shall obtain, through any required means including Site meetings, the necessary information to update the CPM schedule to reflect progress to date and to update/revise the schedule (plan) of the Work for the balance of the Project. The updated schedule and draft narrative report shall be furnished to the Engineer at least 48 hours prior to the meeting and be distributed by the Contractor in hard copy at the meeting for review.

To update the CPM schedule, the Contractor shall:

1. Enter actual start and completion dates for those Activities started and/or completed during the previous reporting period;

2. For Activities in progress, indicate the Remaining Duration correlating to an accurate forecasted completion date and physical percentage complete to date (Percent Complete is to reflect the actual quantity of Work completed, and is separate from any actual or Remaining Duration calculation). review, and revise as necessary, the network Logic for the Remaining Duration of the Work from the update to the estimated completion date;

3. For Activities not yet started, review, and revise as required, the necessary Logic, the Durations of Work and the estimated start and completion dates;

4. Enter, for each applicable Activity, actual installed quantities information;

5. For identified construction change requests, Extra Work or change orders, add the appropriate detailed schedule Activities upon submittal of Form 1 for changes in the Work. The change order review and registration Fragnet will be provided by the Engineer and shall include the following Activities in sequence:

   a. Submittal of Form 1 on the actual date submitted;

b. Contractor pricing of the identified change subsequent to submittal of Form 1;

c. Pricing negotiations;

d. Comptroller review and registration, followed by;

e. Detailed submittal and construction Activities with correct Activity coding, as specified within this Section.

C. The total Duration to be initially added to any schedule update reflecting the Activities from submittal of Form 1 to the registration of any specific change order, shall be in accordance with the Fragnet provided by the Engineer and shall be incorporated into the monthly schedule update following the submittal of Form 1 for the change in Work. The forecasted construction Activities shall be Logically tied to the appropriate predecessor and successor base Contract Activities and contain all of the required Logic, Duration, and Resource Loading specified for the detailed CPM schedule Activities.

D. In the event the Contractor begins performance in the field of identified Extra Work during the update period, the monthly progress schedule update shall reflect the actual start date of the Work, and any predecessor Logic ties or restraints shall be broken in order to accurately forecast completion of the identified Extra Work Activity. This will allow for accurate forecasting of the successor Work Activities and completion milestones.

1. Annotate updated status information on the CPM schedule update in a manner that will graphically depict the current status of the Work;

2. Should discrepancies regarding data/information accuracy be noted during the review meeting or other discussions, the Engineer may direct the Contractor to adjust the percentage completion, Remaining Duration and actual dates to selected activities and re-issue the updated schedule and reports.

E. Default progress data provided from the scheduling system shall not be allowed. Actual start and finish dates and Remaining Durations of Activities shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual start and finish dates on the CPM schedule shall match those dates provided from the Contractor's Daily Quality Control Reports. Failure of the Contractor to document the actual start and finish dates on the Contractor Daily Quality Control Report for every in-progress or completed Activity, and to ensure that the data contained on the Contractor Daily Quality Control Reports is the sole basis for schedule updating, shall result in the disapproval of the Contractor's submittal.

F. Activities that have reported progress without predecessor Activities being completed (out-of-sequence progress) will not be allowed except on a case-by-case basis with the approval of the Engineer. A written explanation for each instance shall be included in the monthly submittal.

G. The Contractor shall not constrain the schedule with artificial Logic ties and or constraint dates and or any other scheduling techniques that may distort the Activity Float and Total Float associated with the critical path Activities and the schedule in general.

H. In addition to the requirements of the General Conditions, the Contractor shall submit monthly the proposed correlated sequence and estimated dates for submission, approval and final submission activities for the following:

1. Working drawings submittals;
2. Equipment operation and maintenance manuals submittals;
3. Witness shop tests;
4. Delivery of materials and equipment to Site;
5. Final field tests;
6. Special tools and lubricant deliveries;
7. Spare part deliveries;
8. Instructional services;
9. Permits;
10. Final record documents;
11. Startup and commissioning/testing;
12. Piping and equipment identification.

I. The above information shall be presented in an organized tabular format, showing for each submittal item, organized by item:

1. Submission date (actual or forecast);
2. Approval date (actual or forecast);
3. Final submissions (actual or forecast);
4. Comments (actual or forecast).

J. Equipment/material procurement information shall be presented in an organized tabular format, showing for each item, organized by item:

1. Drawing submittal date (actual or forecast);
2. Drawing approval date (actual or forecast);
3. Release for fabrication date (actual or forecast);
4. Witness shop test date (actual or forecast);
5. Delivery date (actual or forecast).

1.15 REMEDIAL MEASURES AND RECOVERY SCHEDULE

A. Delays to the Critical Path – Whenever it becomes apparent from the monthly CPM schedule update that delays to the critical path have occurred

due to action or inaction of the Contractor, and as a result the Contract completion date will not be met, the Contractor shall take some or all of the following actions at no additional cost to the City, in addition to and apart from the other requirements of this Section, as directed by the Engineer:

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.
2. Increase the number of working hours per shift, shifts per day, or working days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.
3. Reschedule Activities to achieve maximum practical concurrence of accomplishment of Activities, and comply with the revised schedule.
4. Submit to the Engineer for review a written statement of the steps the Contractor intends to take to remove or arrest the delay to the schedule. The Contractor shall promptly provide the necessary level of effort to bring the Work back on schedule.

B. The Engineer may require the Contractor to add to its equipment and materials or construction forces, as well as increase the working hours, if operations for critical, less critical or non-critical Activities fall behind the Contractor's Baseline Schedule at any time during the construction period.

C. The Engineer may require the Contractor, at any time during the Project and at no additional cost to the City, to develop a more detailed schedule/Fragnet than depicted in the detailed Baseline Schedule to provide a clearer understanding of the effort needed to complete a specific area of Work or task.

D. Should the Contractor fall behind schedule, the Engineer may require the Contractor to prepare a recovery schedule for the Engineer’s review and acceptance. The recovery schedule shall propose alternative methods, overtime, and other means available to the Contractor to recover the schedule slippage incurred to date.

1.16 ATTACHMENTS

A. Exhibit 1 - Work Breakdown Structure

B. Exhibit 2 - Activity ID Format

C. Exhibit 3 – Schedule Milestones

D. Exhibit 4 – Proposed Activity Codes

E. Exhibit 5 – Project Calendars

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

EXHIBIT 1 -- WORK BREAKDOWN STRUCTURE

WBS Code	WBS Name
CRO-624	**CRO-624 – Reconstruction of Kensico Lab as EOH Headquarters**
CRO-624.CO	Reconstruction of Kensico Lab as EOH Headquarters - Contract
CRO-624.CO.CO	Reconstruction of Kensico Lab as EOH Headquarters Construction
CRO-624.CO.CO.EOHB	East of Hudson Headquarters Building
CRO-624.CO.CO.EOHB.DEM	Demolition
CRO-624.CO.CO. EOHB.DEM.HMT	Hazardous Material Abatement
CRO-624.CO.CO.EOHB.STE	Site Work
CRO-624.CO.CO.EOHB.STE.LND	Landscaping
CRO-624.CO.CO.EOHB.OFF	Office Space
CRO-624.CO.CO. EOHB.WRS	Workshop
CRO-624.CO.CO. EOHB.HVAC	HVAC System
CRO-624.CO.CO. EOHB.PLN	Plumbing System
CRO-624.CO.CO. EOHB.ELE	Electrical System
CRO-624.CO.CO. EOHB.ELE. TP	Temporary Power
CRO-624.CO.CO.STE	Kensico Lab as EOH Headquarters - Site
CRO-624.CO.CO.STE. PAV	Facility Paving
CRO-624.CO.CO.STE.LNS	Landscaping and Erosion control

****

EXHIBIT 2 – ACTIVITY ID FORMAT

1. Activity ID format: Activity ID's shall be preceded by the Contract identifier: CRO-624 - …
2. Do not use the letters X or Z within the activity ID as these are reserved for DEP use
3. For Activities added to the schedule during the project representing Contract change order execution and Extra Work, the Contractor shall insert "CO" after the Contract identifier and use the succeeding numbers to identify the change order number.

****

EXHIBIT 3 – SCHEDULE MILESTONES

1. NTP- CRO-624;
2. Mobilization- CRO-624;
3. Construction Start (start of installation of permanent Work in the field - CRO-624);
4. Project Specific milestones- CRO-624;
5. Substantial Completion- CRO-624;
6. Or other Milestones as directed by the Engineer.

****

EXHIBIT 4 -- PROPOSED ACTIVITY CODES

1. **CRO-624 _RESP -** Responsibility Code – The party contractually responsible for the scheduled Activity. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
DEP	1	Department of Environmental Protection
ENG	2	DEP's Design Engineer
CCM	3	DEP's Construction Manager
GEN	4	General Prime Contractor
ELE	5	Electrical Prime Contractor
HVC	6	HVAC Prime Contractor
PLB	7	Plumbing Prime Contractor – Not Used

2. **CRO-624 _MLS -** Milestone Code – Milestones specified in the Contract. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
M1	1	Notice To Proceed
M2	2	Substantial Completion
M3	3	Final Completion

3. **CRO-624 _LOC -** Location Code – Project location specified in the Contract. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
EOHB	1	East of Hudson Headquarters Building

4. **CRO-624 _AREA -** Area Code - The specific area within the project Site where the Work is taking place. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
EOHB	1	EOHB - Structure
EOHS	2	EOHB - Site

5. **CRO-624 _OPER** - Operation Code - The operation or type of Work
Note: The operation codes listed are for example only. The specific operation codes will be determined during the development of the Baseline Logic and Duration schedule and will reflect the Contractor's anticipated means and methods. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
01	1	General Requirements
02	2	Site Clearing
03	3	Site Earthwork
04	4	Utilities
05	5	Access Roads
06	6	Temp Facilities
07	7	Erosion Control
08	8	Concrete
09	9	Landscape
10	10	Drainage
11	11	Temp Power
12	12	Lighting
13	13	Dewatering
14	14	Masonry
15	15	Metals
16	16	Wood and Plastics
17	17	Thermal and Moisture Protection
18	18	Doors and Windows
19	19	Finishes
20	20	Specialties
21	21	Equipment
22	22	Furnishings
23	23	Special Construction
24	24	Conveying Systems

VALUE	SEQUENCE	TITLE
25	25	Mechanical
26	26	Electrical
27	27	Instrumentation and Control
28	28	Site Restoration
29	29	Piping modifications
30	30	Electrical modifications
31	31	Maintenance Activities

6. **CRO-624 _ADD -** Activities Added – Code for Activities added during the current schedule update period. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
001	1	Activity Added in Update #01
002	2	Activity Added in Update #02
003	3	Activity Added in Update #03
Continued – to be updated by Contractor in each Progress Schedule		

7. **CRO-624 _CO# -** Change Order Number – Code for Activities added for Change Order work. This Activity Code field should be defined as being four digits in length.

VALUE	SEQUENCE	TITLE
G001	1	G001 – General Change Order No.1 Description
E001	2	E001 – Electrical Change Order No.1 Description
H001	3	H001 – HVAC Change Order No.1 Description
G002	4	G002 – General Change Order No.2 Description
E002	5	E002 – Electrical Change Order No.2 Description
H002	6	H002 – HVAC Change Order No.2 Description
Continued – to be updated by Contractor in each Progress Schedule		

8. **CRO-624 _Contractor** General Contractor. This Activity Code field should be defined as being seven digits in length.

VALUE	SEQUENCE	TITLE
G1	1	General Contractor
E1	2	Electrical Contractor
H1	3	HVAC Contractor
P1	4	Plumbing Contractor
Continued – to be updated by Contractor in each Progress Schedule		

9. CRO-624 **_Point of Contact** DEP Accountable Manager. This Activity Code field should be defined as being seven digits in length.

VALUE	SEQUENCE	TITLE
JN	1	Jose Nieves
Continued – to be updated by Contractor in each Progress Schedule		

10. **CRO-624 _Key Milestones** Optional Field for DEP use. This Activity Code field should be defined as being seven digits in length.

11. **CRO-624 _Standard Milestones** Optional Field for DEP use. This Activity Code field should be defined as being seven digits in length.

12. **CRO-624 _Temporary** Optional Field for DEP use. This Activity Code field should be defined as being seven digits in length.

13. **CRO-624 _Hide** Optional Field for DEP use. This Activity Code field should be defined as being seven digits in length.

14. In addition to the required Activity coding outlined above, the Engineer may direct the Contractor to provide additional Activity coding, at no additional cost to the City, in order to facilitate the management of the project and schedule. Additional Activity coding may include:

    a. SUBC – Code designating major subcontractors or vendors;

    b. SYST – Code designating process or functional system;

    c. TYPE – Code designating general type of Work;

    d. PHAS – Phase of Work in accordance with construction phasing requirements.

****

EXHIBIT 5 – PROJECT CALENDARS

1.	CRO-624_5D1S	-	5 days per week and one shift per day
2.	CRO-624_5D2S	-	5 days per week and two shifts per day
3.	CRO-624_5D3S	-	5 days per week and three shifts per day
4.	CRO-624_7D3S	-	7 days per week and one shift per day
5.	CRO-624_Planting	-	Contains months warm enough for planting vegetation
6.	CRO-624_X-Xxx	-	Limited months in calendar year (Xxx – Xxx) work can occur.

****

NO TEXT ON THIS PAGE

SECTION 01323
Job Photographs and Videos

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pre-Construction Photographs and Videos

B. Construction Photographs and Videos

C. Post-Construction Photographs and Videos

D. Aerial Photographs

E. Informational Video

1.02 PAYMENT

A. The cost of furnishing the goods and services described herein shall be included in the lump sum price bid for the Structures and Equipment Contract.

B. In the event that fewer than the specified number of photographs is required, the Structures and Equipment Contractor shall credit the City twenty dollars ($20.00) for each photograph under the specified number.

C. The Engineer reserves the right to reject any photograph that is not clear or definitive. Any photograph so rejected shall be subtracted from the total exposures before computations for payment or credit under this Section.

1.03 RELATED SPECIFICATIONS

A. Detailed Specification 01312 - Web-based Project Management Information System

B. Detailed Specification 01335 - Records in Electronic Formats

1.04 REFERENCE STANDARDS

A. International Organization for Standardization

1. ISO 18902: 2013 - Imaging materials -- Imaging Materials – Albums, Framing and Storage Materials.

2. ISO-IEC 14496-14 Information technology -- Generic coding of moving pictures and associated audio information: MPEG-4 Part 14 (MP4 file format).

3. IPTC/XMP (International Press Telecommunications Council's/Adobe Extensible Metadata Platform) Standard

1.05 DEFINITIONS

A. For the purposes of this Section, "Photograph" shall be defined as one (1) digital camera image, which is approved by the Engineer for development into the products specified herein.

B. For the purposes of this Section, an "Aerial Photograph" shall be defined as one (1) aerial view, approved by the Engineer, for development into the products specified herein.

1.06 DESCRIPTION

A. Unless specifically noted otherwise, all Work of this Section shall be performed by the Structures and Equipment Contractor.

B. The Structures and Equipment Contractor shall engage the services of experienced professional photographers and/or video recording firms, approved by the Engineer, to document the progress of Work by taking color job Photographs, Aerial Photographs and videos. The photographer shall take Photographs, Aerial Photographs and videos of the Project before start of construction work, during ongoing construction, and after completion of construction as directed by the Engineer.

C. A designee of the Engineer will accompany the photographer for the taking of all Photographs and videos.

D. Pre-Construction Photographs and Videos

1. The photographer, when directed by the Engineer, shall visit the Site prior to start of construction to take a total of 100 photographs and make a 30-minute video showing existing conditions of the entire project site and any adjacent areas which could possibly be disturbed during construction.

2. 2 aerial photographs shall be taken which showcase the project site in relation to the surrounding neighborhood.

E. Construction Photographs and Videos

1. The photographer, when directed by the Engineer, shall visit the Site during construction on a monthly basis unless the Engineer requests different frequencies of the visits, to take a total of 1,200 Photographs for the project and to visit the site when directed by the Engineer to tape a total of 2 hours of videos. Photographs taken and video minutes taped shall be distributed evenly among the visits and visits shall be distributed evenly over the course of the Project, all subject to the direction of the Engineer.

2. A total of 6 Aerial Photographs shall be taken with 6 views, at 6 phases of construction, as determined by the Engineer.

F. Post-Construction Photographs and Videos

1. The photographer, when directed by the Engineer, shall visit the Site at the completion of construction to take a total of 100 Photographs and make a 30-minute video showing the completed Work, the entire Project Site and any adjacent areas which were disturbed during construction.

2. 8 aerial photographs shall be taken showing the completed Work, the entire project site and any adjacent areas which were disturbed during construction.

G. Informational Video

1. The Structures and Equipment Contractor shall engage a professional video recording firm to develop a finished 60-minute informational video as directed by the Engineer.

2. The video shall be developed by editing the videos made during the pre-construction, construction and post-construction stages of the project, as well as any additional taping needed to complete the documentation of Work at the Project Site.

1.07 QUALITY ASSURANCE

A. Photographs shall be clear with proper exposure. New Photographs are to be taken immediately if Photographs of an adequate quality cannot be achieved. Photographs shall be of a quality to permit enlargements.

B. The professional photographer and professional video recording firm shall have a minimum of three (3) years of experience with duties similar to those specified herein. The qualifications of the professional photographer and professional video recording firm shall be subject to review by the Engineer.

C. All videos shall be made using professional-type video cameras and with adequate lighting.

1.08 SUBMITTALS

A. Submittals shall include, but not be limited to, the following:

1. Resume of the professional photographer proposed for this Work;

2. Resume and experience of the professional video recording firm proposed for preparing the informational video;

3. Plot plans indicating the location and unique sequential identifier of all Photographs.

4. Photo log of all photographs and associated metadata in an Excel spreadsheet

5. One (1) set of all Photographs / Aerial Photographs taken for the Engineer's review and approval for processing further.

6. The Structures and Equipment Contractor shall provide the Engineer with updated images, key plans and photo logs on a monthly basis.

B. Submittals shall be made in accordance with Section 01312 web-based Project Management Information System.

PART 2 PRODUCTS

2.01 PHOTOGRAPHS

A. Digital cameras shall produce records with true optical resolution. Images shall not be resized or interpolated to a higher resolution from a lower resolution.

B. The file format for Photographs shall be color, uncompressed Tagged Image File Format (TIFF) produced by a digital camera with a minimum sensor size of 12 megapixel files or greater, and at an image resolution of not less than 5,000 pixels by 3,500 pixels at 300 dpi or greater

C. Photographic images shall be provided as 8 bit per channel RGB color images.

D. One set of digital images shall be submitted to DEP's web-based Project Management Information System.

E. Photographs should be embedded with metadata using the IPTC/XMP (International Press Telecommunications Council's/Adobe Extensible Metadata Platform) Standard. This includes:

1. Project number
2. Project name
3. Contract number and description
4. Unique sequential identifier
5. Description of Vantage point, indication location, direction and other pertinent information
6. General description of what the Photograph represents
7. Global Positioning System (GPS) location data
8. Phase of Construction (i.e. pre-construction, construction or post-construction)
9. Date and time Photograph was taken if not date stamped by camera
10. Name of photographer

11. Name of Department of Environmental Protection witness

F. The Structures and Equipment Contractor shall transmit one (1) electronic copy of each Photograph to the Engineer for use in preparing descriptions. The Photographs with descriptions will be returned to the Structures and Equipment Contractor for record management.

G. PDC Photographs are required at the completion of the work: The record photos shall be 8.5x11" to clearly show each elevation of the building and a perspective view as submitted to the PDC. Photographs must clearly and comprehensively show the completed project so that the Public Design Commission (PDC) can confirm that a project was built as approved. Five copies of each photograph shall be printed in color on 8.5" x 11" photographic or archival paper and labeled on the back with the project title, view, and key plan indicating position and number of the photograph taken. In addition include one disk with digital versions of the photographs.

2.02 AERIAL PHOTOGRAPHS

A. One set of digital images shall be submitted to DEP's web-based Project Management Information System. Aerial Photographs shall meet the digital Photograph requirements of this Section, except that they shall be a minimum 50 megapixel file size.

B. Two, color, 24-inches by 36-inches glossy prints of each Aerial Photograph shall be produced.

2.03 VIDEOS

A. Video recordings shall be ASTC format, 1080P (1920 x 1080) using MPEG-4 Program Stream encoding (ISO-IEC 14496-14 "Coding of audio-visual objects -- Part 14: MP4 File Format"), using professional video cameras with clear and succinct narrative. The narrative material shall be developed in conjunction with the Construction Manager, Structures and Equipment Contractor, and Engineer.

1. All video recordings shall begin with a chapter index listing the contents in detail and providing direct access to each chapter.

2. All video recordings must include on parallel tracks metadata (catalogue information) to include the date and time of recording, the name of the area being documented, the project name, direction of travel, the viewing side, project number, Contract number and description, name of photographer and Department of Environmental Protection witness. The date and time shall be on a track separate from the rest of the metadata and, when displayed, shall appear in the upper left hand corner of the picture. Time and date shall use the following format:

Time: HH;MM;SS (using 24-hour clock time) Date: MM/DD/YYYY

3. The project number, project name, Contract number and description, name of photographer and Department of Environmental Protection witness, when displayed, shall appear on the lower half.

B. Video output from camera used must be capable of producing full HD resolution (1920 x 1080). Geometric distortion should not exceed two (2) percent of picture height at any point in picture area.

C. All recording shall be done with adequate lighting. Written authorization by the Engineer to proceed with video documentation at any areas must be done with consideration of existing environmental conditions. The designee of the Engineer will accompany the photographer during all taping sessions.

D. During the recording period, all records shall be turned over to the Engineer for review of the content and quality. Any portion of the recording deemed unacceptable by the Engineer shall be re- recorded by the Structures and Equipment Contractor at no additional cost to the City.

E. One copy of all acceptable recordings shall be furnished and shall be properly identified by container number, equipment, location and project name. A record of the contents of each recording shall be provided on a run sheet, identifying each chapter segment of the recording.

2.04 INFORMATIONAL VIDEO

A. The informational video shall have titles and audio defining all aspects of Work activities. In consultation with the Engineer and the City, the video shall develop the basic design criteria, explain each phase of excavation or construction, extras or credits, safety highlights, concrete, steel and other suppliers, disposal of materials, dewatering, control of groundwater, and other such items.

B. Two copies of the acceptable informational video (flash drive or hard drive) shall be furnished and shall be properly identified and labeled. Identifying information furnished on the informational video shall be the same as specified for other videos in this Section.

PART 3 EXECUTION

3.01 USE OF PHOTOGRAPHS AND VIDEOS

A. All Photographs, Aerial Photographs, and videos resulting from the work under this Contract shall become the exclusive property of the City upon their creation.

B. Neither the Structures and Equipment Contractor nor the photographer nor the video recording firm shall retain any rights pertaining to the Photographs, Aerial Photographs, and videos nor shall they reproduce or otherwise publish or disseminate any of the Photographs, Aerial Photographs, prints, CDs/DVDs, or videos taken under this Contract without the prior written approval of DEP.

C. The Photographs, Aerial Photographs, and videos shall be considered "work made for hire" under applicable provisions of the Copyright Act, and the City shall be the copyright owner thereof and of all aspects, elements and components thereof in which copyright protection might subsist. To the extent that such materials do not qualify as "work made for hire", the Structures and Equipment Contractor hereby irrevocably transfers, assigns and conveys exclusive copyright ownership in and to such materials to the City, free and clear of any liens, claims or other encumbrances. The agreements between the Structures and Equipment Contractor and the photographer and video recording firm shall contain a provision containing these requirements.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01330
Submittal Procedures

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittal Categories

B. Schedule of Submittals

C. Letter of Transmittal

D. Contractor Responsibilities

E. Shop Drawing Submittals

F. Approval of Submittals not a Waiver

G. Quality Assurance

H. Final Copy Shop Drawings

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Section 01312 – Web-based Project Management Information System

B. Section 01332 – Final Record Documents

1.04 REFERENCE STANDARDS

A. The Specifications for Structural Steel (ASTM Des. A36)

B. The AISC Specification for Structural Steel for Buildings, current edition

C. The New York City Building Code (NYCBC)

1.05 DEFINITIONS

A. Submittals includes all types of drawings and other documents required to be prepared or assembled and submitted to the Engineer by the Contractor before, during, or after construction, such as, but not limited to, the following "submittal categories":

1. As-Built Drawings

2. Certifications;

3. Construction Progress Photos and Videos;
4. Detailed Estimate Breakdown
5. Final Record Documents;
6. Material Safety Data Sheets;
7. Mock Ups;
8. Operation and Maintenance Manuals;
9. Permits;
10. Plans (or Procedures);
11. Product Data;
12. Reports;
13. Samples;
14. Shop Drawings;
15. Spare Parts;
16. Test Reports;
17. Warranties.

B. Shop Drawings – includes all drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for the Contractor and submitted by the Contractor to illustrate some portion of the Work.

1.06 DESCRIPTION

A. General:

1. All Submittals including, but not limited to, Shop Drawings and inquiries pertaining to engineering features or Specification and Contract Drawing interpretations, shall conform to the General Conditions and the requirements of this Section and Section 01312 – Web-based Project Management Information System.

2. Within 30 days from issuance of the Notice to Proceed (NTP), the Contractor shall prepare and submit for the Engineer's approval a Schedule of Submittals which it proposes to follow, listing Section references, names of Submittals required, and the dates on which the Contractor proposes to make the Submittals. No other Submittals will be considered for review until the Schedule of Submittals is received and approved by the Engineer.

3. Submittal shall be made as directed by the Engineer. All submittals shall be in the English language with U.S. customary units of measurement being used in all drawings and data.

4. The Contractor shall use the project web-based document management system as directed by the Engineer and as described in Section 01312 – Web-based Project Management Information System, to submit all documents.

5. Samples shall be shipped directly to the Engineer. A copy of the transmittal with photographs (JPEG format) of the samples (minimum three (3) angles per sample) shall be entered into the web-based Project Management Information System.

B. Letter of Transmittal or Inquiry

1. A letter of transmittal shall accompany each submission. If data for more than one (1) Section of the Specifications is being submitted, a separate transmittal letter shall accompany the material being submitted under each Section. Insofar as possible, letters of inquiry concerning certain phases of the Contract shall also deal with only one (1) Section of the Specifications.

2. At the beginning of each letter of transmittal and each letter of inquiry, provide a reference heading indicating the following:

OWNER'S Name: NYC Department of Environmental Protection
Project Name: _____
Contract Number: _____
Transmittal Number: _____
Section and Item Number: _____

3. If submittals show variation from the requirements of the Contract, the Contractor shall make specific mention of such variation in the Submittal package.

C. Contractor Responsibilities

1. The Contractor shall review all submittals made by its suppliers and subcontractors before transmitting them to the Engineer to assure proper coordination of the Work and to determine that each submittal is in accordance with the requirements of this Section.

a. A note shall appear on the Shop Drawings indicating that the Contractor has made this check. Shop Drawings not so checked and noted will be returned to the Contractor without further examination.

2. Approval of Submittals shall not relieve the Contractor of the responsibility of furnishing materials and equipment of proper dimension, size, quality, quantity, and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Approval of Submittals shall not relieve the Contractor of responsibility for errors of any sort on the Submittals. The Contractor is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the Work of all trades.

3. Approval of any Submittal by the Engineer does not constitute a representation that all details of the Submittal were found to conform to the Contract requirements.

D. Shop Drawing Submittals

1. The Contractor shall promptly prepare and submit Shop Drawings of all parts of the Work as specified herein. Shop Drawings which are full size shall be on "D" size, 22-inch x 34-inch ANSI standard drawing sheets. All Shop Drawings shall be drawn to scale.

2. Shop Drawings shall be numbered consecutively and shall accurately and distinctly present the following:

a. All shop and erection dimensions;

b. Arrangement and sectional views;

c. Necessary details, including complete information for making connections between Work under this Contract and work under other contracts;

d. Kinds of materials and finishes;

e. Parts list and description thereof.

3. Each Shop Drawing shall be dated and contain:

a. The name of the Project and the Contract number;

b. The descriptive names of equipment or materials covered by the drawing and the Contract item number or numbers under which it is or they are required;

c. The locations or points at which the materials or equipment are to be installed in the Work.

4. Shop Drawings for equipment requiring electrical and/or mechanical connections shall show the units of equipment in the proposed position for installation and the details of attachments and connections required, with locations referred to each other and to the structure.

5. Whenever mechanical equipment, electrical equipment, tanks, pipe sections, structural and architectural details and other related items are to be permanently installed in the structures or are of sufficient weight and bulk to cause excessive stresses on the structural members and frame while being hauled, rigged, hoisted, blocked and placed in final positions, the Contractor shall submit, in advance of this work, to the Engineer for approval, Shop Drawings showing the methods and sequence of the positioning operations, the size and material of all skids, blocks, falsework, runways, etc., the capacities of hand-operated and electric hoists and chain blocks, the positions of the hoists on the completed structural frame, temporary shores and supports, the capacities of winches and their position of attachment and similar and related rigging equipment required to effect the successful positioning of the permanently installed mechanical and electrical equipment.

6. Mechanical and electrical equipment shall not be moved across the floor of the structure without first covering the floor with timber of sufficient size so that the applied loads will be transferred to floor beams and girders of steel or concrete. If it is required to reduce bending stresses or deflection, the beams and girders shall be provided with temporary supports.

7. The Shop Drawings shall also show the loads at points of concentration, the stresses in the structures due to these temporary loads, the size and class of material of the temporary members and bracing installed or placed to minimize excessive stresses in the completed structures and computations to demonstrate that the temporary rigging equipment and accessories will not damage or injure any portion of the completed structure.

8. The approval by the Engineer of Shop Drawings for rigging and hoisting electrical and mechanical equipment and related items in final position will not relieve the Contractor of its responsibility to ensure the safety of the rigging operations, the equipment to be installed and its personnel nor will it relieve the Contractor from its responsibility not to damage completed structures, parts or members thereof or other installed equipment.

9. Supporting structures designed by Contractor. Supporting structures, which the Contractor is required to design, shall be of

sufficient strength to safely withstand all stresses to which they may be subjected, within permissible deflections, and shall meet the applicable requirements under NYCBC, ASTM A36 and AISC Specifications for structural steel.

10. Engineer's assumed design data. All structural steel, concrete and reinforcement indicated or specified to fully or partially support equipment or appurtenances and the areas immediately adjacent thereto, have been designed from data based on assumed average anticipated clearances and loadings. The final structural design in these locations will be based on definite data available only after the Engineer approves the equipment and appurtenances to be installed. Therefore, no Shop Drawings pertaining to such supporting steel or concrete structures shall be submitted until the Contractor is furnished with full data relative to the approved equipment and appurtenances.

11. Necessary major changes in framing will be covered by supplementary or revised drawings which will be furnished to the Contractor. All changes indicated or necessary to accommodate the equipment and appurtenances shall be incorporated into the Shop Drawings submitted by the Contractor for approval.

12. Shop Drawings for the work in paragraphs 9, 10, and 11 above shall be prepared by or under the direction of a qualified licensed Professional Engineer, currently registered in the State of New York, and shall bear the imprint of such Professional Engineer's seal and signature.

E. Shop Drawings Approval

1. Shop Drawing Submittals to the Engineer shall contain complete data on the Work and full information on related matters.

2. In submitting Shop Drawings for approval, all associated drawings relating to a complete assembly of various parts necessary for a unit shall not be submitted until the assembly of drawings is complete so that they may be checked in relation to the assembly proposed. Where errors, deviations and/or omissions are discovered later, they shall be made good by the Contractor irrespective of any approval by the Engineer.

3. With Submittals, the Contractor shall notify the Engineer of all departures from the Contract Drawings and Specifications; otherwise, approval of such Submittals will not constitute approval of the departure. Approval of a Submittal will constitute approval of the subject matter thereof only and not of any other structure, material, equipment or apparatus shown or indicated.

4. Materials or equipment shall not be ordered, nor shall any Work be performed by the Contractor before the materials, the equipment and the Shop Drawings have been approved by the Engineer.

5. After the Engineer completes their review, the Submittals will be marked with one of the following notations:

   - Furnish as Submitted;
   - Furnish as Corrected;
   - Revise and Resubmit;
   - Rejected;
   - For Information Purposes Only.

   a. If a Submittal is acceptable, it will be marked "Furnish as Submitted" or "Furnish as Corrected". If a Submittal is unacceptable, it will be marked "Revise and Resubmit" or "Rejected."

   b. Upon return of a Submittal marked "Furnish as Submitted" or "Furnish as Corrected", the Contractor may order, ship or fabricate the materials included on the Submittal, provided they are in accordance with any corrections indicated. Upon return of a Submittal marked "Furnish as Corrected", the Contractor shall make the corrections indicated, and resubmit the Submittal to the Engineer for record purposes, unless otherwise specified by the Engineer.

   c. Upon return of a Submittal marked "Revise and Resubmit", the Contractor shall make the corrections indicated, clearly noting any revisions and repeat the initial approval procedure. The "Rejected" notation is used to indicate material or equipment that is not acceptable. Upon return of a Submittal marked “Revise and Resubmit”, the Contractor shall repeat the initial approval procedure utilizing acceptable material or equipment.

   d. Shop Drawings or other Submittals not bearing the Engineer's "Furnish as Submitted" or "Furnish as Corrected" notation shall not be issued to subcontractors nor utilized for construction purposes. No Work shall be performed or equipment installed without a "Furnish as Submitted" or "Furnish as Corrected" Shop Drawing or other Submittal.

6. In the event the Contractor obtains the Engineer's approval for the use of equipment other than that which is shown or specified in the Contract Documents, the Contractor shall, at its own expense and

using methods approved by the Engineer, make all changes to the Work, including structures, piping, and electrical equipment and controls that may be necessary to accommodate this equipment.

7. Shop Drawings shall be submitted well in advance of the need for the material or equipment for construction and with ample allowance for time required to make delivery of material or equipment after the Submittal covering such is approved. The Contractor shall assume the risk for all materials or equipment which are fabricated or delivered prior to the approval of Shop Drawings. No materials or equipment will be permitted to be incorporated into the Work nor will such be included in monthly payment estimates until approval thereof has been obtained in the specified manner.

8. The Engineer will review and process all Submittals promptly. A reasonable time should be allowed for the Engineer's review and processing of Submittals, the Contractor's revisions and resubmission of Submittals, and the Engineer's review and returning of the revised Submittals to the Contractor.

F. Approval of Submittals not a Waiver

1. The approval of a Submittal shall not constitute a waiver of any of the requirements of the Contract nor shall the City be compelled to accept any Work unless it passes all the tests and requirements specified in the Contract Documents.

2. All deviations made during construction from final Shop Drawings previously annotated by the Engineer "Furnish as Submitted", shall be corrected on the Shop Drawings, and resubmitted to the Engineer showing conditions as constructed.

1.07 QUALITY ASSURANCE

A. Shop Drawings shall be submitted so that they can be approved within the first 3 submissions. Starting with the fourth submission, liquidated damages will be assessed against the Contractor in accordance with Schedule A of the General Conditions.

1.08 SUBMITTALS

A. All Submittals shall have identifying titles and bear the stamp of approval and signature of the Contractor as evidence that they have been reviewed and approved by the Contractor and that they conform to the requirements of the Contract Documents. Submittals without this stamp of approval will not be reviewed by the Engineer and will be returned to the Contractor. The stamp shall contain the following minimum information completed in ink:

Project Name: _____
Contract No.: _____
Contractor's Name: _____
Date: _____
Item: _____
Specification Section No.: _____ Section Title: _____
Page Nos.: _____ _____ Article No.:_____ Paragraph No.:_____
Contract Drawing No.: _____ of _____
Location: _____
Submittal No.: _____ Review Cycle No.: _____
Shop Drawing Reference No.: _____
Source company name: _____
Approved By: _____

B. Submittal Identification and Tracking: In order to identify and track each Submittal as a separate and unique item, the Contractor shall utilize a Submittal numbering system as follows:

1. Submittal Number: The Submittal Number shall be a separate and unique number correlating to each individual Submittal that needs to be tracked as a separate and unique item. The Submittal Number shall be a two-part, eight-character, alpha/numeric number assigned by the Contractor in the following manner:

   a. The first part of the Submittal Number shall consist of the numbers that pertain to the applicable Specification section.

   b. The second part of the Submittal Number shall consist of 3 digits (between 001 and 999) to number each separate and unique Submittal under each Section.

   c. A dash shall separate the two parts of the Submittal Number.

   d. As an example, the Submittal Number for the third submittal under Section 09900 – Painting, would be 09900-003.

C. Review Cycle: The review cycle shall be identified by a three-digit number indicating whether a Submittal is the initial submission (“000”) or a resubmission of an earlier Submittal. The first resubmission, for example, will be assigned “001”; the second resubmission will be assigned “002”; etc. Liquidated damages will be assessed upon rejection of any Submittal identified as “003” in the review cycle.

D. Submittals shall include appropriate references to Contract Drawings and Specifications.

E. In submitting Shop Drawings for approval, all associated drawings relating to a complete assembly of various parts necessary for a unit shall be included. Shop Drawings shall not be submitted until the full set of associated drawings is complete, so that they may be checked in relation to the assembly proposed.

F. All items of electrical equipment constituting an operating system and any mechanical units involved therein or necessary for the functioning of such system shall be submitted at the same time and shall include clear diagrams showing circuit functioning and necessary details for field construction.

G. Partial, incomplete, or illegible submissions will be marked "Rejected" and returned to the Contractor without review, for resubmission.

H. Final Copy Shop Drawings: The Contractor shall furnish all "Final Copy Shop Drawings" to the DEP as a condition precedent to the Commissioner issuing a written determination of Final Acceptance. Final Copy Shop Drawings shall be submitted in accordance with Section 01332 - Final Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01332
Final Record Documents

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for all final record documents.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01291 – Detailed Estimate Breakdown

B. Detailed Specification 01323 – Job Photographs and Videos

C. Detailed Specification 01330 – Submittal Procedures

D. Detailed Specification 01333 – Records in Paper Formats

E. Detailed Specification 01334 – Records in Microfilm Formats

F. Detailed Specification 01335 – Records in Electronic Formats

G. Detailed Specification 01831 – Operation and Maintenance Manuals

1.04 DEFINITIONS

A. Archive: For the purposes of this Section, to Archive means to furnish as a final record document.

B. Final Copy Shop Drawing (FCSD): The Final Copy Shop Drawing means the approved copy (Furnish as Submitted (FAS) or Furnish as Corrected (FAC)) of the Shop Drawing as described in Detailed Specification 01330 – Submittal Procedures, corrected to reflect any deviations made for the installed condition showing the actual construction.

C. Conformed Drawings: The Conformed Drawings are the original Bid Set Contract Drawings modified to incorporate the changes made by addenda to the Invitation for Bids issued during the bid period.

D. Conformed Set Contract: The Conformed Set Contract is the original Bid Set Contract modified to incorporate the changes made by addenda to the Invitation for Bids issued during the bid period.

E. Bid Set Drawings (or Design Drawings): The Bid Set Drawings consists of the original Contract Drawings issued by DEP with the solicitation for Contract bids.

F. Bid Set Contract (including Addenda): The Bid Set Contract is the text of the original Contract (excluding Contract Drawings) issued by DEP with the solicitation for Contract bids, including any Addenda issued during the bid period.

G. Change Orders: Change Orders include registered Change Order forms and the complete sets of attached text and/or drawings for all design and field Change Orders.

H. Operations and Maintenance Manuals: When specified, Operations and Maintenance Manuals ("O&M Manuals") shall be prepared by the Contractor in conformance with Detailed Specification 01831 - Operation and Maintenance Manuals. Final copies of the O&M Manuals shall be submitted in accordance with the requirements of this Section.

I. Key Documents: For purposes of this Section, Key Documents shall include, but not be limited to, to the following items:

1. Signed copy of the Standard Construction Contract;
2. The Contractor's bonds;
3. Signed and submitted Bid Schedule of Prices;
4. DEP Award Folder contents;
5. Contract Notice of Award letter;
6. Notice to Proceed letter;
7. Approved Detailed Estimate Breakdown as described in Detailed Specification 01291 – Detailed Estimate Breakdown;
8. Written determination by the Engineer or Resident Engineer, as applicable, that the Work is substantially complete, as described in Article 14 of the Standard Construction Contract;
9. Final evaluation;
10. Final extension of time (if applicable);
11. Claim settlements (if applicable);
12. Certificate of Occupancy (if possible);
13. Warranties;
14. Structure Survey (per Article 9 of the General Conditions);
15. Regulatory Transition Plan (where applicable).

J. Additional Documents: These shall be any additional documents that the Engineer directs to be furnished as a final record document in accordance with the requirements of this Section.

K. Job Photographs and Videos: These are the photographs and videos furnished in accordance with Detailed Specification 01323 – Job Photographs and Videos.

1.05 DESCRIPTION

A. The Contractor shall submit the following final record documents in paper, microfilm, and electronic formats according to the requirements of Table 1 – Summary of Final Record Documents to be Furnished, attached at the end of this Section, and as defined above and specified below:

1. Final Copy Shop Drawings;
2. Bid Set Drawings (aka Design Drawings);
3. Conformed Drawings;
4. Bid Set Contract (including Addenda);
5. Conformed Set Contract
6. Key Documents;
7. Change Orders (text and drawings);
8. O&M Manuals;
9. Additional Documents;
10. Job Photographs and Videos.

B. Submittal of these documents shall be a condition precedent to obtaining the final payment.

C. As-Built drawings shall be prepared by the construction manager (CM). However, the Contractor shall furnish all necessary information to the CM for preparation of the as-built drawings. Prior to final acceptance of the Work, the Contractor shall document any deviations, and/or changes from the configurations shown on the original Contract Drawings or revised drawings issued during the course of executing the Work. These deviations, and/or changes shall include, but not be limited to, topographic features, relocation of structures, or locations of underground items such as pipelines, duct banks, manholes or footings. Survey distances, coordinates and/or elevations shall be included to accurately locate all such items. The Contractor shall submit this information to the CM in the format directed by the CM. Typically the format shall be redlined drawings, where all changes are shown in red mark-ups on the original drawing.

1.06 QUALITY ASSURANCE

A. Project records in paper, microfilm, and electronic formats shall be submitted in conformance with the following specifications, as applicable:

1. All records in paper formats shall be produced in conformity with Detailed Specification 01333 – Records in Paper Formats.

2. All records in microfilm format shall be produced in conformity with Detailed Specification 01334 – Records in Microfilm Formats.

3. All records in electronic format shall be produced in conformity with Detailed Specification 01335 – Records in Electronic Formats.

1.07 SUBMITTALS

A. Final Copy Shop Drawings

1. The Contractor shall furnish all FCSDs to DEP.

a. The FCSD shall be the approved copy (FAS or FAC) of the Shop Drawing, corrected to reflect any deviations made for the installed condition showing the actual construction.

2. In addition to submitting the complete set of FCSDs as a final item at the end of construction, the Contractor shall prepare and submit FCSDs for approval on a continual basis during the performance of the Work when the particular item of Work for a FCSD has been completed. The Contractor shall submit the FCSD within 30 calendar days after the completion of the work item.

3. The drawing revision boxes shall have all previous revisions and references removed from the drawings. The revision boxes shall indicate “Final Copy Shop Drawing”.

4. Each drawing shall bear the original submittal file number, without the revision number, which shall be written in the lower right hand corner of a drawing above the title box. The file number shall also have a prefix, which identifies it as a FCSD.

a. For example, if the file number for an approved Shop Drawing is 16221-002, the FCSD will be numbered “**FCSD-16221-002.**”

5. Supporting Documentation: Supporting documentation shall bear the correlating FCSD file number so as to identify it. All supporting documentation (e.g. catalog cuts, test results, calculations, etc.) shall be submitted, together with the related FCSD so as to maintain a complete set of all documents submitted with each FCSD**.**

6. Submittal for Approval. Two paper prints of each FCSD (full size where applicable) shall be submitted for approval. The drawing shall be checked by the Resident Engineer against the field records and a copy shall either be stamped "Approved" or returned with comments for correction and re-submittal by the Contractor. The Contractor shall retain one approved set of the FCSDs for use in submitting the entire set in paper, microfilm and electronic copies.

B. Bid Set Contract

1. If the Contractor does not have a complete set of the original Bid Set Contract and Addenda in the original PDF format (non-scanned), it may request a set from the Engineer. Upon request, the Bid Set Contract and Addenda will be provided to the Contractor in PDF format if possible. If a PDF format is not available, then a paper copy set may be utilized. This may also be requested from the Engineer if required and shall be provided if possible.

2. The Contractor shall archive the entire set of Contract Documents, except Drawings, as discussed below. This set shall include all of the sequential pages of the Contract Documents and shall include:

   a. Front and back covers

   b. Notice to Bidders

   c. Invitation for Bids

   d. Information for Bidders

   e. Standard Construction Contract (unsigned)

   f. Table of Contents

   g. General Conditions

   h. Schedule of Wage Rates

   i. General Specifications

   j. Detailed Specifications

   k. Addenda

3. On a multiple contract project, the "E," "P," and "H" Contractors shall only archive the Detailed Specifications respective to their Work. These are only required in the microfilm and electronic archives. No paper version is required as that will be produced by the "G" Contractor.

4. The signed (executed) parts of the Standard Construction Contract shall be included by the Contractor as part of the Key Documents.

C. Bid Set Drawings (Design Drawings).

1. The Bid Set Drawings shall be Archived. If the Contractor does not have a complete set of the original Bid Set Drawings in AutoCAD format, the Contractor may request a set from the Engineer. If possible, the Bid Set Drawings will be provided to the Contractor in AutoCAD format, bound with their respective data sets.

D. Conformed Set Contract

1. The Conformed Set Contract shall be Archived.

E. Conformed Drawings

1. The Conformed Drawings shall be Archived. If the Contractor does not have a complete set of the Conformed Drawings in the AutoCAD format, it may request a set from the Engineer. If possible, the Conformed Drawings will be provided to the Contractor in AutoCAD format, bound with their respective data sets.

F. Change Orders

1. All Change Orders (both field and design) produced during the construction of the project shall be archived.

G. Operations and Maintenance (O&M) Manuals

1. O&M Manuals should have been submitted and reviewed as part of the working drawings submission and review process in accordance with Detailed Specification 01831 - Operations and Maintenance Manuals.

Final, approved copies of the O&M Manuals shall be furnished during the progress of the work in accordance with Detailed Specification 01831 - Operations and Maintenance Manuals. Additional electronic copies of each manual shall be submitted as part of the Final Record Documents.

H. Key Documents

1. Key Documents produced during the construction of the project shall be archived. They shall consist generally of the items defined above.

I. Additional Documents

1. Any Additional Documents such as Soil Classification Reports, Environmental Impact Statements, Site Assessments, Geotechnical Reports, permits, and RFI's shall also be Archived when directed by DEP. If the Contractor does not have copies of any documents, they will be provided by the Engineer, when possible, in electronic or paper format.

J. Job Photographs and Videos

1. Job Photographs and Videos produced during the performance of the Work shall be Archived.

K. Quantities

1. The quantities and formats to be furnished for each Final Record Document shall be as shown in Table 1.

1.08 ATTACHMENTS

A. Table 1 – Summary of Final Record Documents to be Furnished

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

Table 1

Summary of Final Record Documents To Be Furnished

Final Record Document Type	EPMIS	Electronic (USB Drive)	Paper
As-Built Drawings	1 set (PDF/A & AutoCAD)	4 sets (PDF/A & AutoCAD)	2 sets
Final Copy Shop Drawings	1 set (PDF/A & AutoCAD)	4 sets (PDF/A & AutoCAD)	1 set
Conformed Drawings	1 set (PDF/A & AutoCAD	4 sets (PDF/A & AutoCAD)	NA
Bid Set Drawings	1 set (PDF/A & AutoCAD)	4 sets (PDF/A & AutoCAD)	NA
Bid Set Contract (including Addenda)	1 set (PDF/A)	4 sets (PDF/A)	1 set
Conformed Contract	1 set (PDF/A)	4 sets (PDF/A)	NA
Change Orders (Text & Drawings) (Design & Field)	1 set (PDF/A)	4 sets (PDF/A)	NA
O&M Manuals	1 set (PDF/A)	6 sets (PDF/A)* 2 compilation sets*	4 sets *
Key Documents	1 set (PDF/A)	4 sets (PDF/A)	NA
Additional Documents	1 set (PDF/A)	4 sets (PDF/A)	NA
Job Photographs	1 set (TIFF)	2 sets (TIFF)	NA
Job Videos	1 Set (MPEG 2)	2 Sets (MPEG 2)	NA

*Each paper copy of an O&M manual shall have a DVD-R copy of the Manual in a fitted sleeve attached on the inside of the front cover of the binder for the Manual. The O&M Manuals shall be furnished to the Operating Bureau in accordance with the requirements Detailed Specification 01831 - Operation and Maintenance during the progress of the work. Two extra DVD-R's of each manual or two compilation DVD-Rs which include all O&Ms shall be furnished as part of the Final Record Documents.

NO TEXT ON THIS PAGE

SECTION 01333
Records in Paper Formats

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expected longevity of paper documents without significant deterioration under normal use and storage conditions.

B. Properties of the paper and of the printing processes, and the tests required to demonstrate these properties.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01332 -- Final Record Documents

B. Detailed Specification 01831 -- Operation and Maintenance Manuals

1.04 REFERENCE STANDARDS

1. The Work of this Section shall be performed in accordance with the following standards and guidelines or their latest available updates or revisions:

   a. ANSI/NISO Z39.48, *Permanence of Paper for Publications and Documents in Libraries and Archives*. This standard is accessible at http://www.niso.org.

   b. Library of Congress - *Preservation Photocopying*.

   c. National Archives and Records Administration -- *Peel Test*.

1.05 DEFINITIONS

1. Small-Format Documents: 11 by 17 inches or smaller

2. Large-Format Documents: larger than 11 by 17 inches

1.06 DESCRIPTION

A. Final Record Documents

1. For the Final Record Documents specified in Detailed Specification 01332 - Final Record Documents, the following directions shall apply.

a. Drawings

i. As specified in Detailed Specification 01332 - Final Record Documents, provide full size, paper copies of the Final Copy Shop Drawings and As-Built Drawings (if required).

(a) Bid Set and Conformed Drawings are not required to be furnished as paper copies but shall be furnished as part of the electronic archives.

ii. Paper copies are to be produced from the electronic copies.

b. Bid Set - Contract

i. A single set of the Bid Set Contract in paper format shall be provided by the Contractor, and it shall be identical to the copy distributed for bid. They shall be furnished as bound volumes.

ii. All Addenda shall be produced in paper format by the Contractor. Each Addendum shall be bound separately and include all attachments including sketches and drawings. Drawings shall be attached using half-size drawings (11” x 17”).

c. O&M Manuals

i. As required in Detailed Specification 01831 - Operation and Maintenance Manuals, submit hardbound copies and electronic copies of each O&M Manual during the progress of the Work.

ii. No additional paper copies are required to be submitted as part of the Final record Documents.

d. Key Documents

i. Key Documents, as defined in Detailed Specification 01332 - Final Record Documents, are not required to be produced in paper format.

e. Change Orders

i. Change orders are not required to be produced in paper format.

f. Job Photographs

i. The job photographs are not required to be produced in paper format for purposes of the Final Record Documents.

g. Additional Documents

i. Additional Documents are not required to be produced in paper format.

1.07 QUALITY ASSURANCE

A. Properties of Paper

1. All paper used for documents covered by this Section shall conform to the standards of ANSI/NISO Z39.48, as amended herein, for pH, tear resistance, alkaline reserves and paper stock.

2. Paper Stock

a. Uncoated paper shall be used.

b. Uncoated paper shall not be less than 24 pounds basis weight.

B. Printing Processes

1. Small Format Documents, With Color Images and With Black and White Images

a. Only electrophotographic printing shall be used. When color electrophotographic printing is used, the process shall be certified by the manufacturer of the printer as not soluble in water, chemically stable, and resistant to fading, for a period of not less than 50 years. All documents printed using a color electrophotographic printer shall be accompanied by a certification from the manufacturer of the printer that the process is in compliance with this requirement.

2. Large-Format Documents, With Black and White Images

a. Only electrophotographic printing shall be used. Large-format documents shall be printed in black and white, unless color is an essential information component of the document. An example of documents where color may be an essential information component is a topographic drawing produced from data in a Geographic Information System. Color prints, when required, shall comply with the provisions of Paragraph C below.

3. Large-Format Documents, With Color Images and With Black and White Images

a. Either electrophotographic or inkjet printing shall be used. When inkjet printing is used, a formulation of ink shall be used that is certified by the manufacturer of the printer as not soluble in water, chemically stable, and resistant to

fading, for a period of not less than 50 years. All documents printed using an inkjet printer shall be accompanied by a certification from the manufacturer of the inks that the inks are in compliance with this requirement.

C. Testing

1. Test Method: All printing processes and materials used to produce the documents covered by this Section shall be tested periodically to ensure proper function, using the National Archives and Records Administration Technical Information Peel Test.

2. Test Frequency: All printing processes and materials used to produce the documents covered by this Section shall be tested not less than twice a day, once at the beginning of the workday, and once at the end of the workday.

D. Inspections

1. DEP may carry out inspections of the production facilities without notice.

1.08 SUBMITTALS

A. Paper Certification: All documents covered by this Section shall be accompanied by a certification from the manufacturer of the paper that it complies with ANSI/NISO Z39.48.

B. Printing Test Certification: The organization that operates the printing processes and materials used to produce the documents covered by this Section shall submit the following documentation as proof that the tests have been carried out:

1. An affidavit, signed by the supervisor responsible for the production area, certifying that the tests have been performed in accordance with the procedures described in the National Archives and Records Administration Peel Test.

2. All of the Peel Test targets actually used to perform the tests.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01335
Records in Electronic Formats

PART 1 GENERAL

1.01 SUMMARY

A. This Specification describes the requirements for the electronic records for the items specified in Detailed Specification 01332 - Final Record Documents.

B. This Specification does not cover digital objects which include a time base correction code (e.g., analogue or digital video recordings, analogue or digital audio recordings, instrumentation data feeds, etc.), or geo-coded objects (produced by Geographic Information Systems-GIS).

C. This Specification does not cover digital records stored in EPMIS.

D. Exhibit A – Folder Structure

E. Exhibit B – Sample DVD-R Label

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01332 - Final Record Documents;

B. Detailed Specification 01323 - Job Photographs and Videos;

C. Detailed Specification 01333 - Records in Paper Formats;

D. Detailed Specification 01334 - Records in Microfilm Formats

1.04 REFERENCE STANDARDS

A. Adobe Reference Specification for Tagged Image File Format (TIFF), revision 6.0 (1992);

B. ANSI/AIIM MS44 – Recommended Practice for Quality Control of Image Scanning;

C. ANSI/AIIM MS52 – Recommended Practice for the Requirements and Characteristics of Original Documents Intended for Optical Scanning;

D. ANSI/AIIM TR34 – Sampling Procedures for Inspection by Attributes of Images in Electronic Image Management and Micrographic Systems;

E. ISO/DIS 15009-1 -- Document management -- Electronic document file format for long-term preservation -- Part 1: Use of PDF 1.4 (PDF/A-1).

1.05 DEFINITIONS

A. Archive: For the purposes of this Section, to Archive shall mean to furnish as a Final Record Document.

B. Metadata: Metadata is commonly defined as "data about data." For the purposes of this Section, Metadata refers to the "descriptive metadata" that describes the content and form of the construction records known as Final Record Documents (i.e. contract name, document date, construction phase, engineer of record, etc.) and supports the discovery (searching) and identification of the resources.

C. Portable Document Format-Archival (PDF/A): A standard that identifies a "profile" for electronic documents that ensures the documents can be reproduced the exact same way. A key element to this reproducibility is the requirement for PDF/A documents to be 100% self-contained. All of the information necessary for displaying the document in the same manner every time is embedded in the file. This includes, but is not limited to, all content (text, raster images and vector graphics), fonts, and color information. A PDF/A document is not permitted to be reliant on information from external sources (e.g. font programs and hyperlinks).

1.06 DESCRIPTION

A. Source of Electronic Records

1. In preparing the electronic records, the Contractor shall make every reasonable effort to obtain from the originator (e.g., the manufacturer) documents in their original electronic format and incorporate these in the Final Record Documents. Subject to the approval of the Engineer, electronic records may be scanned from a paper version only when the Contractor cannot obtain the electronic version from the originator.

B. Metadata

1. For each type of Final Record Document, a Metadata table shall be prepared in Microsoft Excel which will furnish the specified data for that document. The data elements shall be furnished to the Contractor by DEP prior to production of the Final Record Documents DVD-Rs.

C. File Compression, File Formats, and Quality Control

1. File compression is not permitted for any of the files in any format.

2. File formats acceptable to DEP are ISO 15009-1 Portable Document Format-Archival (PDF/A); Tagged Image File Format (TIFF), version 6.0 ("II" format) and AutoCAD. All files shall be delivered to DEP with file names that use the default file extension for each of the above formats.

3. Portable Document Format-Archival (PDF/A)

   a. Security Settings: Records converted to PDF/A must have all security settings deactivated (e.g., encryption, master passwords, and/or permissions) prior to transfer to DEP. Deactivating security settings ensures DEP's ability to support long term migration and preservation of the records.

   b. Review of Special Features: Because of the complexities associated with certain PDF features, DEP will review PDF/A records containing special features on a case-by-case basis when the records are scheduled. Examples of special features include but are not limited to: digital signatures; links to other documents, files or sites; embedded files (including multimedia objects); form data; comments and/or annotations.

   c. Fonts: Electronic records that have been converted to PDF/A from their native electronic formats must have all fonts referenced in the record embedded within the PDF file to guarantee the visual reproduction of all text as created. This requirement is met by having, as a minimum, subsets of all referenced fonts embedded within the PDF/A file. All fonts embedded in PDF/A records must be publicly identified as legally embeddable (i.e., font license permits embedding) in a file for unlimited, universal viewing and printing;

   d. Scanning Production Requirements: Records converted from scanned images also must adhere to the production requirements described in Paragraph 6 below.

4. Tagged Image File Format (TIFF)

   a. In the 'II' format (i.e., little-endian), byte order is always from the least significant byte to the most significant byte.

5. Vector Drawings

   a. Each vector drawing (produced by a Computer-Assisted Design system, or CAD) shall be delivered to DEP in two

different file formats: Native AutoCAD and Portable Document Format (PDF/A).

b. Drawings will be "bound" to include all related matter, such as base files, font files, and shapes. Each file shall be viewable and printable, in its entirety, without recourse to external matter.

c. When reproduced in Computer Output Microfilm, or COM, (see Detailed Specification 01334 - Records in Microfilm Format), drawings shall be converted to a raster image file format. This conversion shall be performed from the PDF/A version of the drawing.

6. Text Files

a. The file format for all text files, whether converted from office automation systems or scanned, is PDF/A.

b. The quality of documents to be scanned shall be governed by ANSI/AIIM MS52 "Recommended Practice for the Requirements and Characteristics of Original Documents Intended for Optical Scanning".

c. Quality Control in the scanning process shall follow the practices established in ANSI/AIIM MS44 "Recommended Practice for Quality Control of Image Scanning" and ANSI/AIIM TR34 "Sampling Procedures for Inspection by Attributes of Images in Electronic Image Management and Micrographic Systems". The sampling rates for each type of Quality Control (visual and printed) shall be established by written agreement with DEP. The Subcontractor producing Final Record Documents shall supply a description of the Quality Control inspection performed as part of the scanning process and a report on the results of the last inspection performed on the images and the date of that inspection.

d. Documents shall be scanned using equipment and scanning parameters sufficient to ensure full reproduction of all significant detail in the documents, such as (but not limited to) curved lines and fill in drawings, color and tonal gradations in photographic images, the smallest printed text, handwritten notes, and signatures. Records may be scanned in bitonal (1-bit) mode and 300 pixels per inch (ppi) or better only when the records consist exclusively of clean printed type possessing high inherent contrast (e.g., laser printed or typeset on a white background). Records shall be scanned in gray scale (8-bit) and 300 ppi or better when the records

consist of textual documents of poor legibility because of low inherent contrast, staining or fading (e.g., carbon copies, thermofax, or documents with handwritten annotations or other markings), or that contain halftone illustrations or photographs. Records shall be scanned in color (24-bit RGB) and 300 ppi or better when the records contain color information important to interpretation or content.

7. Digital Photographs

   a. The file format for digital photographs is TIFF.

   b. Photographic (raster) images shall be produced directly by digital cameras.

   c. Digital cameras shall produce records with true optical resolution. Images shall not be resized or interpolated to a higher resolution from a lower resolution.

   d. Photographic images shall be provided as continuous-tone (8-bit) gray scale or color (24-bit or 48-bit RGB) raster images.

   e. Digital camera files shall be captured as specified in Detailed Specification 01323 - Job Photographs and Videos.

PART 2 PRODUCTS

2.01 FILE TRANSFER MEDIA

A. The current file transfer medium is a DVD-R. Alternative file transfer media may be used, at the discretion of DEP. The DVD-Rs used for producing the electronic Archives shall be:

1. MAM-A Mitsui Gold DVD-R with White Inkjet Printable Surface;

2. Or approved equal.

PART 3 EXECUTION

3.01 GENERAL

A. When creating DVD-Rs, the Contractor should organize the information in separate DVD-R's as presented below. For each Final Record Document, use as many disks as needed to accommodate the materials. The multiple disks will be further labeled to read “1 of x”, “2 of x”, etc. where “x” is the total number of discs. Therefore, if three DVD-Rs are needed to accommodate the material for a specific final record document, the DVD-Rs would be labeled Disk 1 of 3, etc.

In general, separate DVD-R's shall be prepared for the following items:

1. As-Built Drawings (when required);
2. Final Copy Shop Drawings;
3. Bid Set Drawings (Design Drawings);
4. Bid Set - Contract (including Addenda);
5. Conformed Drawings;
6. Conformed Contract;
7. Key Documents;
8. Change Orders;
9. O&M Manuals;
10. Job Photographs;
11. Job Videos
12. Additional Documents.

For projects with a smaller amount of Final Record Document files, some of the above volumes may be combined.

B. The DVD-R label shall include:

1. Project by number, facility, and description;
2. Contract number and title;
3. Description of the Final Record Documents(s) included on the disc;
4. The total number of DVD-Rs for the Final Record Document(s);
5. The date (month and year) of when the materials were archived;
6. The preparer of the Final Record Document (i.e. Contractor or Consultant CM);
7. For O&M Manuals, include the Equipment Item, the Manufacturer, and the related Specification Section number;

An example of a DVD-R label is provided for guidance in Exhibit B, attached at the end of this Section.

C. Files submitted in AutoCAD format shall be bound to include all related matter (e.g., base files, font files and shapes) so that each file is viewable and printable in its entirety without recourse to external files.

D. PDF files shall be 1200 dpi print quality.

3.02 METADATA

A. The Metadata Excel Table shall be included in the DVD-R of each Final Record Document type and shall serve as an index for the files for of the record in the DVD-R. Each file indexed in the Metadata Table shall be hyperlinked so that clicking on the file name opens that file. The filenames given on the Metadata Table must exactly match the files on the DVD-R to which they are hyperlinked.

B. The Metadata Excel tables shall be utilized as the Final Record Document Log. Templates for the Metadata Excel table for each Final Record Document will be provided by the DEP.

C. A sample Metadata Excel table will be provided by DEP.

3.03 ATTACHMENTS

A. Exhibit A – DVD-R Folder Structure

B. Exhibit B - Sampled DVD-R Label

END OF SECTION

NO TEXT ON THIS PAGE

EXHIBIT A

DVD-R Folder Structure

1. The DVD-R shall have a folder structure similar to the ones shown below.
    a. For a DVD-R with one set of Final Record Documents

    "Contract CRO-624 – Bid Drawings (PDF Files)

    (a) Metadata Table- Contract CRO-624 – As-Built Drawings - PDF.xls"

    b. For a DVD-R with more than one set of Final Record Documents:

    "Contract CRO-624 – Bid Drawings (PDF)

    (a) Contract CRO-624 – Bid Drawings (PDF Files)

    (b) Metadata Table- Contract CRO-624 – As-Built Drawings - PDF.xls"

    "Contract CRO-624 – Bid Drawings (AutoCAD)

    (c) Contract CRO-624 – Bid Drawings (AutoCAD Files)

    (d) Metadata Table- Contract CRO-624 – As-Built Drawings - AutoCAD.xls"

EXHIBIT B

Sample DVD-R Label

SECTION 01351
Working in Hazardous (Classification) Locations

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hazardous (Classified) Locations

B. Combustible Gas Detection

C. Qualifications of Combustible Gas Detection Employees

D. Task Hazard Analysis

E. Hot Work Permit

F. Air Monitoring Notices and Reports

1.02 PAYMENT

A. There is no separate payment provision for this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01356 – Environmental Health and Safety Requirements

1.04 REFERENCE STANDARDS

A. OSHA 29 CFR 1910.178 – Powered Industrial Trucks

B. NFPA 820 -- Standard for Fire Protection in Wastewater Treatment and Collection Facilities

1.05 DEFINITIONS

A. Combustible Gas Detection: Performed by use of a gas detector to detect the presence of flammable vapors and gases and to warn when concentrations in air approach the explosive range.

B. Hazardous (Classified) Locations: A location that is classified based on the properties of the flammable vapors, liquids, or gases, or combustible dusts or fibers, that might be present and the likelihood that a flammable or combustible concentration or quantity that is present.

C. Hot Work: Any work involving burning, welding, grinding, or similar operations that are capable of initiating fires or explosions.

D. Rated Equipment and Wiring:

1. Explosion Proof: Equipment and wiring that is enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.

2. Intrinsically Safe: Equipment and wiring that are incapable of releasing sufficient electrical energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture.

3. Approved Industrial Truck: A truck that is listed or approved by a nationally recognized testing laboratory for fire safety purposes for the intended use and designated for the Hazardous (Classified) Location in accordance with the OSHA regulation at 29 CFR 1910.178(b).

E. Lower Explosive Limit (LEL): The concentration of a combustible material in air below which ignition will not occur.

F. Upper Explosive Limit (UEL): The highest concentration of a combustible substance in a gaseous oxidizer that will propagate a flame.

1.06 DESCRIPTION

A. Hazardous (Classified) Locations

1. The Contractor's attention is directed to the fact that certain Work areas where process equipment, tanks or piping systems exist above or below the ground may be configured such that they may be classified to be Hazardous (Classified) Locations as defined in this Section.

2. There are no Hazardous (Classified) Locations at the Work Site.

3. The Contractor shall be aware of the classification of all work areas and understand that the introduction of certain equipment and materials may cause an area to be re-classified as a Hazardous (Classified) Location.

4. The Contractor shall prevent unauthorized work from taking place in any Hazardous (Classified) Location:

   a. Before entering any Hazardous (Classified) Location, the Contractor shall ensure that a safe working atmosphere exists;

b. When working within the Hazardous (Classified) Locations, the Contractor shall take suitable precautions to ensure a safe working atmosphere;

c. The Contractor shall take all necessary protective measures to ensure the safe completion of the Work.

5. Atmospheric monitoring to ensure the protection of employee health and safety must comply with the requirements of the Contractor's Environmental Health and Safety Plan (EHASP) as per Detailed Specification 01356 – Environmental Health and Safety Requirements.

B. Working in Hazardous (Classified) Locations:

1. All Hazardous (Classified) Locations and the extent of such locations shall be identified prior to the performance of Work in Hazardous (Classified) Locations.

2. Work in Hazardous (Classified) Locations shall be performed using only equipment and wiring rated and clearly marked for such use, unless approved Combustible Gas Detection equipment and qualified Combustible Gas Detection personnel are provided to ensure a safe working atmosphere for the duration of the time that employees are working in Hazardous (Classified) Locations.

3. The performance of Hot Work in Hazardous (Classified) Locations is prohibited unless performed under the issuance of a DEP Hot Work permit from the Permit Authorizing Individual (PAI). The Engineer and/or DEP shall provide the PAI.

a. Where the Engineer and DEP are not routinely present on site, the DEP may authorize the Contractor to obtain PAI certification for a Contractor employee in order to issue hot work permits.

b. In active DEP facilities, the Hot Work permit will also be signed off on by the DEP Operating Bureau Designee (OPD).

4. The Contractor shall provide the Engineer with a Job Hazard Analysis (JHA) at least 48 hours prior to the performance of Hot Work in a Hazardous (Classified) Location. The JHA shall identify the following:

a. The Hazardous (Classified) Locations where the Work is to be performed;

b. Equipment and wiring to be used in the Hazardous (Classified) Location;

c. Gases or vapors within or adjacent to the Hazardous (Classified) Location that have the potential to create a combustible atmosphere;

d. Controls required to mitigate or prevent the accumulation of gases or vapors in quantities that have the potential to create a combustible atmosphere;

e. Controls or methods to promptly discontinue the use of and de-energize non-rated equipment when a combustible atmosphere is detected.

5. The Contractor shall not use any non-rated equipment (e.g., powered industrial trucks not specifically rated for the areas to be used) in Hazardous (Classified) Locations without obtaining approval from the Engineer.

a. Where approval is provided the Contractor shall provide the Engineer with documentation that workers using non-rated equipment in the Hazardous (Classified) Location have been provided training and information on the applicable JHA and emergency procedures prior to working with non-rated equipment.

C. Combustible Gas Detection:

1. The Contractor shall arrange for Combustible Gas Detection to be performed by qualified Combustible Gas Detection personnel, as identified within this Section, anytime Work is to be performed in Hazardous (Classified) Locations with equipment and wiring that is not rated for such use. The Contractor shall certify that all Work in Hazardous (Classified) Locations is being performed in a safe atmosphere.

2. Prior to commencing the Work for Combustible Gas Detection, the Contractor shall submit for the approval of the Engineer a communications protocol detailing the type and sequence of warning signals to be utilized, and describing the evacuation procedure to be employed, whenever a hazardous condition occurs.

3. The Contractor shall ensure that Combustible Gas Detection equipment, which is listed by Underwriters Laboratories (UL) and rated for use in Hazardous (Classified) Locations, is calibrated, tested and maintained prior to use in a Hazardous (Classified) Location by qualified persons in accordance with the requirements of the equipment's manufacturer.

4. Prior to the start of Combustible Gas Detection, the Contractor shall:

a. Ensure the gas detection manager has performed an analysis of the work area to evaluate the combustible gas hazards of the location, determine the arrangement of Combustible Gas Detection equipment and implement any further controls necessary to mitigate or prevent the accumulation of a combustible atmosphere (i.e., ventilation controls, equipment positioning, etc.).

b. Calibrate all Combustible Gas Detection equipment in accordance with the manufacturer's requirements, and perform any necessary test functions (e.g., "bump test") at a minimum daily to ensure appropriate use of the equipment in accordance with the manufacturer's requirements.

c. Where the use of non-rated equipment is approved as described within this Section, Position Combustible Gas Detection equipment to establish monitoring results at least 15 minutes prior to the use of any non-rated equipment in a Hazardous (Classified) Location. The following conditions must be present to allow for the initial use of non-rated equipment:

   i. An oxygen level greater than 19.5 percent and less than 23.5 percent concentration;

   ii. A LEL less than 5 percent concentration.

d. Ensure the JHA for performing Hot Work in a Hazardous (Classified) Location is prepared, reviewed and updated by the Contractor's gas detection manager prior to the start of Hot Work and any time:

   i. The scope of Work changes to introduce hazards or a potential for combustible gases or vapors to be present was not previously identified;

   ii. The JHA's hazard evaluation does not adequately address the identified hazards;

   iii. Hazard controls of the JHA have changed or do not sufficiently mitigate or prevent the accumulation of a combustible atmosphere.

e. Provide written verification to the Engineer that all gas detection equipment has been properly calibrated and tested prior to the start of Work in any Hazardous (Classified) Location.

f. Provide written verification to the Engineer that all work areas where non-rated equipment and wiring being used is safe through the issuance of a Notice of Safe Atmosphere

upon calibration and testing of gas detection equipment and prior to the use of non-rated equipment in a Hazardous (Classified) Location.

5. Continuously monitor the Hazardous (Classified) Location with documented readings every 15 minutes. Electronic data logging where gas detection equipment possesses such capabilities is adequate so long as readings are recorded at least every 15 minutes and results are capable of being provided to the Engineer as written documentation.

6. Combustible Gas Detection equipment shall be capable of providing a continuous digital output measuring:

   a. Oxygen in percent concentration;

   b. LEL in percent concentration.

7. A warning condition shall be declared to all affected persons in the area, and the Engineer, by radio, PA, or in person anytime the following condition exists:

   a. LEL greater than 5 percent.

8. Work shall be immediately stopped and non-rated equipment de-energized when any hazardous atmosphere is measured by gas detection equipment. A hazardous atmosphere is determined by the presence of any of the following:

   a. Oxygen levels less than 19.5 percent or greater than 23.5 percent concentration;

   b. LEL greater than 10 percent.

9. When a hazardous atmosphere is present, a hazardous condition shall be declared and the gas detection technicians shall immediately implement the following actions:

   a. Sound a portable air horn to warn all personnel that a hazardous atmosphere exists;

   b. Notify the Contractor and the Engineer by radio communication, PA, or in person that a hazardous condition has been declared;

   c. Notify all persons in the potentially affected areas to immediately evacuate the area and discontinue use of non-rated equipment in Hazardous (Classified) Locations until the Engineer determines the conditions leading to the presence of a hazardous atmosphere, identified corrective actions to mitigate or prevent a re-accumulation of an

unsafe atmosphere, and the atmosphere of the Hazardous (Classified) Location has returned to levels that personnel can safely resume operations in the area;

d. Issue a Notice of Unsafe Atmosphere to the Engineer and ensure access is precluded by the Contractor's personnel in areas where a hazardous atmosphere is present;

e. The Contractor shall make combustible gas detection equipment available to the Engineer during the investigation and corrective/preventative action review.

10. When the Contractor determines that a hazardous atmosphere no longer exists, Work may resume upon issuance of a Notice of Safe Atmosphere in accordance with the procedures identified in this Section.

11. Provide all required Combustible Gas Detection equipment in sufficient quantities, with backups.

a. The number of required equipment shall be determined by the gas detection manager and shall consider the size of work area, work to be performed, location of personnel, and configuration. Gas detection shall be adequate to identify potentially hazardous conditions in any area which could present a hazard to personnel.

1.07 QUALITY ASSURANCE

A. Qualification of Combustible Gas Detection Employees:

1. The Contractor shall ensure the following qualified personnel are available when performing Combustible Gas Detection:

a. A gas detection manager who meets at least one (1) of the following and has been approved by DEP:

i. Certified Industrial Hygienist (CIH) by the American Board of Industrial Hygienists (ABIH) with at least five (5) years of documented professional industrial hygiene and air monitoring management experience.

ii. Certified Safety Professional (CSP) by the Board of Certified Safety Professionals (BCSP) with at least five (5) years of documented professional industrial hygiene and air monitoring management experience.

iii. Bachelor of Science degree in industrial hygiene, occupational safety and health, or environmental health and science and ten (10) years of documented

professional industrial hygiene and air monitoring management experience.

b. Gas detection technicians shall be present as necessary to ensure the continuous monitoring for the presence of combustible gases and shall have no other responsibilities than those of a combustible gas detection technician. Technicians shall meet the following prior to operating Combustible Gas Detection equipment:

i. Trained in the calibration, testing, maintenance and operation of the Combustible Gas Detection equipment being used;

ii. Have a minimum of six (6) months' experience in the monitoring of combustible gases and vapors;

iii. Where confined spaces are involved, possess confined space training to include the responsibilities of the confined space entrant, attendant and entry supervisor.

c. The Engineer shall have the right to interview and review the qualifications of all personnel performing Combustible Gas Detection.

1.08 SUBMITTALS

A. At a minimum, submittals shall include:

1. Prior to the commencement of any Work of this Section, the following items shall be submitted to the Engineer:

a. Qualifications of the Combustible Gas Detection employees.

2. In addition, during the performance of Work, the Contractor shall submit the following items as required in this Section:

a. JHA;

b. Communications protocol;

c. Written verification of equipment calibration;

d. Written review and verification of conditions;

B. Air Monitoring Notices and Reports

1. The Contractor shall prepare and submit the following air monitoring notices and reports to the Engineer:

a. Notice of Safe Atmosphere:

i. When a previously determined hazardous atmosphere has been eliminated, and immediately after completing the procedures required above, the Contractor shall prepare and deliver a Notice of Safe Atmosphere to the Engineer;

ii. If the Notice of Safe Atmosphere is issued to rescind a Notice of Unsafe Atmosphere, it shall identify the contributing factors leading to the unsafe atmosphere and the necessary corrective actions to prevent reoccurrence.

b. Notice of Unsafe Atmosphere:

i. This notice shall be prepared on site when a hazardous condition is detected and immediately after all notifications required above within this Section have been completed. The Notice of Unsafe Atmosphere shall specify the type(s) and concentration(s) of gas(es) detected, the nature of the gas hazard and the location where, and the time when the hazard has been detected;

ii. This notice shall be presented to the Engineer immediately upon completion.

C. Daily Log Report

1. The daily log report shall be provided to the Engineer daily and provide the Combustible Gas Detection equipment's readings in 15 minute intervals. Location and other task specific information shall be included in the daily report.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01355
Hazardous Materials Control

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Known Hazardous Materials

B. Unforeseen Hazardous Materials

C. Hazardous Materials Investigation and Remediation

D. Hazardous Waste Management and Regulatory Compliance

1.02 PAYMENT

A. Except for the allowance specified herein, no separate payment will be made for performing any other Work required under this Section.

1.03 RELATED SECTIONS

A.	Detailed Specification 01270	--	Measurement and Payment
B.	Detailed Specification 01356	--	Environmental, Health and Safety Requirements
C.	Detailed Specification 02116	--	Above Ground Storage Tank Removal and Disposal
D.	Detailed Specification 13281	--	Asbestos Management
E.	Detailed Specification 13282	--	Mercury Management
F.	Detailed Specification 13283	--	Lead Management
G.	Detailed Specification 13284	--	PCB Management

1.04 REFERENCE STANDARDS

A. 29 CFR 1910 – OSHA General Industry Regulations;

B. 29 CFR 1926 – OSHA Construction Industry Regulations;

C. 6 NYCRR 364, 370-375 – NYSDEC Hazardous Waste Regulations & Environmental Remediation Program;

1.05 DEFINITIONS

A. Competent Person: One who is capable of identifying existing and predictable hazards in the work area or unsanitary, hazardous, or dangerous working conditions, and who has authority to take prompt corrective measures (29 CFR 1926.32(f)).

B. Large Quantity Generator (LQG): A facility that generates (in a calendar month) ≥1,000 kg of total hazardous waste or >1 kg of acute

hazardous waste or >100 kg of acute hazardous waste spill residue or soil, or at any time stores hazardous and acute hazardous wastes in greater quantities (at any time) than 6,000 kg of hazardous waste, 1 kg acute hazardous waste, or 100 kg of acute hazardous waste spill residue or soil.

1.06 DESCRIPTION

A. Known Hazardous Materials

1. There are materials present within the designated Work areas that will require special handling and other safeguard measures in order to minimize chemical exposure hazards to site workers and to prevent environmental impacts to offsite areas. As applicable to its Work, the Contractor shall incorporate these minimum requirements into its Environmental, Health and Safety Plan (EHASP) or other applicable submittal to ensure a safe and healthful working environment. The EHASP shall be designed in accordance with Section 01356 – Environmental, Health and Safety Requirements.

    a. Upon completion of any additional material sampling at the Work Site(s), the Contractor's EHASP shall be updated as needed to incorporate new data generated by analysis of the samples.

2. These materials include lead, asbestos, PCBs, universal wastes, and other miscellaneous regulated wastes as summarized in Tables 1 through 29 as provided at the end of this Section, and as shown on Contract Drawings. Additional details pertaining to the hazardous materials investigation, including sample locations are provided in the Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC. All hazardous material remediation shall be performed by the Contractor.

3. The Contractor shall not initiate or proceed with any Work in areas associated with the contaminated, potentially hazardous, or hazardous materials until these materials have been removed from these areas or managed in accordance with the DEP Paint Management Policy, the DEP Hazardous Waste Management Policy, and the following Specifications:

    a. Asbestos-containing material shall be handled in accordance with Section 13281 – Asbestos Management

    b. Mercury-containing material shall be handled in accordance with Section 13282 – Mercury Management

    c. Lead-containing paint shall be handled in accordance with Section 13283 – Lead Management

d. PCB-containing material shall be handled in accordance with Section 13284 – PCBs Management

4. The Contractor shall attend an initial site inspection, a coordination conference, and any other meetings to review hazardous materials control issues in connection with the progress of the Work. The initial site inspection and coordination conference shall be as described below. Other meetings to monitor hazardous materials control issues associated with the Work, including any briefing of DEP personnel, including, but not limited to, facility managers and supervisors, shall be scheduled as necessary.

   a. Initial Site Inspection: Within five (5) business days after Work commencement date in the Notice to Proceed, five (5) business days after approval of the environmental health and safety (EHS) Resources, or an agreed upon timeframe, the Contractor, the Engineer, and applicable DEP personnel shall perform an initial site inspection to review all the Work areas that will be affected by contaminated, potentially hazardous and hazardous materials. EHS Resources are defined in Section 01356 – Environmental Health and Safety Requirements.

      i. Initial site inspection shall be organized by the Contractor who shall contact DEP, and the Engineer to determine the representatives that should attend.

      ii. A minimum of one representative from each party shall be present for the inspection.

      iii. Competent Persons shall lead the site inspection.

      iv. Wipe sampling or sampling outside of the Work to be performed may not be performed without DEP approval.

      v. A site inspection report shall be distributed by the Contractor at the beginning of the site inspection. The site inspection report shall include drawing(s) and associated text that describes the work in sufficient detail to aid in the site inspection.

      vi. The Contractor shall note in the site inspection report any special requirements that they have to perform their Work during the inspection.

      vii. The Contractor shall prepare and distribute a summary of the site inspection and any comments noted during the inspection to all parties present at the site inspection.

viii. In the event that the initial site inspection does not satisfactorily identify the contaminated, potentially hazardous, and hazardous materials potentially affecting the Work, follow-up inspection(s) shall be organized and held as required.

b. Coordination Conference: Within five (5) business days after receipt of the submittals from the initial site inspection, the Engineer will direct the Contractor to schedule and organize a coordination conference. The coordination conference shall be held at the Engineer's field office, and shall include DEP facility managers and supervisors as relevant.

i. The coordination conference shall be led by the Contractor.

ii. The Contractor shall prepare and distribute a summary of the conference and any comments noted during the conference to all parties present at the conference.

c. Coordination Plan: Within 14 business days after the coordination conference, the Contractor shall submit a coordination plan for Work affected by contaminated, potentially hazardous, and hazardous materials, incorporating all the Engineer's comments, for the Engineer's approval.

d. Follow-up Conferences: Within 14 business days of receiving the coordination plan, the Engineer will review and notify the Contractor of the approval of the coordination plan or of required changes. In the event that the plan is not approved, follow-up conference(s) shall be organized and held as required to receive approval.

i. The follow-up conference dates shall be as directed by the Engineer.

B. Unforeseen Hazardous Material

1. The Work Sites may contain unforeseen hazardous materials. When a potentially hazardous material that was previously unforeseen is discovered or an upgrade of its EHASP is necessary for managing unforeseen hazardous material, the Engineer will direct the Contractor to engage the services of a hazardous materials specialist to perform the necessary investigation, develop a remediation plan, and perform the remediation work. Additionally, the Engineer will direct the Contractor to update its EHASP as necessary.

2. The Contractor shall be responsible for identifying previously unknown and suspect hazardous materials as they are encountered using approved techniques and analytical methodologies. The Contractor shall submit a sampling plan to the Engineer for acceptance prior to sample collection. Indication of the presence of hazardous materials, including but not limited to odorous or stained soils, sediment or liquids, mercury sources and suspect asbestos containing materials must be immediately reported to the Engineer. All Work in the area shall stop until otherwise directed by the Engineer.

3. In the event that hazardous material is detected, the Engineer will provide the Contractor with a scope of work for the remediation services and direct the Contractor to obtain cost proposals for such work from at least three (3) hazardous material specialists unless otherwise required by the DEP depending upon the magnitude and timing of the work. The Contractor shall submit the proposals, indicating which hazardous material specialist the Contractor proposes to engage, to the Engineer within ten (10) business days of receiving the scope of remediation work. The Engineer shall review the proposals and approve such selection or direct the Contractor to submit an alternative selection or obtain additional proposals. Remediation work shall not commence until the Contractor receives written notice from the Engineer to proceed with the work. As directed by the Engineer, pre-remediation inspections and coordination may also be required, in a manner similar to the procedures for known hazardous materials.

4. Soils testing and analysis shall be performed in accordance with Section 02105 – Soil Sampling and Analysis. In the event that hazardous levels of lead are detected in soil, the DEP will provide the Contractor with a Community Air Monitoring Program (CAMP) to include particulate air monitoring. The Engineer will direct the Contractor to obtain cost proposals for work of the CAMP from at least three (3) experienced firms unless otherwise required by the DEP depending upon the magnitude and timing of the work. Within five (5) business days of receiving the CAMP, the Contractor shall submit the cost proposals to the Engineer, indicating which firm the Contractor proposes to engage. The Engineer shall review the cost proposals and approve such selection or direct the Contractor to submit an alternative selection or obtain additional proposals. CAMP work shall not commence until the Contractor receives written notice from the Engineer to process with the work.

5. The Contractor shall not initiate or proceed with any other Work in areas associated with contaminated, potentially hazardous, or hazardous materials until these materials have been removed

from these areas or managed, "in accordance with the following Specifications:

a. Asbestos-containing material shall be handled in accordance with Section 13281 – Asbestos Management

b. Mercury-containing material shall be handled in accordance with Section 13282 – Mercury Management

c. Lead-containing paint shall be handled in accordance with Detailed Section 13283 – Lead Management

d. PCB-containing material shall be handled in accordance with Section 13284 – PCBs Management

6. Some of the remediation work may be critical to maintaining construction schedules. When this occurs, the Engineer will establish a time for completion.

C. Hazardous Waste Management and Regulatory Compliance

1. Hazardous Waste Contingency Plan and Hazardous Waste Minimization Plan

a. If the location of the project is on a site which has a Large Quantity Generator (LQG) status or subsequently obtains LQG status during the course of the Work, then the Contractor shall conform to the requirements of the Hazardous Waste Contingency Plan and Hazardous Waste Minimization Plan for that site.

2. Hazardous Waste Storage Compliance

a. The Contractor shall maintain compliance with hazardous waste storage requirements at the Work Site. Storage areas and inspections of storage areas must comply with the hazardous waste regulations detailed within 6 NYCRR Parts 370 through 375.

3. Waste Management Records

a. Disposal of wastes generated by remediation Work will be based on the results of testing and shall be at a site permitted to accept such waste by the U.S. Environmental Protection Agency (EPA) or an authorized state or local government agency. The Contractor shall provide remediation waste profiles for DEP signature as generator, permit documentation required for the selected Treatment, Storage, or Disposal Facility (TSDF) to receive these wastes, and the transporter's 6 NYCRR Part 364 Waste Transporter Permit(s) required to transport wastes to the TSDF. The Contractor will conduct due diligence of the TSDF,

including a list of violations received. The Contractor shall also provide advance copies of the waste manifest(s) for the Engineer's review and approval. The Contractor will keep and update a Hazardous Waste Inventory Log and will document weekly inspections by a Competent Person in the management of hazardous waste.

b. The Contractor shall submit written evidence that selected TSDF's will accept or have accepted the wastes generated during remediation. The Contractor shall also submit copies of the completed manifest, signed and dated by the initial transporter, in accordance with federal and state requirements and with associated documentation (e.g., Waste Profile and Hazardous Waste Land Disposal Restrictions (LDR) Notification and Certification Form). Copies of completed and signed waste manifests from TSDF's shall be provided to the Engineer as soon as possible but no later than thirty (30) days of waste shipment offsite.

4. Changes to Hazardous Waste Generator Status

a. The Contractor shall be aware that work activities may result in a change to the Work Site's hazardous waste generator status. Compliance with the revised generator status is required.

5. Hazardous Waste Regulatory Program Fees and Taxes

a. The Contractor may be directed to pay the New York State Department of Taxation and Finance for special assessments on hazardous waste generated at the Project Site or the NYSDEC regulatory program fees charged to the facility operating at the Site. When directed by the Engineer, the Contractor shall pay the amount indicated within 48 hours of notification. The Contractor will be reimbursed for the amount paid, with no provision for overhead and profit, from the allowance provided for unforeseen hazardous materials remediation as specified in Section 01270 – Measurement and Payment.

1.07 QUALITY ASSURANCE

A. Remediation plans for unforeseen hazardous materials shall comply with all applicable requirements of federal, state, and local hazardous waste regulations and shall include, but not be limited to the following:

1. Identification of hazardous and regulated/non-hazardous wastes associated with the Work.

2. Estimated quantities of wastes to be generated and disposed of.
3. Names and qualifications of each Subcontractor that will be testing, transporting, storing, and disposing of wastes. Include the facility location and a 24-hour telephone contact number and applicable transporter and TSDF permits, EPA Identification Numbers, and insurance certificates.
4. Names and qualifications (experience and training) of personnel who will be responsible for on-site management of hazardous wastes.
5. Detailed description of the containment and removal procedures.
6. List of waste handling equipment to be used in performing the remediation Work, to include cleaning, volume reduction, and transport equipment.
7. Spill prevention and cleanup contingency measures to be implemented.
8. Work plan for waste management, on-site storage, removal and disposal.
9. Detailed schedule indicating the beginning and completion dates for each activity and each Work area, including time for clean-up, inspection, and monitoring activities.

1.08 SUBMITTALS

A. The following items shall be submitted as described above for the Engineer's approval:
   1. Site Inspection Report
   2. Coordination Plan for Known Hazardous Materials and, when required, for Unknown Hazardous Materials.
   3. Remediation Plan for Unforeseen Hazardous Materials, when required.
   4. Three (3) cost proposals from hazardous materials specialists for remedial action work, when required.
   5. Written evidence of disposal of hazardous and non-hazardous waste at an approved facility in accordance with the requirements of this Section.
   6. EHASP upgrades as needed in accordance with Section 01356 – Environmental, Health and Safety Requirements.

B. The Contractor, when requested by the Engineer, shall provide additional copies of all reports and related materials as may be needed for conferences with the Commissioner and other agencies having jurisdiction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

Table 1
Summary of Lead and PCB Analysis on Paints

Sample ID	Location	Sample Description	Substrate	Color	Result (mg/kg)*	
					Lead	PCBs
191-LBP-01[a]	Microbiology Office	Ceiling	Cement	Beige	0.0912%	NA
191-19-LCP-01[a,1]	Microbiology Office	Ceiling	Cement	Beige	0.105%	5.61
191-LBP-02[a]	Boiler Room	Duct	Metal	Black	0.264%	NA
191-01-LCP-01[a,2]	Boiler Room	Duct	Metal	Black	0.205%	ND
191-LBP-03[a]	Boiler Room	Boiler	Metal	Silver	0.213%	NA
191-01-LCP-02[a,3]	Boiler Room	Boiler	Metal	Silver	0.104%	ND
191-LBP-04[a]	Storage Room	Ceiling	Cement	Beige	0.512%	NA
264428.02[b]	Attic	Duct work	Unknown	Unknown	820	2.9
264428.03[b]	Lunch Room	Unknown	Unknown	White	1,000	3.7
264428.04[b]	Lunch Room	Unknown	Unknown	Beige	350	ND
264428.05[b]	Drafting Room	Ceiling beams	Unknown	Unknown	1,800	3.2
264428.06[b]	Library	Walls	Unknown	Unknown	320	3.3
264428.07[b]	First Floor	Ceiling tiles	Unknown	Unknown	20	2.6
264428.08[b]	Boiler Room	Walls	Unknown	Unknown	5,600	26
CAT423-2ND-PC-01	Second Floor, Library and Conference Room	Walls	Plaster	Blue over beige	9,000	13.6
CAT423-2ND-PC-02	Second Floor, Hallway	Walls	Plaster	Green	2,510	4.56
CAT423-2ND-PC-03	Second Floor, Men's Bathroom	Sink drain pipe	Metal	White	1,400	2.14
CAT423-2ND-PC-04	Second Floor, Watershed Division Engineer's Office	Walls	Plaster	Beige over blue	1,560	3.49

Table 1
Summary of Lead and PCB Analysis on Paints

Sample ID	Location	Sample Description	Substrate	Color	Result (mg/kg)*	
					Lead	PCBs
CAT423-2ND-PC-05	Second Floor, Watershed Division Engineer's Office	Walls	Plaster	Yellow	2,890	10.9
CAT423-2ND-PC-06	Second Floor, Stairwell	Hand rail	Metal	Black	38,500	ND
CAT423-ATT-PC-07	Attic	Frame work	Metal	Silver	88,000	5.13
CAT423-ATT-PC-08	Attic	Frame work	Metal	Yellow over silver	268	ND
CAT423-1ST-PC-09	First Floor, Sample Reception Room	Floor	Concrete	Grey/blue	35.8	ND
CAT423-1ST-PC-10	First Floor, Offices	Door	Metal	Beige over green	15.1	14.5
CAT423-BASE-PC-11	Basement, Boiler Room	Drain pipe	Metal	Black	4,720	30.6
CAT423-BASE-PC-12	Basement, Storage Room	Floor	Cement	Green	472	0.485
CAT423-BASE-PC-13	Basement, Hallway	Walls	Cement	White	26,800	20.7
CAT423-BASE-PC-14	Basement, Storage Room	Walls	Brick	Beige	5,490	6.16
CAT423-BASE-PC-15	Basement, Boiler Room	Main panel	Metal	Silver	2,810	22
CAT423-1ST-PC-16	First Floor, Garage	Floor	Concrete	Green	40.3	ND
CAT423-1ST-PC-17	First Floor, Garage	Support beam	Metal	Grey over red	126,000	ND
CAT423-BASE-PC-18	Basement, Crawlspace	Drain pipe	Metal	Black	310,000	52.7
CAT423-BASE-PC-19	Basement, Crawlspace	Drain pipe	Metal	Brown	533,000	128
CAT423-BASE-PC-20	Basement, Crawlspace	Piping	Metal	Blue	634,000	5.19
CAT423-BASE-PC-21	Basement, Crawlspace	Piping	Metal	Green	9,900	702
CAT423-BASE-PC-22	Basement, Crawlspace	Piping	Metal	Yellow	67,600	145

Table 1
Summary of Lead and PCB Analysis on Paints

Notes:

(1) Samples collected by Bidwell Environmental in December, 2017 and January, 2018.

(2) The DEP and HUD action level used to define lead based paints is 5,000 mg/kg or 0.5%. The regulatory limit for defining TSCA-regulated PCBs is 50 mg/kg. However, any detected concentration of lead or PCBs in paint has the potential to affect worker health and safety during certain construction activities and shall be addressed in the Contractor's health and safety protocol for the affected work.

(3) Sample results noted above are considered representative of similarly painted structures, equipment, and substrates.

* - Unless otherwise noted

[a] - Samples collected by URS in September, 2004 for the Facility-Specific Assessment Report.

[b] - Samples collected in November, 2006.

[1] - Sample is homogenous to 191-LBP-01

[2] - Sample is homogenous to 191-LBP-02

[3] - Sample is homogenous to 191-LBP-03

Table 2
Summary of Lead Analysis on Miscellaneous Materials

Sample ID	*Location*	*Sample Description*	*Color*	*Result (mg/kg)*
CAT423-2ND-PB-01	Second Floor, Library and Conference Room	Vinyl covebase	Grey	6.91
CAT423-2ND-PB-02	Second Floor, Hallway	Vinyl covebase	Black	ND
CAT423-1ST-PB-03	First Floor, Offices	Glazed wall tile	Green	50.4

Notes:
(1) Samples collected by Bidwell Environmental in December, 2017.
(2) Any detected concentration of lead has the potential to affect worker health and safety during certain construction activities and shall be addressed in the Contractor's health and safety protocol for the affected work.
(3) Sample results noted above are considered representative of materials with similar age, appearance, and texture.
ND - Not Detected

Table 3
Summary of PCB Analysis on Miscellaneous Materials

Sample ID	Area	Location	Material Description	Color	Result (mg/kg)
264428.01[a]	Second Floor, Lunch Room	Window	Caulk	Unknown	ND
CAT423-1ST-PCB-01	First Floor, General Lab	Interior window	Caulk	Grey	8.13
CAT423-BASE-PCB-02	Basement, Boiler Room	Door	Caulk	Beige	13.1
CAT423-BASE-PCB-03	Basement, Boiler Room	Ground	Tar	Black	ND
CAT423-EXT-PCB-04	Exterior	Window	Caulk	Grey	ND
CAT423-1ST-PCB-05	First Floor, Garage	Floor joint	Caulk	Green	ND
CAT423-1ST-PCB-06	First Floor, Garage	Base of wall	Caulk	Yellow	ND
CAT423-EXT-PCB-07	Exterior	Vent	Caulk	White	ND
CAT423-EXT-PCB-08	Exterior	Entrance curb	Expansion joint	Black	ND
CAT423-EXT-PCB-09	Exterior	Window	Caulk	White	ND
CAT423-BASE-PCB-10	Basement, Crawlspace	Base of wall	Tar	Black	ND
CAT423-1ST-PCB-11	First Floor, Offices	Door closer	Oil	Brown	7.87

Notes:

(1) Samples collected by Bidwell Environmental in December, 2017, January, 2018, and March 2018.

(2) The regulatory limit for defining TSCA-regulated PCBs is 50 mg/kg. However, any detected concentration of PCBs has the potential to affect worker health and safety during certain construction activities and shall be addressed in the Contractor's health and safety protocol for the affected work.

(3) Sample results noted above are considered representative of materials with similar age, appearance, and texture.

[a] - Sample collected in November, 2006.

ND - Not Detected

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)* PLM	PLM-NOB	TEM
0105040201E[a]	**–**	**First Floor, Garage**	**Old incubator, top cavity in cabinet**	**Gray air cell sheet insulation**	**28.57**	**NA**	**NA**
0105040202E[a]	**–**	**First Floor, Garage**	**Left door, cavity in cabinet**	**Gray air cell sheet insulation**	**33.33**	**NA**	**NA**
0913040201E[b]	**–**	**First Floor, Back Door Room**	**Heat pipe at ceiling**	**White insulation**	**36.4**	**NA**	**NA**
0913040202E[b]	**–**	**First Floor, Main Lab Area**	**Heat pipe at ceiling**	**White insulation**	**44.4**	**NA**	**NA**
0913040203E[b]	**–**	**First Floor, Bottle Wash Room**	**Heat pipe at ceiling**	**White insulation**	**40**	**NA**	**NA**
0913040204E[b]	–	First Floor, Bottle Wash Room	Ceiling	Black ceiling tile glue	IND	NA	ND
0913040205E[b]	–	First Floor, Back Room Left	Ceiling	Black ceiling tile glue	IND	NA	NA
0913040206E[b]	–	First Floor, East Back Room	Ceiling	Black ceiling tile glue	IND	NA	NA
0913040207E[b]	–	First Floor, Back Left Room	Ceiling	Brown fiber ceiling tile	ND	NA	NA
191-01-01[c]	**–**	**Attic**	**HVAC system**	**Sealants (duct batting mastic)**	**7**	**NA**	**NA**
191-01-02[c]	**–**	**Attic**	**HVAC system**	**Sealants (duct batting mastic)**	**NA**	**NA**	**NA**
191-01-03[c]	**–**	**Attic**	**HVAC system**	**Sealants (duct batting mastic)**	**NA**	**NA**	**NA**
191-02-01[c]	–	Second Floor, Microbiology Office	Ceiling	Suspended ceiling tiles	ND	NA	NA

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)* PLM	PLM-NOB	TEM
191-02-02[c]	–	Second Floor, Microbiology Office	Ceiling	Suspended ceiling tiles	ND	NA	NA
191-02-03[c]	–	Second Floor, Microbiology Office	Ceiling	Suspended ceiling tiles	ND	NA	NA
191-03-01[c]	–	First Floor, Autoclave and Bottle Lab	Ceiling	Ceiling tile mastic	ND	NA	NA
191-03-02[c]	–	First Floor, Autoclave and Bottle Lab	Ceiling	Ceiling tile mastic	ND	NA	NA
191-03-03[c]	–	First Floor, Autoclave and Bottle Lab	Ceiling	Ceiling tile mastic	ND	NA	NA
191-04-01[c]	–	First Floor, Autoclave and Bottle Lab	Ceiling	Plaster with scratch coat	ND	NA	NA
191-04-02[c]	–	First Floor, Autoclave and Bottle Lab	Ceiling	Plaster with scratch coat	ND	NA	NA
191-04-03[c]	–	First Floor, Autoclave and Bottle Lab	Ceiling	Plaster with scratch coat	ND	NA	NA
191-05-01[c]	–	First Floor, Wet Chem Lab	Door	Caulk	<1 Trace	NA	NA
191-05-02[c]	–	First Floor, Wet Chem Lab	Door	Caulk	<1 Trace	NA	NA
191-05-03[c]	–	First Floor, Wet Chem Lab	Door	Caulk	<1 Trace	NA	NA
191-06-01[c]	–	**Basement, Boiler Room**	**Door**	**Caulk**	**2.25**	**NA**	**NA**
191-06-02[c]	–	**Basement, Boiler Room**	**Door**	**Caulk**	**NA**	**NA**	**NA**
191-06-03[c]	–	**Basement, Boiler Room**	**Door**	**Caulk**	**NA**	**NA**	**NA**
0222060201E[d]	–	First Floor, Chemical Lab	Unknown	Brown ceiling debris	ND	NA	NA
0222060202E[d]	–	First Floor, Chemical Lab	Unknown	Brown ceiling debris	ND	NA	NA
0821060210E[e]	–	**Front Entrance**	**Canopy**	**Black membrane tar**	**IND**	**NA**	**NA**
0821060211E[e]	–	**Front Entrance**	**Canopy**	**Black membrane tar**	**IND**	**NA**	**NA**

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	PLM-NOB	TEM
0821060212E[e]	–	**Front Entrance**	**Canopy**	**Black membrane tar**	**IND**	**NA**	**NA**
0821060213E[e]	–	**Front Entrance**	**Canopy**	**Black membrane tar**	**10.6**	**NA**	**NA**
1[g]	–	**Second Floor, Lunch Room**	**Left side**	**Gray window frame caulking**	**NA**	**5.1**	**NA**
2[g]	–	**Second Floor, Lunch Room**	**Left side**	**Gray window frame caulking**	**NA**	**4.2**	**NA**
3[g]	–	**Second Floor, Lunch Room**	**Left side**	**Gray window frame caulking**	**NA**	**5.8**	**NA**
4[g]	–	**Attic**	**Duct exhaust**	**Brown mastic**	**NA**	**6**	**NA**
5[g]	–	**Attic**	**Duct exhaust**	**Brown mastic**	**NA**	**4**	**NA**
6[g]	–	**Attic**	**Duct exhaust**	**Brown mastic**	**NA**	**4.5**	**NA**
7[g]	–	Attic	Main air handler	Dark brown duct vibration	ND	NA	NA
8[g]	–	Attic	Fan #1	Black duct vibration	ND	NA	NA
9[g]	–	Attic	Fan #2	Dark brown duct vibration	ND	NA	NA
10[g]	–	Attic	Fan #2	Dark brown duct vibration	ND	NA	NA
11[g]	–	Attic	Fan #3	Dark brown duct vibration	ND	NA	NA
12[g]	–	Second Floor, Lunch Room	Southeast corner	Brown 2x4' ceiling tile	ND	NA	NA
13[g]	–	Second Floor, Lunch Room	Southeast corner	Brown 2x4' ceiling tile	ND	NA	NA
14[g]	–	Second Floor, Lunch Room	Southeast corner	Brown 2x4' ceiling tile	ND	NA	NA
15A[g]	–	Second Floor, Lunch Room	East side, southeast corner	White ceiling plaster	ND	NA	NA

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)* PLM	PLM-NOB	TEM
15B[g]	–	Second Floor, Lunch Room	East side, southeast corner	Brown ceiling plaster	ND	NA	NA
16A[g]	–	Second Floor, Lunch Room	West side, southwest corner	White ceiling plaster	ND	NA	NA
16B[g]	–	Second Floor, Lunch Room	West side, southwest corner	Brown ceiling plaster	ND	NA	NA
17A[g]	–	Second Floor, Lunch Room	West side, southwest corner	White ceiling plaster	ND	NA	NA
17B[g]	–	Second Floor, Lunch Room	West side, southwest corner	Brown ceiling plaster	ND	NA	NA
18[g]	–	Second Floor, Library-Conference Room	Northeast corner	Brown 2x4' ceiling tile	ND	NA	NA
19[g]	–	Second Floor, Library-Conference Room	Southwest corner	White 2x4' ceiling tile	ND	NA	NA
20[g]	–	Second Floor, Library-Conference Room	Southwest corner	White 2x4' ceiling tile	ND	NA	NA
21A[g]	–	Second Floor, Library-Conference Room	Southwest corner	White ceiling plaster	ND	NA	NA
21B[g]	–	Second Floor, Library-Conference Room	Southwest corner	Brown ceiling plaster	ND	NA	NA
22A[g]	–	Second Floor, Library-Conference Room	Southwest corner	White ceiling plaster	ND	NA	NA
22B[g]	–	Second Floor, Library-Conference Room	Southwest corner	Brown ceiling plaster	ND	NA	NA
23A[g]	–	Second Floor, Library-Conference Room	Northeast corner	White ceiling plaster	ND	NA	NA
23B[g]	–	Second Floor, Library-Conference Room	Northeast corner	Brown ceiling plaster	ND	NA	NA

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
24[g]	–	First Floor, Auto Clave Room	Northeast corner	White plaster beam coat	ND	NA	NA
25[g]	–	First Floor, Auto Clave Room	Northeast corner	Yellow 9x9" ceiling tile	ND	NA	NA
26[g]	–	First Floor, Auto Clave Room	Northeast corner	Yellow 9x9" ceiling tile	ND	NA	NA
27[g]	–	First Floor, Auto Clave Room	Northeast corner, duct wall	Yellow 9x9" ceiling tile	ND	NA	NA
28[g]	–	First Floor, Auto Clave Room	Northeast corner, duct wall	Brown duct mesh plaster	ND	NA	NA
29[g]	–	First Floor, Auto Clave Room	Northeast corner, duct wall	Brown duct mesh plaster	NA	NA	NA
30A[g]	–	**First Floor, Auto Clave Room**	**Duct work, east side**	**Black duct insulation spot coating**	**NA**	**8**	**NA**
30B[g]	–	First Floor, Auto Clave Room	Northeast corner duct, east	Yellow duct insulation	ND	NA	NA
31A[g]	–	**First Floor, Auto Clave Room**	**Duct work, east side**	**Black duct insulation spot coating**	**NA**	**7.5**	**NA**
31B[g]	–	First Floor, Auto Clave Room	Northeast corner duct east	Yellow duct insulation	ND	NA	NA
32[g]	–	First Floor, Auto Clave Room	Northeast corner, ceiling	Brown ceiling tile glue	NA	IND	ND
33[g]	–	First Floor, Auto Clave Room	Northeast corner duct, east wall	Brown ceiling tile glue	NA	IND	ND
34[g]	–	First Floor, Auto Clave Room	Northeast corner duct, east wall	Brown ceiling tile glue	ND	IND	ND

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
35A[g]	–	First Floor, Auto Clave Room	South middle area, upper	White wall plaster	ND	NA	NA
35B[g]	–	First Floor, Auto Clave Room	South middle area, upper	Brown wall plaster	ND	NA	NA
36A[g]	–	First Floor, Auto Clave Room	South middle area, upper	White wall plaster	ND	NA	NA
36B[g]	–	First Floor, Auto Clave Room	South middle area, upper	Brown wall plaster	ND	NA	NA
37A[g]	–	First Floor, Auto Clave Room	Northwest corner, upper area	White wall plaster	ND	NA	NA
37B[g]	–	First Floor, Auto Clave Room	Northwest corner, upper area	Brown wall plaster	ND	NA	NA
38[g]	–	First Floor, Auto Clave Room	South wall, upper area	Pale green ceramic brick	ND	NA	NA
39[g]	–	First Floor, Auto Clave Room	South wall, upper area	Pale green ceramic brick	ND	NA	NA
40[g]	–	First Floor, Auto Clave Room	South wall, upper area	Pale green ceramic brick	ND	NA	NA
41[g]	–	First Floor, Water & Sewer Lab	West side, duct wall	Brown duct mesh plaster	ND	NA	NA
42[g]	–	First Floor, Water & Sewer Lab	West side, duct wall	Brown duct mesh plaster	ND	NA	NA
43[g]	–	First Floor, Water & Sewer Lab	West side, middle area	Yellow 9x9" ceiling tile	ND	NA	NA
44A[g]	–	**First Floor, Water & Sewer Lab**	**South end**	**Black duct insulation spot coating**	**NA**	**6.4**	**NA**

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)* PLM	PLM-NOB	TEM
44B[g]	–	First Floor, Water & Sewer Lab		Yellow duct insulation	ND	NA	NA
45[g]	–	First Floor, Water & Sewer Lab	South end	Gray duct insulation cement	ND	NA	NA
46[g]	–	First Floor, Water & Sewer Lab	South end	Gray duct insulation cement	ND	NA	NA
47[g]	–	First Floor, Water & Sewer Lab	South end	Gray duct insulation cement	ND	NA	NA
48[g]	–	Basement, Boiler Room	South side, middle	Grey wall concrete	ND	NA	NA
49[g]	–	Basement, Boiler Room	South side, middle	Grey wall concrete	ND	NA	NA
50[g]	–	Basement, Boiler Room	South side, middle	Grey wall concrete	ND	NA	NA
51[g]	–	Basement, Boiler Room	South side, above boiler	Grey beam concrete	ND	NA	NA
52[g]	–	Basement, Boiler Room	South side, above boiler	Grey beam concrete	ND	NA	NA
53[g]	–	Basement, Boiler Room	South side, above boiler	Grey beam concrete	ND	NA	NA
1218070201E[h]	–	**First Floor, Chem Room**	**HVAC duct insulation**	**Grey vapor barrier below batting**	**6**	**NA**	**NA**
1218070202E[h]	–	**First Floor, Chem Room**	**HVAC duct insulation**	**Grey vapor barrier below batting**	**6**	**NA**	**NA**
1218070203E[h]	–	**First Floor, Chem Room**	**HVAC duct insulation**	**Grey vapor barrier below batting**	**6**	**NA**	**NA**
1218070204E[h]	–	First Floor, Auto Clave Room	Ceiling	Grey concrete	ND	NA	NA
1218070205E[h]	–	First Floor, Auto Clave Room	Ceiling	Grey concrete	ND	NA	NA
1218070206E[h]	–	First Floor, Auto Clave Room	Ceiling	Grey concrete	ND	NA	NA

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
02130802-01E[i]	–	Attic	Inside HVAC unit	Fiberglass insulation liner	ND	NA	NA
02130802-02E[i]	–	Attic	Inside HVAC unit	Fiberglass insulation liner	ND	NA	NA
02130802-03E[i]	–	Attic	Inside HVAC unit	Fiberglass insulation liner	ND	NA	NA
02130802-04E[i]	–	Attic	Inside HVAC unit	Black adhesive	NA	IND	<1 (Trace)
02130802-05E[i]	–	Attic	Inside HVAC unit	Black adhesive	NA	IND	ND
02130802-06E[i]	–	Attic	Inside HVAC unit	Black adhesive	NA	IND	<1 (Trace)
02130802-07E[i]	–	**Attic**	**Inside HVAC unit**	**Gasket at top seam**	**NA**	**IND**	**1.4**
02130802-08E[i]	–	**Attic**	**Inside HVAC unit**	**Gasket at top seam**	**NA**	**IND**	**0.2 (Trace)**
02130802-09E[i]	–	**Attic**	**Inside HVAC unit**	**Gasket at top seam**	**NA**	**IND**	**0.2 (Trace)**
02130802-10E[i]	–	**Attic**	**HVAC duct**	**Residual tar covering**	**NA**	**12.5**	**NA**
02130802-11E[i]	–	**Attic**	**HVAC duct**	**Residual tar covering**	**NA**	**17.7**	**NA**
02130802-12E[i]	–	**Attic**	**HVAC duct**	**Residual tar covering**	**NA**	**14.8**	**NA**
02130802-13E[i]	–	First Floor, Auto Clave Room	Unknown	Tan ceramic panels	ND	NA	NA
02130802-14E[i]	–	First Floor, Auto Clave Room	Unknown	Tan ceramic panels	ND	NA	NA
02130802-15E[i]	–	First Floor, Auto Clave Room	Unknown	Tan ceramic panels	ND	NA	NA
02130802-16E[i]	–	First Floor, Entranceway	Floor	Terrazzo floor	ND	NA	NA
02130802-17E[i]	–	First Floor, Entranceway	Floor	Terrazzo floor	ND	NA	NA
02130802-18E[i]	–	First Floor, Entranceway	Floor	Terrazzo floor	ND	NA	NA
1E[j]	–	Basement, Boiler Room	Main distribution panel	Bridge feeder insulation	ND	IND	ND
2E[j]	–	Basement, Boiler Room	Main distribution panel	Bridge feeder insulation	ND	IND	ND

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
3E[j]	–	Basement, Boiler Room	Main distribution panel	Bridge feeder insulation	ND	IND	ND
4E[j]	–	Basement, Boiler Room	Main distribution panel	Wire insulation	ND	IND	ND
5E[j]	–	Basement, Boiler Room	Main distribution panel	Wire insulation	ND	IND	ND
6E[j]	–	Basement, Boiler Room	Main distribution panel	Wire insulation	ND	IND	ND
7E[j]	–	First Floor, Hallway	Panel	Wire insulation	ND	IND	ND
8E[j]	–	First Floor, Hallway	Panel	Wire insulation	ND	IND	ND
9E[j]	–	First Floor, Hallway	Panel	Wire insulation	ND	IND	ND
10E[j]	–	First Floor, Hallway	Panel	Wire insulation	ND	IND	ND
11E[j]	–	First Floor, Hallway	Panel	Main panel feed insulation	ND	IND	ND
12E[j]	–	First Floor, Hallway	Panel	Main panel feed insulation	ND	IND	ND
13E[j]	–	First Floor, Hallway	Panel	Main panel feed insulation	ND	IND	ND
14E[j]	–	Attic	Air conditioner panel	Main panel feed insulation	ND	IND	ND
15E[j]	–	Attic	Air conditioner panel	Main panel feed insulation	ND	IND	ND
16E[j]	–	Attic	Air conditioner panel	Main panel feed insulation	ND	IND	ND
17E[j]	–	Attic	Air conditioner panel	Wire insulation	ND	IND	ND
18E[j]	–	Attic	Air conditioner panel	Wire insulation	ND	IND	ND
19E[j]	–	Attic	Air conditioner panel	Wire insulation	ND	IND	ND

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
20E[j]	–	Main lab	Light switch	Wire insulation	ND	IND	ND
1E[k]	–	Lab Storage	Floor drain	Black tar coating	NA	IND	ND
2E[k]	–	Lab Storage	Floor drain	Black tar coating	NA	IND	ND
1E[k]	–	Lab Storage	Floor drain	Black tar coating	NA	IND	NA
2E[k]	–	**Lab Storage**	**Along wall**	**Black tar coating**	**NA**	**IND**	**1.4**
0210040201E[l]	–	Second Floor, Office	Left front chimney	White plaster	ND	NA	NA
0210040202E[l]	–	Second Floor, Office	Left front chimney	White plaster	ND	NA	NA
0210040203E[l]	–	Second Floor, Office	Left front chimney	Powdered concrete	ND	NA	NA
0210040204E[l]	–	Second Floor, Office	Right rear	White plaster	ND	NA	NA
0210040205E[l]	–	Second Floor, Office	Right rear	White plaster	ND	NA	NA
CAT423-2ND-ASB-01	1	Second Floor, Library and Conference Room	Wall	Grey vinyl covebase	NA	IND	ND
CAT423-2ND-ASB-02	2	Second Floor, Library and Conference Room	Wall	Brown covebase mastic	NA	IND	ND
CAT423-2ND-ASB-03	3	Second Floor, Library and Conference Room	Floor	Brown carpet mastic	NA	IND	ND
CAT423-2ND-ASB-04	4	Second Floor, Library and Conference Room	Door	Grey glazing	NA	IND	ND
CAT423-2ND-ASB-05	4	Second Floor, Drafting Room	Door	Grey glazing	NA	IND	ND
CAT423-2ND-ASB-06	5	Second Floor, Drafting Room	North wall	Black conduit putty	NA	IND	ND
CAT423-2ND-ASB-07	5	Second Floor, Drafting Room	North wall	Black conduit putty	NA	IND	ND
CAT423-2ND-ASB-08	6	Second Floor, Drafting Room	Floor	Green linoleum	NA	IND	ND
CAT423-2ND-ASB-09	6	Second Floor, Drafting Room	Floor	Green linoleum	NA	IND	ND
CAT423-2ND-ASB-10	7	Second Floor, Drafting Room	Floor	Brown mastic under green linoleum	NA	IND	ND

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
CAT423-2ND-ASB-11	7	Second Floor, Drafting Room	Floor	Brown mastic under green linoleum	NA	IND	ND
CAT423-2ND-ASB-12	8	Second Floor, Hallway	Wall	Black vinyl covebase	NA	IND	ND
CAT423-2ND-ASB-13	9	Second Floor, Hallway	Wall	Brown covebase mastic	NA	IND	ND
CAT423-2ND-ASB-14	10	Second Floor, Hallway	Floor	Beige linoleum	NA	IND	ND
CAT423-2ND-ASB-15	11	Second Floor, Hallway	Floor	Brown mastic under linoleum	NA	IND	ND
CAT423-2ND-ASB-16	8	Second Floor, Lunch Room	Wall	Black vinyl covebase	NA	IND	ND
CAT423-2ND-ASB-17	9	Second Floor, Lunch Room	Wall	Brown covebase mastic	NA	IND	ND
CAT423-2ND-ASB-18	10	Second Floor, Lunch Room	Floor	Beige linoleum	NA	IND	ND
CAT423-2ND-ASB-19	12	Second Floor, Lunch Room	Floor	Brown mastic/grey leveling compound	NA	IND	ND
CAT423-2ND-ASB-20	12	Second Floor, Lunch Room	Floor	Brown mastic/grey leveling compound	NA	IND	ND
CAT423-2ND-ASB-21	13	Second Floor, Women's Restroom	Wall	Green mortar	ND	NA	NA
CAT423-2ND-ASB-22	1	Second Floor, Watershed Office	Wall	Grey vinyl covebase	NA	IND	ND
CAT423-2ND-ASB-23	2	Second Floor, Watershed Office	Wall	Brown covebase mastic	NA	IND	ND
CAT423-2ND-ASB-24	3	Second Floor, Watershed Office	Floor	Brown carpet mastic	NA	IND	ND

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)* PLM	PLM-NOB	TEM
CAT423-2ND-ASB-25	13	Second Floor, Men's Restroom	Wall	Green mortar	ND	NA	NA
CAT423-2ND-ASB-26	**14**	**Second Floor, Women's Restroom**	**Radiator**	**Black caulk**	**NA**	**IND**	**15**
CAT423-2ND-ASB-27	**14**	**Second Floor, Men's Restroom**	**Radiator**	**Black caulk**	**NA**	**IND**	**21**
CAT423-2ND-ASB-28	**15**	**Second Floor, Stairwell**	**Radiator**	**White (painted black) shielding**	**80**	**NA**	**NA**
CAT423-2ND-ASB-29	**15**	**Second Floor, Library (Microbiology Office)**	**Radiator**	**White (painted black) shielding**	**NA**	**NA**	**NA**
CAT423-ATT-ASB-30	16	Attic	HVAC unit	Black gasket	NA	IND	< 1 (Trace)
CAT423-ATT-ASB-31	16	Attic	Fan #2 access hatch	Black gasket	NA	IND	ND
CAT423-ATT-ASB-32	17	Attic	Chimney	Grey mortar	ND	NA	NA
CAT423-ATT-ASB-33	17	Attic	Chimney	Grey mortar	ND	NA	NA
CAT423-1ST-ASB-34	18	First Floor, General Lab	Lab benches	Black countertop	ND	NA	NA
CAT423-1ST-ASB-35	19	First Floor, General Lab	Lab benches	Black countertop bonding agent	ND	NA	NA
CAT423-1ST-ASB-36	19	First Floor, General Lab	Lab benches	Black countertop bonding agent	NA	IND	ND
CAT423-1ST-ASB-37	18	First Floor, Physical Lab	Lab benches	Black countertop	ND	NA	NA
CAT423-1ST-ASB-38	**20**	**First Floor, General Lab**	**Radiator**	**Brown canvas wire wra**	**80**	**NA**	**NA**
CAT423-1ST-ASB-39	**20**	**First Floor, General Lab**	**Radiator**	**Brown canvas wire wra**	**NA**	**NA**	**NA**
CAT423-1ST-ASB-40	21	First Floor, Reagent and Media Prep Room	Fume hood	White rope gasket	ND	NA	NA
CAT423-1ST-ASB-41	21	First Floor, Reagent and Media Prep Room	Fume hood	White rope gasket	ND	NA	NA

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
CAT423-BASE-ASB-42	22	Basement, Boiler Room	Boiler	Silver paint	NA	IND	ND
CAT423-BASE-ASB-43	22	Basement, Boiler Room	Boiler	Silver paint	NA	IND	ND
CAT423-BASE-ASB-44	23	Basement, Boiler Room	Boiler	Interior packing rope	ND	NA	NA
CAT423-BASE-ASB-45	23	Basement, Boiler Room	Boiler	Interior packing rope	ND	NA	NA
CAT423-BASE-ASB-46	24	Basement, Boiler Room	Boiler	Red fire brick	ND	NA	NA
CAT423-BASE-ASB-47	24	Basement, Boiler Room	Boiler	Red fire brick	ND	NA	NA
CAT423-BASE-ASB-48	25	Basement, Boiler Room	Wall	Grey wall penetration sealant	ND	NA	NA
CAT423-BASE-ASB-49	25	Basement, Boiler Room	Wall	Grey wall penetration sealant	ND	NA	NA
CAT423-BASE-ASB-50	26	Basement, Boiler Room	Boiler	White paper gasket	ND	NA	NA
CAT423-BASE-ASB-51	26	Basement, Boiler Room	Boiler	White paper gasket	ND	NA	NA
CAT423-BASE-ASB-52	27	Basement, Boiler Room	Duct motor	Black braided wire	ND	NA	NA
CAT423-BASE-ASB-53	27	Basement, Boiler Room	Duct motor	Black braided wire	ND	NA	NA
CAT423-BASE-ASB-54	28	Basement, Boiler Room	Door	Grey glazing	NA	IND	ND

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
CAT423-BASE-ASB-55	28	Basement, Storage Room	Door	Grey glazing	NA	IND	ND
CAT423-EXT-ASB-56	29	Exterior, West Wall	Window	White caulk	NA	IND	ND
CAT423-EXT-ASB-57	29	Exterior, West Wall	Window	White caulk	NA	IND	ND
CAT423-1ST-ASB-58	30	First Floor, General Lab	Floor	Beige linoleum	NA	IND	ND
CAT423-1ST-ASB-59	31	First Floor, General Lab	Floor	Brown mastic under beige linoleum	NA	IND	ND
CAT423-1ST-ASB-60	30	First Floor, Water and Sewage Lab	Floor	Beige linoleum	NA	IND	ND
CAT423-1ST-ASB-61	31	First Floor, Water and Sewage Lab	Floor	Brown mastic under beige linoleum	NA	IND	ND
CAT423-BASE-ASB-62	32	Basement, Boiler Room	Electrical panel	White braided wire	ND	NA	NA
CAT423-BASE-ASB-63	32	Basement, Boiler Room	Electrical panel	White braided wire	ND	NA	NA
CAT423-BASE-ASB-64	33	Basement, Boiler Room	Electrical panel	Red braided wire	ND	NA	NA
CAT423-BASE-ASB-65	33	Basement, Boiler Room	Electrical panel	Red braided wire	ND	NA	NA
CAT423-1ST-ASB-66	34	First Floor, Water and Sewage Lab	Fume hood	Tan shelf	ND	NA	NA
CAT423-1ST-ASB-67	34	First Floor, Water and Sewage Lab	Fume hood	Tan shelf	ND	NA	NA
CAT423-1ST-ASB-68	35	First Floor, Garage	Brick wall	Grey mortar	ND	NA	NA
CAT423-1ST-ASB-69	35	First Floor, Garage	Brick wall	Grey mortar	ND	NA	NA
CAT423-1ST-ASB-70	36	First Floor, Garage	Door	Grey glazing	NA	IND	ND
CAT423-1ST-ASB-71	36	First Floor, Garage	Door	Grey glazing	NA	IND	ND
CAT423-1ST-ASB-72	37	First Floor, Garage	Door panel	Black gasket	NA	IND	ND
CAT423-1ST-ASB-73	37	First Floor, Garage	Door panel	Black gasket	NA	IND	ND

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
CAT423-1ST-ASB-74	38	First Floor, Garage	Floor joint	Green caulk	NA	IND	ND
CAT423-1ST-ASB-75	38	First Floor, Garage	Floor joint	Green caulk	NA	IND	ND
CAT423-1ST-ASB-76	39	First Floor, Garage	Base of wall	Yellow caulk	NA	IND	ND
CAT423-1ST-ASB-77	39	First Floor, Garage	Base of wall	Yellow caulk	NA	IND	ND
CAT423-EXT-ASB-78	40	Exterior, North Wall	Base of stone wall	Grey mortar	ND	NA	NA
CAT423-EXT-ASB-79	40	Exterior, South Wall	Base of stone wall	Grey mortar	ND	NA	NA
CAT423-EXT-ASB-80	41	Exterior, North Wall	Upper brick wall	Tan mortar	ND	NA	NA
CAT423-EXT-ASB-81	41	Exterior, North Wall	Upper brick wall	Tan mortar	ND	NA	NA
CAT423-EXT-ASB-82	42	Exterior, North Wall	Base of wall	Black tar	NA	IND	ND
CAT423-EXT-ASB-83	42	Exterior, South Wall	Base of wall	Black tar	NA	IND	ND
CAT423-EXT-ASB-84	**43**	**Exterior, South Wall**	**Around vent**	**White caulk**	**NA**	**2.3**	**NA**
CAT423-EXT-ASB-85	**43**	**Exterior, South Wall**	**Around vent**	**White caulk**	**NA**	**NA**	**NA**
CAT423-EXT-ASB-86	44	Exterior, North Wall	Entrance curb	Black expansion joint	ND	NA	NA
CAT423-EXT-ASB-87	44	Exterior, North Wall	Entrance curb	Black expansion joint	ND	NA	NA
CAT423-BASE-ASB-88	45	Basement, Crawl Space	Base of wall	Black tar	NA	IND	ND
CAT423-BASE-ASB-89	45	Basement, Crawl Space	Base of wall	Black tar	NA	IND	ND
CAT423-BASE-ASB-90	46	Basement, Crawl Space	Floor	Top 1" of soil	ND	NA	NA
CAT423-BASE-ASB-91	46	Basement, Crawl Space	Floor	Top 1" of soil	ND	NA	NA
CAT423-BASE-ASB-92	47	Basement, Crawl Space	Pipe	Red 6" gasket	NA	IND	ND

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)* PLM	PLM-NOB	TEM
CAT423-BASE-ASB-93	47	Basement, Crawl Space	Pipe	Red 6" gasket	NA	IND	ND
CAT423-BASE-ASB-94	**48**	**Basement, Crawl Space**	**Pipe**	**Brown 4" gasket**	**80**	**NA**	**NA**
CAT423-BASE-ASB-95	**48**	**Basement, Crawl Space**	**Pipe**	**Brown 4" gasket**	**NA**	**NA**	**NA**
CAT423-BASE-ASB-96	49	Basement, Crawl Space	Drain pipe	Grey joint packing	NA	IND	ND
CAT423-BASE-ASB-97	49	Basement, Crawl Space	Drain pipe	Grey joint packing	NA	IND	ND

Notes:

(1) Samples collected by Bidwell Environmental in December, 2017, January, 2018, and March, 2018.

(2) Materials containing more than 1% asbestos are considered asbestos containing materials. Items in bold are asbestos containing materials. While the removal of materials containing trace levels of asbestos is not regulated, it is recommended that the work be performed in accordar with minimum safe work practices.

[a] - Samples collected in January, 2004.

[b] - Samples collected in September, 2004.

[c] - Samples collected by URS in October, 2004 for the Facility-Specific Assessment Report.

[d] - Samples collected in February, 2006.

[e] - Samples collected in August, 2006.

[f] - Samples collected in September, 2006.

[g] - Samples collected in November, 2006.

[h] - Samples collected in December, 2007.

[i] - Samples collected in February, 2008.

[j] - Samples collected in October, 2008.

[k] - Samples collected in August, 2013.

[l] - Samples collected in February, 2004.

Table 4
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)* PLM	PLM-NOB	TEM

HMG - Homogenous Materials Group
ND - Not Detected
NA - Not Analyzed
IND - Inconclusive None Detected

Table 5
Summary of Confirmed Hazardous Materials for the Attic

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Silver paint	Frame work	Lead-based, PCB-containing	CAT423-ATT-PC-07
Yellow over silver paint	Framework	Lead-containing	CAT423-ATT-PC-08
Black paint	Duct work	Lead containing, PCB-containing	264428.02
Lead packing	Drain piping	Lead joints (23 locations)	–––

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black gasket	Inside HVAC unit	02130802-07E	88 linear ft	Damaged	Non-friable
Black residual mastic	HVAC duct	02130802-10E,11E,12E	Approx. 275 spots (2x2 in) on 750 ft^2 of duct work	Damaged	Non-friable

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.

Table 6
Summary of Confirmed Hazardous Materials for the Second Floor, Library and Conference Room (Microbiology Office)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Blue over beige paint	Walls	Lead-based, PCB-containing	CAT423-2ND-PC-01
Grey vinyl covebase	Walls	Lead-containing	CAT423-2ND-PB-01
Beige paint	Walls	Lead-containing	264428.04
Beige paint	Ceiling	Lead-containing, PCB-containing	191-19-LCP-01
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	46 ft^2 (2 radiators)	Good	Non-friable
Grey caulk around frame	Windows	1, 2, 3	55 linear ft (2 windows)	Good	Non-friable
Caulk behind door frame*	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	8, 4 ft bulbs	Universal waste
Ballasts	Ceiling	4 ballasts	Non-hazardous regulated waste (no PCBs)

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 7
Summary of Confirmed Hazardous Materials for the Second Floor, Drafting Room (Administration Office)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
White paint	Ceiling	Lead-containing, PCB-containing	264428.05
Blue over beige paint	Walls	Lead-based, PCB-containing	CAT423-2ND-PC-01
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	70 ft^2 (3 radiators)	Good	Non-friable
Grey caulk around frame	Windows	1, 2, 3	82 linear ft (3 windows)	Good	Non-friable
Caulk behind door frame*	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	14, 8 ft bulbs	Universal waste
Ballasts	Ceiling	7 ballasts	Non-hazardous regulated waste (no PCBs)

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 8
Summary of Confirmed Hazardous Materials for the Second Floor, Hallway

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Green paint	Walls	Lead-containing, PCB-containing	CAT423-2ND-PC-02
Beige paint	Ceiling	Lead-containing, PCB-containing	191-19-LCP-01
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Caulk behind door frame*	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Exit/Emergency light	Above door	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 9
Summary of Confirmed Hazardous Materials for the Second Floor, Lunch Room

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
White paint	Ceiling	Lead-containing, PCB-containing	264428.03
Beige paint	Walls	Lead-containing	264428.04
Green paint	Walls	Lead-containing, PCB-containing	CAT423-2ND-PC-02
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiator	CAT423-2ND-ASB-28,29	23 ft^2 (1 radiator)	Good	Non-friable
Grey caulk around frame	Window	1, 2, 3	28 linear ft (1 window)	Good	Non-friable
Caulk behind door frame*	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent lights	Ceiling	4, 4ft bulbs	Universal waste
Ballasts	Ceiling	2	Non-hazardous regulated waste (no PCBs)
Fire extinguisher	Wall	1	Regulated waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 10
Summary of Confirmed Hazardous Materials for the Second Floor, Women's Restroom

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Green glazed tile	Wall	Lead-containing	CAT423-1ST-PB-03
White paint	Ceiling	Lead-containing, PCB-containing	264428.03
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiator	CAT423-2ND-ASB-28,29	23 ft^2 (1 location)	Good	Non-friable
Black caulk	Radiator	CAT423-2ND-ASB-26,27	3.5 linear ft (1 location)	Good	Non-friable
Grey caulk	Window	1, 2, 3	28 linear ft (1 location)	Good	Non-friable
Caulk behind door frame*	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	2, 4ft bulbs	Universal waste
Ballast	Ceiling	1	Non-hazardous regulated waste (no PCBs)

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 11
Summary of Confirmed Hazardous Materials for the Second Floor, Watershed Division Engineer's Office (Directors Office)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Beige over blue paint	Walls	Lead-containing, PCB-containing	CAT423-2ND-PC-04
Yellow paint	Closet walls	Lead-containing, PCB-containing	CAT423-2ND-PC-05
Blue paint	Walls above suspended ceiling	Lead-containing, PCB-containing	CAT423-2ND-PC-01
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11
Grey vinyl covebase	Walls	Lead-containing	CAT423-2ND-PB-01

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	46 ft^2 (2 locations)	Good	Non-friable
Grey caulk	Windows	1, 2, 3	55 linear ft (2 locations)	Good	Non-friable
Caulk behind door frame*	Door	–––	40 linear ft (2 locations)	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	8, 4 ft bulbs	Universal waste
Ballast	Ceiling	4	Non-hazardous regulated waste (no PCBs)

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 12
Summary of Confirmed Hazardous Materials for the Second Floor, Watershed Office (Conference Room)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Beige paint	Ceiling	Lead-containing, PCB-containing	191-19-LCP-01
Blue over beige paint	Walls	Lead-based, PCB-containing	CAT423-2ND-PC-01
Grey vinyl covebase	Walls	Lead-containing	CAT423-2ND-PB-01
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	70 ft^2 (3 locations)	Good	Non-friable
Grey caulk	Windows	1, 2, 3	83 linear ft (3 locations)	Good	Non-friable
Caulk behind door frame*	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	16, 4 ft bulbs	Universal waste
Ballast	Ceiling	8	Non-hazardous regulated waste (no PCBs)

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 13
Summary of Confirmed Hazardous Materials for the Second Floor, Men's Restroom

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
White paint	Sink drain pipe	Lead-containing, PCB-containing	CAT423-2ND-PC-03
White paint	Ceiling	Lead-containing, PCB-containing	264428.03
Green glazed tile	Wall	Lead-containing	CAT423-1ST-PB-03
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiator	CAT423-2ND-ASB-28,29	23 ft^2 (1 location)	Good	Non-friable
Black caulk	Radiator	CAT423-2ND-ASB-26,27	3.5 linear ft (1 location)	Good	Non-friable
Grey caulk	Windows	1, 2, 3	28 linear ft (1 location)	Good	Non-friable
Caulk behind door frame*	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	2, 4 ft bulbs	Universal waste
Ballast	Ceiling	1	Non-hazardous regulated waste (no PCBs)

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 14
Summary of Confirmed Hazardous Materials for the Second Floor, Stairwell

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Black paint	Hand rail	Lead-based	CAT423-2ND-PC-06
White paint	Ceiling	Lead-containing, PCB-containing	264428.03
Green glazed tile	Wall	Lead-containing	CAT423-1ST-PB-03

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiator	CAT423-2ND-ASB-28,29	23 ft^2 (1 location)	Good	Non-friable
Grey caulk	Window	1, 2, 3	28 linear ft (1 location)	Good	Non-friable

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Emergency light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.

Table 15
Summary of Confirmed Hazardous Materials for the First Floor, Entrance

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Black paint	Hand rail	Lead-based	CAT423-2ND-PC-06
White paint	Ceiling	Lead-containing, PCB-containing	264428.07
Green glazed tile	Wall	Lead-containing	CAT423-1ST-PB-03

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Grey caulk	Window	1, 2, 3	28 linear ft	Good	Non-friable
Black shielding	Radiator	CAT423-2ND-ASB-28,29	25 ft^2	Good	Non-friable
Brown wire wrap (presumed present)	Radiator	CAT423-1ST-ASB-38,39	5 linear ft	Good	Non-friable

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Exit sign/Emergency light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste
Fire extinguisher	Wall	1	Regulated waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.

Table 16
Summary of Confirmed Hazardous Materials for the First Floor, Reagent and Media Prep Room (Autoclave and Bottle Washing)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
White paint	Ceiling	Lead-containing, PCB-containing	264428.07
Green glazed tile	Wall	Lead-containing	CAT423-1ST-PB-03
Grey caulk	Windows	PCB-containing	CAT423-1ST-PCB-01
Lead packing	Drain pipes	Lead joints (4 locations)	–––

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	46 ft^2 (2 locations)	Good	Non-friable
Brown wire wrap (presumed present)	Radiators	CAT423-1ST-ASB-38,39	9 linear ft (2 locations)	Good	Non-friable
Grey caulk	Windows	1, 2, 3	55 linear ft (2 locations)	Good	Non-friable
Black insulation spot coating	Duct work	30A, 31A, 44A	720 ft^2	Unknown	Unknown
Green 9x9" tile	Floor	NA*	500 ft^2	Good	Non-friable
Caulk behind door frame**	Door	–––	20 linear ft	Unknown	Unknown
White insulation	Piping	0913040201E, 2E, 3E	28 linear ft	Good	Non-friable
White insulation	Piping	0913040201E, 2E, 3E	2 elbows	Good	Non-friable

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	4, 4 ft bulbs	Universal waste
		8, 8 ft bulbs	Universal waste
Ballasts	Ceiling	6	Non-hazardous regulated waste (no PCBs)
Fire extinguisher	Wall	1	Regulated waste
Exit/Emergency light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Green floor tile confirmed ACM by NYCDEP Legacy Database.
** - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).
NA - Not applicable

Table 17
Summary of Confirmed Hazardous Materials for the First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Grey/blue paint	Floor	Lead-containing	CAT423-1ST-PC-09
White paint	Ceiling	Lead-containing, PCB-containing	264428.07
Green glazed tile	Walls	Lead-containing	CAT423-1ST-PB-03
Grey caulk	Windows	PCB-containing	CAT423-1ST-PCB-01
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	46 ft^2 (2 locations)	Good	Non-friable
Brown wire wrap (presumed present)	Radiators	CAT423-1ST-ASB-38,39	9 linear ft (2 locations)	Good	Non-friable
Grey caulk	Windows	1, 2, 3	28 linear ft (1 location)	Good	Non-friable
Green 9x9" tile	Floor	NA*	235 ft^2	Good	Non-friable
Black insulation spot coating	Duct work	30A, 31A , 44A	180 ft^2	Unknown	Unknown
Caulk behind door frame**	Door	–––	20 linear ft	Unknown	Unknown
White insulation	Piping	0913040201E, 2E,3E	45 linear ft	Good	Non-friable
White insulation	Piping	0913040201E, 2E,3E	12 elbows	Good	Non-friable

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	6 bulbs	Universal waste
Ballasts	Ceiling	3	Non-hazardous regulated waste (no PCBs)
Exit/Emergency Light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.

Table 17
Summary of Confirmed Hazardous Materials for the First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)

(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Green floor tile confirmed ACM by NYCDEP Legacy Database.
** - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).
NA - Not Applicable

Table 18
Summary of Confirmed Hazardous Materials for the First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
White paint	Ceiling	Lead-containing, PCB-containing	264428.07
Grey caulk	Windows	PCB-containing	CAT423-1ST-PCB-01
Green glazed tile	Wall	Lead-containing	CAT423-1ST-PB-03
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11
Black paint	Duct work	Lead-containing, PCB-containing	264428.02

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	70 ft^2 (3 locations)	Good	Non-friable
Brown wire wrap	Radiators	CAT423-1ST-ASB-38,39	12 linear ft (3 locations)	Good	Non-friable
Grey caulk	Windows	1, 2, 3	82 linear ft (3 locations)	Good	Non-friable
Black insulation spot coating	Duct work	30A, 31A , 44A	660 ft^2	Unknown	Unknown
Green 9x9" tile	Floor	NA*	800 ft^2	Good	Non-friable
Caulk behind door frame**	Door	–––	40 linear ft (2 locations)	Unknown	Unknown
White insulation	Piping	0913040201E, 2E, 3E	100 linear ft	Good	Non-friable
White insulation	Piping	0913040201E, 2E, 3E	20 elbows	Good	Non-friable

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	12, 8 ft bulbs	Universal waste
		4, 4 ft bulbs	Universal waste
Ballasts	Ceiling	8	Non-hazardous regulated waste (no PCBs)
Exit/Emergency light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste
Fire extinguishers	Wall	2	Regulated waste
Refrigerator***	Wall	1	Regulated waste

Table 18
Summary of Confirmed Hazardous Materials for the First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Green floor tile confirmed ACM by NYCDEP Legacy Database.
** - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).
*** - Refrigerator uses Freon 134a (1,1,1,2-Tetrafluoroethane) as a refrigerant.
NA - Not applicable

Table 19
Summary of Confirmed Hazardous Materials for the First Floor, Physical Laboratory (Microbiology Lab)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
White paint	Ceiling	Lead-containing, PCB-containing	264428.07
Grey caulk	Windows	PCB-containing	CAT423-1ST-PCB-01
Green glazed tile	Walls	Lead-containing	CAT423-1ST-PB-03
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	70 ft^2 (3 locations)	Good	Non-friable
Brown wire wrap	Radiators	CAT423-1ST-ASB-38,39	15 linear ft (3 locations)	Good	Non-friable
Black insulation spot coating	Duct work	30A, 31A , 44A	420 ft^2	Unknown	Unknown
Caulk behind door frame*	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	14, 8 ft bulbs	Universal waste
Ballasts	Ceiling	7	Non-hazardous regulated waste (no PCBs)
Exit/Emergency light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste
Fire extinguisher	Wall	1	Regulated waste
Refrigerator**	Wall	1	Regulated waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.

Table 19
Summary of Confirmed Hazardous Materials for the First Floor, Physical Laboratory (Microbiology Lab)

(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.

* - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

** - Refrigerator uses Freon 134a (1,1,1,2-Tetrafluoroethane) as a refrigerant.

Table 20
Summary of Confirmed Hazardous Materials for the First Floor, Dark Room (Storage)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
White paint	Ceiling	Lead-containing, PCB-containing	264428.07
Green glazed tile	Wall	Lead-containing	CAT423-1ST-PB-03

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black insulation spot coating	Duct work	30A, 31A , 44A	300 ft^2	Unknown	Unknown
Green 9x9" tile	Floor	NA*	86 ft^2	Good	Non-friable
Caulk behind door frame**	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent lights	Ceiling	2, 4 ft bulbs	Universal waste
Ballasts	Ceiling	1	Non-hazardous regulated waste (no PCBs)

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Green floor tile confirmed to be ACM by NYCDEP Legacy Database.
** - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).
NA - Not applicable

Table 21
Summary of Confirmed Hazardous Materials for the First Floor, General Laboratory (Instrumentation)

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Grey caulk	Windows	PCB-containing	CAT423-1ST-PCB-01
Green glazed tile	Walls	Lead-containing	CAT423-1ST-PB-03
White paint	Ceiling	Lead-containing, PCB-containing	264428.07
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11
Lead packing	Drain piping	Lead joints (7 locations)	–––

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	70 ft^2 (3 locations)	Good	Non-friable
Brown wire wrap	Radiators	CAT423-1ST-ASB-38,39	15 linear ft (3 locations)	Good	Non-friable
Black insulation spot coating	Duct work	30A, 31A , 44A	540 ft^2	Unknown	Unknown
Green 9x9" tile	Floor	NA*	465 ft^2	Good	Non-friable
Caulk behind door frame**	Door	–––	20 linear ft	Unknown	Unknown

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	12, 8 ft bulbs	Universal waste
Ballasts	Ceiling	6	Non-hazardous regulated waste (no PCBs)
Exit/Emergency light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.

Table 21
Summary of Confirmed Hazardous Materials for the First Floor, General Laboratory (Instrumentation)

(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
NA -Not applicable
* - Green floor tile confirmed ACM by NYCDEP Legacy Database.
** - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 22
Summary of Confirmed Hazardous Materials for First Floor, Offices

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
White paint	Ceiling	Lead-containing, PCB-containing	264428.07
Beige over green paint	Dividing wall	Lead-containing, PCB-containing	CAT423-1ST-PC-10
Green glazed tile	Wall	Lead-containing	CAT423-1ST-PB-03
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11
Grey caulk	Windows	PCB-containing	CAT423-1ST-PCB-01

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black shielding	Radiators	CAT423-2ND-ASB-28,29	46 ft^2 (2 locations)	Good	Non-friable
Brown wire wrap	Radiators	CAT423-1ST-ASB-38,39	9 linear ft (2 locations)	Good	Non-friable
Grey caulk	Windows	1, 2, 3	55 linear ft (2 locations)	Good	Non-friable
Black insulation spot coating	Duct	30A, 31A , 44A	120 ft^2	Unknown	Unknown
Green 9x9" tile	Floor	NA*	300 ft^2	Good	Non-friable
Caulk behind door frame**	Door	–––	40 linear ft (2 locations)	Unknown	Unknown
White insulation	Piping	0913040201E, 2E, 3E	48 linear ft	Good	Non-friable
White insulation	Piping	0913040201E, 2E, 3E	12 elbows	Good	Non-friable

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	6, 8 ft bulbs	Universal waste
		2, 4 ft bulbs	Universal waste
Ballasts	Ceiling	4	Non-hazardous regulated waste (no PCBs)
Emergency light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste

Table 22
Summary of Confirmed Hazardous Materials for First Floor, Offices

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
* - Green tile confirmed ACM by NYCDEP Legacy Database.
** - Caulk is presumed to be present and asbestos containing. Caulk is presumed to be present under the entire steel frame (approx. 8" wide).
NA - Not Applicable

Table 23
Summary of Confirmed Hazardous Materials for the First Floor, Garage

Lead and PCBs

Material Description	*Location*	*Hazard*	*Sample ID*
Green concrete	Floor	Lead-containing	CAT423-1ST-PC-16
Grey over red paint	Support beam	Lead-based	CAT423-1ST-PC-17

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Fluorescent bulbs	Ceiling	12, 8 ft bulbs	Universal waste
Ballasts	Ceiling	6	Non-hazardous regulated waste (no PCBs)
Refrigerators*	Wall	2	Regulated waste
Fire extinguishers	Wall	2	Regulated waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Refrigerators uses Freon 134a (1,1,1,2-Tetrafluoroethane) as a refrigerant.

Table 24
Summary of Confirmed Hazardous Materials for the Basement, Boiler Room

Lead and PCBs

Material Description	*Location*	*Hazard*	*Quantity*	*Sample ID*
Black paint	Duct work	Lead-containing	–––	191-01-LCP-01
Silver paint	Boiler	Lead-containing	–––	191-01-LCP-02
White paint	Walls	Lead-based, PCB-containing	–––	264428.08
Green paint	Floor	Lead-containing, PCB-containing	–––	CAT423-BASE-PC-12
Green paint*	Pipes (2")	Lead-based, TSCA-regulated PCBs	60 linear ft	CAT423-BASE-PC-21
Yellow paint*	Pipes (2")	Lead-based, TSCA-regulated PCBs	60 linear ft	CAT423-BASE-PC-22
Grey/silver paint	Electrical panel	Lead-containing, PCB-containing	–––	CAT423-BASE-PC-15
Black paint	Drain pipe	Lead-containing, PCB-containing	–––	CAT423-BASE-PC-11
Grey caulk	Interior door	PCB-containing	–––	CAT423-BASE-PCB-02
Lead packing	Drain pipes	Lead joints	36 locations	–––
Door closer oil	Door	PCB-containing	–––	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Grey caulk**	Interior door	191-06-01	20 linear ft	Good	Non-Friable
Grey caulk**	Exterior door	1, 2, 3	26 linear ft	Good	Non-Friable
Grey caulk	Window	1, 2, 3	22 linear ft	Good	Non-Friable
Transite arc panels***	Electrical panel	–––	33 ft^2 (3 locations)	Good	Non-Friable
Black tar	Floor	2E	4 ft^2 (3 locations)	Damaged	Non-Friable
White insulation****	Pipe	–––	11 linear ft (5 locations)	Damaged	Friable

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Exit/Emergency light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste
Fire extinguisher	Wall	1	Regulated waste

Table 24
Summary of Confirmed Hazardous Materials for the Basement, Boiler Room

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Paint is in poor condition.
** - Caulk is presumed to be present under the entire steel frame (approx. 8" wide).
*** - Item is presumed to be present and asbestos containing.
**** - Insulation extends through the wall into the Basement, Storage Room and is presumed asbestos containing.

Table 25
Summary of Confirmed Hazardous Materials for the Basement, Hallway

Lead and PCBs

Material Description	*Location*	*Hazard*	*Quantity*	*Sample ID*
Brown paint	Drain pipe (4")	Lead-based, TSCA-regulated PCBs	15 linear ft	CAT423-BASE-PC-19
Blue paint	Pipe	Lead-based, PCB-containing	---	CAT423-BASE-PC-20
White paint	Walls	Lead-based, PCB-containing	---	CAT423-1ST-PC-13
Grey/blue paint	Floor	Lead-containing	---	CAT423-1ST-PC-09
Lead packing	Drain pipes	Lead joints	7 locations	---

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black tar	Floor	2E	2 ft^2	Damaged	Non-friable

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Exit/Emergency light	Wall	2 bulbs	Universal waste
		1 circuit board	Electronic waste
		1 lead battery	Universal waste
Fire extinguisher	Wall	1	Regulated waste

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.

Table 26
Summary of Confirmed Hazardous Materials for the Basement, Crawlspace

Lead and PCBs

Material Description	*Location*	*Hazard*	*Quantity*	*Sample ID*
Black paint*	Drain pipe	Lead-based, TSCA-regulated PCBs	28 linear ft	CAT423-BASE-PC-18
Brown paint*	Drain pipe	Lead-based, TSCA-regulated PCBs	286 linear ft	CAT423-BASE-PC-19
Green paint*	Pipe	Lead-based, TSCA-regulated PCBs	110 linear ft	CAT423-BASE-PC-21
Yellow paint*	Pipe	Lead-based, TSCA-regulated PCBs	88 linear ft (2 pipes)	CAT423-BASE-PC-22
Blue paint*	Pipe	Lead-based, PCB-containing	–––	CAT423-BASE-PC-20
Lead packing	Drain pipes	Lead joints	143 locations	–––

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Brown 4" gasket	Pipe	CAT423-BASE-ASB-94,95	3.5 ft^2 (7 locations)	Damaged	Non-friable

Universal and other Miscellaneous Wastes

Material Description	*Location*	*Quantity*	*Waste Classification*
Chemical waste tank (concrete)	Crawlspace	1 (approx. 200 gal)	Mercury and corrosive hazardous waste**

Notes:
(1) Crawlspace is considered a non-permit required confined space.
(2) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(3) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(4) Materials containing more than 1% asbestos are considered asbestos containing materials.
(5) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Paints are in poor condition.
** - Contents of chemical waste tank were not investigated during survey.

Table 27
Summary of Confirmed Hazardous Materials for the Basement, Storage Room

Lead and PCBs

Material Description	*Location*	*Hazard*	*Quantity*	*Sample ID*
Black paint*	Drain pipe (4")	Lead-based, TSCA-regulated PCBs	38 linear ft	CAT423-BASE-PC-18
Brown paint*	Drain pipe (4")	Lead-based, TSCA-regulated PCBs	13 linear ft	CAT423-BASE-PC-19
Green paint*	Pipe (2")	Lead-based, TSCA-regulated PCBs	20 linear ft	CAT423-BASE-PC-21
Yellow paint*	Pipe (2")	Lead-based, TSCA-regulated PCBs	38 linear ft	CAT423-BASE-PC-22
White paint	Ceiling	Lead-based, PCB-containing	–––	CAT423-BASE-PC-13
Blue paint*	Pipe	Lead-based, PCB-containing	–––	CAT423-BASE-PC-20
Beige paint	Walls	Lead-based, PCB-containing	–––	CAT423-BASE-PC-14
Green paint	Floor	Lead-containing, PCB-containing	–––	CAT423-BASE-PC-12
Lead packing	Drain pipes	Lead joints	23 locations	–––
Door closer oil	Door	PCB-containing	–––	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black tar coating	Floor	2E	4 ft^2	Damaged	Non-friable
Grey caulk**	Interior door	191-06-01	16 linear ft	Good	Non-friable
Grey caulk**	Exterior door	1, 2, 3	20 linear ft	Good	Non-friable

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Paints are in poor condition.
** - Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 28
Summary of Confirmed Hazardous Materials for the Basement, Electrical Room

Lead and PCBs

Material Description	Location	Hazard	Sample ID
Beige paint	Wall/ceiling	Lead-based, PCB-containing	CAT423-BASE-PC-14
Grey/blue paint	Floor	Lead-containing	CAT423-1ST-PC-09
Grey/silver paint	Electrical panels	Lead-containing, PCB-containing	CAT423-BASE-PC-15
Door closer oil	Door	PCB-containing	CAT423-1ST-PCB-11

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Transite arc panels*	Electrical panels	–––	20 ft^2 (2 locations)	Unknown	Unknown
Grey caulk**	Door	191-06-01	20 linear ft	Good	Non-friable

Notes:
(1) Materials containing < 5,000 mg/kg or ≥ 5,000 mg/kg lead are considered lead-containing or lead-based, respectively.
(2) Materials containing < 50 mg/kg or ≥ 50 mg/kg PCBs are considered PCB-containing or TSCA-regulated, respectively.
(3) Materials containing more than 1% asbestos are considered asbestos containing materials.
(4) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.
* - Item is presumed to be present and asbestos containing.
** - Caulk is presumed to be present under the entire steel frame (approx. 8" wide).

Table 29
Summary of Confirmed Hazardous Materials for the Laboratory Exterior

Asbestos

Material Description	*Location*	*Sample ID*	*Quantity*	*Condition*	*Friability*
Black membrane tar	Canopy over north wall entranceway	0821060213E	132 ft^2	Damaged	Non-friable
Black membrane tar	Canopy over south wall entranceway	0821060213E	132 ft^2	Damaged	Non-friable
White caulk	Vents	CAT423-EXT-ASB-84,85	18 linear ft (3 locations)	Significantly damaged	Non-friable

Notes:
(1) Materials containing more than 1% asbestos are considered asbestos containing materials.
(2) Quantities are provided for asbestos containing materials, TSCA-regulated PCBs and universal and other regulated materials.

SECTION 01356
Environmental Health and Safety (EHS) Requirements

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for the Contractor to provide its employees its Subcontractors a safe and healthful work environment and for performing all Work in compliance with all applicable environmental health and safety (EHS) laws, rules, and regulations.

1. The EHS performance of the Contractor and its Subcontractors is the responsibility of the Contractor. Since effective on-site management is essential for EHS performance, the Contractor shall evaluate the performance of its on-site EHS team on a continuous basis. Where deficiencies are found, the Contractor shall take appropriate action including removal of its personnel or its Subcontractors' personnel.

2. The Contractor shall ensure that its employees and those of its Subcontractors working on a DEP project site under the Contract are clearly identifiable as a Project Contractor employee. This may include the use of labeled safety vests or hard hats or other acceptable means in addition to complying with the identification badge requirements of Article 37 of the Standard Construction Contract.

B. Attachments

1. Exhibit A – Standard Environmental, Health and Safety Requirements Specifications

2. Exhibit B – Bidder's EHS Performance and Program Review Questionnaire

C. The following index of this Section is presented for convenience:

1.02 PAYMENT

A. There is no separate payment provision for this Section.

1.03 REFERENCE STANDARDS

A. "Competent Person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees or the environment, and who has authority to take prompt corrective measures to eliminate them. A Competent Person has stop work authority.

B. "EHS Resources" shall mean the Contractor's EHS Professional(s) and its EHS Site Representative (EHS Rep), as approved by the BWS EHS unit. This definition shall also apply to the Subcontractors' EHS Resources, where required. This definition also includes any consultant or other EHS personnel associated with the Project. Such EHS personnel are subject to evaluation and approval by BWS EHS as set forth in this Section.

C. "Environmental Health & Safety Plan (EHASP)" shall mean the plan developed in accordance with all applicable EHS rules and regulations and these Specifications to identify and set forth policies and procedures to control the health and safety concerns and environmental impacts known and unknown at the Site. This plan is not to be confused with the Health and Safety Plan that may be required under 29 CFR 1910.120 for Hazardous Waste Operations and Emergency Response (HAZWOPER).

D. "Job Hazard Analysis" (JHA) shall mean a tool used to document a process by which the steps required to accomplish a work activity are outlined, the actual or potential hazards for each step are identified, and measures for the elimination or control of those hazards are developed.

E. "Hazard Identification" shall mean an existing condition that has the potential to harm people, cause damage to property or the environment, or some combination of these.

F. "Incident" shall mean an undesired occurrence that resulted in injury, illness, environmental release, fire, explosion, motor vehicle event, property damage, equipment failure, non-compliance, and/or adverse impact to operations/work.

G. "Near Miss" shall mean an undesired event in which no property or environment was damaged and no personal injury (i.e., work related harm, damage or loss to a person, including first aid cases as well as recordable injuries) was sustained, but where, given a slight shift in time or position, damage or injury easily could have occurred.

H. "Observation" shall mean an opportunity to improve that does not entail an event included as a hazardous identification, near miss, or incident.

I. "Qualified Individual" shall mean one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his or her ability to solve or resolve problems relating to the subject matter, Work or Project.

1.04 DESCRIPTION

A. General

1. In performing the Work of this Contract, the Contractor shall at all times be in compliance with all federal, state, City and local environmental, health and safety laws, rules, and regulations.

2. The Contractor shall be responsible for the health and safety of its employees, Subcontractors, the public and all other persons at or around the Work Site. The Contractor shall be solely responsible for the adequacy of all construction methods, materials, equipment and the safe and environmentally compliant prosecution of the Work. Where possible, the Contractor shall implement Best Management Practices to reduce injuries, accidents and environmental impacts.

3. The overall site management for EHS is performed by the Engineer in coordination with the DEP Construction Manager. The Construction Manager's EHS staff/consultant and Contractor's EHS staff shall work closely with the Engineer's designated EHS staff (i.e., coordinate to perform joint EHS activities, including inspections, incident investigations, etc.). The Contractor shall coordinate with the Engineer's EHS designee with regard to any Site rules or Site-specific requirements such as working hours, delivery times and operations coordination and sequencing.

4. The Contractor shall perform and document its due diligence in determining whether the Subcontractors it hires to perform Work under the Contract are capable of performing to the EHS standards set forth in this Section. At a minimum, the Contractor is required to perform an EHS evaluation of proposed Subcontractors prior to submitting them for DEP approval. The Contractor must have a Subcontractor EHS evaluation program that is at least as stringent as the DEP Contractor Selection and Management Policy available in the BWS web-based PMIS. Poorly performing Subcontractors

will affect the Contractor's performance evaluations and ability to obtain future contracts with DEP.

5. DEP requires a drug and alcohol free, healthful, safe and secure work environment. Contractor employees will report to work in an appropriate mental and physical condition for work. DEP reserves the right to require any Contractor or Subcontractor employee to submit to drug testing when cause for reasonable suspicion of a violation of this policy exists. Drug testing may occur when: a) there is reasonable suspicion that an employee is under the influence of alcohol or illegal drugs, or b) an employee has been in involved in an Incident, or involved in an unsafe practice, or c) as required by BWS EHS Standards. The Contractor must prohibit any employee from being under the influence of any illegal drug or alcohol while at work, on duty, or operating a vehicle or construction equipment.

6. The Contractor shall implement an EHS Management Program which includes qualified Safety Professionals (SPs) and Environmental Professionals (EPs), collectively referred to as EHS Professionals, along with project management staff, with appropriate competencies to provide EHS direction, guidance, and oversight of all aspects of the performance of the Contract's detailed scope of Work.

7. The Contractor shall ensure that its EHS Resources have appropriate authority to execute their duties and responsibilities as set forth in this Section and under the Contractor's EHS Management Program.

8. The Contractor shall arrange for additional approved EHS Resources to be available during EHS staff absences. The Contractor must inform the Engineer, in writing, of anticipated absences.

9. Contractor EHS Resources:

    a. At a minimum, the Contractor shall provide the EHS Resources described below. The Contractor is required as part of its EHS Management Program to identify any EHS Resources necessary beyond the listed minimums.

    b. For all contracts that employ 100 or less employees on site at any time, the Contractor shall have at least one full-time site EHS Rep. The EHS Rep(s) shall have no other duties except those related to EHS on the Contract, and shall not be the project manager, engineer, superintendent or have any other title or project role other than EHS Rep.

    c. For all contracts that employ over 100 employees on site at any time, the Contractor shall have at least two full time EHS Reps. These EHS Reps shall have no other duties except those related to EHS on the Contract, and shall not be project managers, engineers, superintendents or have any other title or project role other than EHS Rep.

d. The Contractor may submit a request in writing to the Engineer to waive the requirements of this Section and permit other Contractor employees who are Qualified Individuals to monitor the EHS activities of the employees on site and to assume all of the responsibilities of the full-time EHS Rep.

e. The Contractor shall ensure that Subcontractors who consistently employ over 100 employees for more than two weeks at a time under the Contract shall have one full-time site EHS Rep. This EHS Rep shall have no other duties except those related to EHS on the Contract and shall not be the Project Manager, Engineer, superintendent or have any other title or project role other than as the Subcontractor's EHS Rep.

f. If the Contract has more than one location, each location shall be treated as a separate contract for purposes of determining the number(s) of necessary EHS Reps in accordance with paragraphs 2 through 4 above.

g. The Contractor's EHS staff shall be provided an appropriate office on the Project Site to maintain and keep available EHS records, up-to-date copies of all pertinent EHS laws, rules, regulations and governing legislation, material safety data sheets, and the EHASP.

10. All site workers have the right to refuse unsafe work which is reasonably believed to present imminent danger to their own safety or the safety of others, the public or the environment, or to City property, without adverse consequences.

11. The Contractor and its Subcontractors shall stop Work and initiate immediate corrective action whenever a Work procedure or a condition at the work site is deemed unsafe by the EHS staff, DEP, Competent Persons, or the Engineer. All Contractor and Subcontractor employees working on site shall report any unsafe or noncompliant work condition(s) immediately to the EHS staff, Competent Persons, or the Engineer. If a stop Work order is issued to the Contractor by the Engineer for unsatisfactory EHS performance, the Contractor shall not make any claim against the City for any losses associated with the stop work order.

12. The Contractor and all Subcontractors are responsible for daily cleanup of their immediate Work areas in accordance with BWS's Housekeeping Standard. Construction scrap and debris shall be removed daily during the course of construction, alterations and repairs. Contractor refuse shall not be allowed to accumulate so as to create trip hazards or block access routes and pathways. The Contractor shall implement procedures to ensure a high standard of housekeeping. All waste shall be disposed of in accordance with the appropriate regulations and applicable Specifications.

13. The Contractor shall ensure that any sand, soil, plaster, cement, mortar or the like is not deposited or washed into any drain or sewer unless specifically authorized under required permits.

1.05 ENVIRONMENTAL HEALTH AND SAFETY PLAN (EHASP)

A. The Contractor shall have a written EHASP prepared and signed by the EHS Professional in accordance with the BWS EHASP Standard. The EHASP must be signed by a principal or senior manager of the company and project management staff. The EHASP shall be submitted to BWS for review and approval prior to the start of any work. JHAs will be developed as the Work progresses, in accordance with the BWS JHA Standard, and will supplement the Contractor's EHASP.

1.06 EMERGENCY ACTION PLAN (EAP)

A. The Contractor shall work with the Construction Manager and Other Contractors to develop a single cohesive construction EAP in accordance with BWS's EAP Standard.

1. The Contractor is responsible for providing or supplementing the facility's existing, emergency alarm/siren/annunciation system to ensure that all Contractor personnel will be adequately notified of an alarm condition or required/test evacuation.

2. The Contractor is responsible for evaluating and ensuring that all identified emergency resources are adequate and appropriate for the potential rescues/emergencies needed.

1.07 SPILL PREVENTION PROGRAM (SPP)

A. The Contractor shall establish a Spill Prevention Program (SPP) for the prevention of releases of petroleum, hazardous substances or other pollutants. The SPP shall be included in the EHASP, and include awareness training for all personnel on measures designed to reduce, minimize and eliminate the potential for releases.

B. The Contractor shall establish sound work practices and implement appropriate measures to achieve release prevention and control of releases when they do occur.

C. At a minimum, the Contractor shall include within the SPP the following:

1. Proper materials handling, labeling and container storage inspection practices for all products including hazardous and universal waste.

2. All petroleum products, hazardous substances, or chemicals must be stored in designated areas and include secondary containment (with capacity to contain 110% of largest container) for all closed containers with a capacity greater than 5 gallons. Open containers of petroleum products, hazardous substances, or chemicals must be stored on secondary containment at all times.

3. Follow manufacturer recommended preventive Maintenance Procedures (MPs) and where none exist, develop in-house equipment specific MPs.

4. Inspection for and purging of residual materials in piping, tanks and other equipment prior to disassembly, demolition and disposal.

5. Supervision of fuel and chemical deliveries. These deliveries shall only be permitted during normal Project work hours or as otherwise approved by the Engineer.

6. The SPP shall include a detailed summary of anticipated petroleum and chemical storage. The information shall include capacity, contents, description and secondary containment provided.

D. The Contractor shall bear sole responsibility for all costs and delays resulting from any releases on the Project which occur as a result of the work activities.

1.08 QUALITY ASSURANCE

A. Qualifications

1. The Contractor shall ensure that, at all times, its employees and those of its Subcontractors have received OSHA 10-Hour Construction training or OSHA 30-Hour training within the last five (5) years.

2. The EHS Professional(s) shall possess a combination of safety and environmental skills as needed to manage the EHS hazards and issues presented by this Project. The EHS Professional may be one or more persons meeting the individual qualifications for Safety and Environmental Professionals as detailed below.

3. Safety Professional (SP): Persons recognized as a Safety Professional shall, at a minimum, possess the following education and experience:

a. Certification as a Certified Safety Professional granted by the Board of Certified Safety Professionals and five (5) years of documented professional construction EHS management experience; or

b. Certification as a Certified Industrial Hygienist granted by the American Board of Industrial Hygiene and five (5) years of documented professional construction EHS management experience; or

c. A Bachelor of Science degree in safety, industrial hygiene, occupational safety and health, environmental health and science, or related field and ten (10) years of documented professional construction EHS management experience.

d. All documented professional EHS management experience must be in the types of construction and conditions expected to be encountered on the site.

e. For projects that require hazardous waste remediation or response, the SP is also required to have successfully completed a forty-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course.

4. Environmental Professional (EP): Persons recognized as an Environmental Professional shall, at a minimum, possess the following education and experience:

   a. A Bachelor's degree in environmental science, environmental engineering or other related engineering or science field and ten (10) years of documented professional environmental field, management and/or engineering experience. All documented professional environmental experience must be in the types of construction and conditions expected to be encountered under this Contract.

   b. The EP's knowledge and experience should include, but not be limited to, management and disposal of solid and hazardous waste, universal waste, hazardous materials management, chemical and petroleum bulk storage, used oil, chemical and petroleum spill control plans, lead/mercury/PCB and asbestos remediation and management, storm water and soil management, and environmental permit management.

   c. Where required for soil sampling plans and determining soil classifications the EP shall meet the NYSDEC definition for a Qualified Environmental Professional (QEP).

5. Electrical Safety Professional (ESP): Persons recognized as an Electrical Safety Professional shall, at a minimum, possess one of the following qualifications:

   a. Certification as a National Fire Protection Association (NFPA) Certified Electrical Safety Compliance Professional (CESCP)

   b. Licensed electrician with 8,000 hours (4 years) of verifiable work experience with electrical power systems (field work) or in lieu of licensure, must show proof of electrician job role and 8,000 hours (4 years) of verifiable work experience with electrical power systems (field work), and completed a minimum of 40 hours of electrical safety training from one or more of the following sources within the last 3 years:

      1) NFPA 70E Electrical Safety in the Workplace training seminars

      2) International Brotherhood of Electrical Workers (IBEW) electrical safety training

      3) Independent Electrical Contractors (IEC) electrical safety training

      4) Other approved electrical safety training

   c. Licensed Registered Professional Electrical Engineer, or an Electrical Engineer with s Bachelor's degree (or higher) in electrical engineering from an accredited college or university with 4,000

hours (2 years) of verifiable work experience with electrical power systems (field work), or an Associate degree in electrical engineering from an accredited college or university with 8,000 hours (4 years) of verifiable work experience with electrical power systems (field work), and completed a minimum of 40 hours of electrical safety training from one or more of the following sources within the last 3 years:

1) NFPA 70E Electrical Safety in the Workplace training seminars

2) International Brotherhood of Electrical Workers (IBEW) electrical safety training

3) Independent Electrical Contractors (IEC) electrical safety training

4) Other approved electrical safety training

d. Certified Safety Professional (CSP) with 6,000 hours (3 years) of verifiable work experience with electrical power systems and completed a minimum of 40 hours of electrical safety training from one or more of the following sources within the last 3 years:

1) NFPA 70E Electrical Safety in the Workplace training seminars

2) International Brotherhood of Electrical Workers (IBEW) electrical safety training

3) Independent Electrical Contractors (IEC) electrical safety training

4) Other approved electrical safety training

e. Licensed Electrician certified as an InterNational Electrical Testing Association (NETA) Level 3 - Certified Technician with 8,000 hours (4 years) of verifiable work experience with electrical power systems (field work), or Level 4 - Certified Senior Technician with 4,000 hours (2 years) of verifiable work experience with electrical power systems (field work)

6. EHS Rep: Qualifications of the EHS Rep(s) shall include a minimum of: ten years of relevant construction experience, five years of which were exclusively in construction EHS management and successful completion of the following training courses:

a. BWS EHS Standards;

b. Thirty-hour OSHA construction safety and health training;

c. For projects that require hazardous waste remediation or response, forty-hour HAZWOPER training;

d. Resource Conservation Recovery Act/DOT hazardous waste/manifesting training

e. Permit- required confined space;

f. BWS spill prevention and control;

g. Control of hazardous energy sources (lockout/tagout);

7. Electrical Safety Worker (ESW): Persons recognized as an Electrical Safety Worker shall, at a minimum, possess one of the following qualifications:

a. Certification as a National Fire Protection Association (NFPA) Certified Electrical Safety Worker (CESW)

b. Licensed Electrician with a minimum of 40 hours of verifiable electrical safety training within the last 36 months (3 years), and completed an apprenticeship program that provides both a minimum of 576 hours of verifiable related instruction and 8,000 hours (4 years) of verifiable work experience with electrical power systems, or a minimum of 250 hours of verifiable related instruction and a minimum of 12,000 hours (6 years) of verifiable work experience with electrical power systems.

c. Licensed Electrician certified as an InterNational Electrical Testing Association (NETA) Level 3 - Certified Technician with 8,000 hours (4 years) of verifiable work experience with electrical power systems (field work), or Level 4 - Certified Senior Technician with 4,000 hours (2 years) of verifiable work experience with electrical power systems (field work)

8. The EHS Professional and EHS Rep shall have extensive experience with hazard identification, evaluation and controls, and be knowledgeable of all applicable EHS requirements set forth by governing laws, rules and regulations as well as Best Management Practices. Where gaps in the training or experience are identified, DEP may require additional experience or training for approval.

1.09 SUBMITTALS

A. Environmental Health and Safety Plan (EHASP)

a. The Contractor shall submit the draft EHASP to the Engineer for review and approval within thirty business days from issuance of the Notice to Proceed. In no case shall Work be allowed to commence without an approved EHASP.

b. Initial submission of the EHASP shall be provided as one hard copy and one electronic copy (either Word or Acrobat format) to the Engineer.

c. The EHASP submittal shall be reviewed and comments shall be provided to the Contractor upon completion of the review.

1) The Contractor shall work with the Engineer to address all comments in order to obtain EHASP approval.

d. Upon receipt of final approval, the Contractor shall provide one hard copy and one electronic copy (either Word or Acrobat format) of the EHASP to the Engineer.

2. The EHASP shall be available to all of the Contractor's employees working on the Contract.

3. Review, acceptance and/or approval of the EHASP will not impose responsibility for the EHASP on any other party, nor will it relieve the Contractor from any of its EHS responsibilities.

4. The Contractor shall submit to BWS EHS for approval, the names of the EHS Professional and EHS Rep(s) to be employed. BWS EHS may request and conduct an interview of the candidates prior to approval. The Contractor shall submit the resumes, copies of certifications, a signed certification of employee training, along with other qualifications of the EHS Professional and EHS Rep. The resumes shall include items such as: experience, education, EHS courses completed, safety and environmental conferences attended, and certifications achieved. Documentation and/or personal references confirming the qualifications may also be required. The DEP may reject persons proposed as EHS Professionals or EHS Reps for failure to have adequate qualifications or for other cause at any point prior to and during the Contract period, as determined by the Engineer.

5. The Contractor shall adhere to the requirements of BWS Incident and Near Miss Reporting and Investigation Standard and shall immediately notify the Engineer of all Incidents involving employee injury and illness, and any other work-related Incidents or Near Misses, damage to equipment and structures, releases or adverse impacts to the environment, or other conditions as defined in the Standard.

6. The Contractor must notify the Engineer and BWS EHS immediately of any regulatory inspections, notices of citations and penalties, Notices of Violation (NOVs), or any other outside agency violations. In addition, the Contractor shall furnish to the Engineer a copy of all correspondence from OSHA, NYSDEC, the Department of Buildings (DOB) or any other government regulatory agency, within one day of receipt, which may include, but are not limited to, employee complaints, notices of citations and penalties, environmental and NOVs. The Contractor must close out all NOVs and provide documentation to the Engineer that the NOV is closed/corrected as a condition precedent to obtaining final payment.

B. Risk Control Reports

1. The Contractor will forward to the Engineer any risk control reports generated by its insurance carrier or broker within one day of receipt.

C. Monthly Contractor EHS Report

1. The Contractor shall submit, on or before the 10th day of each month, a summary report of EHS activity for the prior month, including, but not limited to:

   a. EHS metrics reported on the metrics reporting form provided as part of the pre-construction package and as may be updated throughout the life of the Project.

   b. Chemical Inventory with HTSL (Hazardous and Toxic Substance List) and Subpart Z List.

   c. Local Law 77 and DEP Bureau of Environmental Compliance air permits.

   d. Summary of audit data including trending and analysis along with root cause and corrective actions/training identified.

   e. Summary of the regulatory inspections, notices of citations and penalties, NOVs, or any other outside agency violations (which occurred and were provided to BWS in accordance with this Section).

   f. Statement by the EHS Professional discussing their review of the monthly report and recommendations for improvement, as necessary.

2. The Engineer shall review the report to verify that the Contractor is effectively managing the EHS requirements under the Contract. If the Contractor has no, or limited Work in a given month, it shall inform the Engineer that no Work was performed or submit the required documentation for those days that Work was performed.

D. Performance Evaluations

1. The Contractor, in conjunction with its Subcontractors, shall be evaluated semi-annually on their performance in implementing the Work of this Contract in accordance with this Section and all related EHS specifications, rules, regulations, laws, policies and procedures. The evaluations are based on the criteria established in DEP's Contractor Selection and Management Policy.

2. In conjunction with the Contractor evaluation form, the EHS Professional and EHS Rep will be evaluated by BWS EHS and these shall be included in the evaluations.

3. Any EHS Professional or EHS Rep who knowingly falsifies any data, result, audit, document, etc. will be removed from the Project and precluded from further DEP Work.

PART 2 PRODUCTS

2.01 EHS EQUIPMENT

A. The Contractor shall provide the proper EHS and rescue equipment for all employees, adequately maintained and readily available, for any foreseeable contingency or situation under the Contract during the performance of the Work.

B. All equipment shall be stored in protected areas and maintained and calibrated in accordance with the manufacturer's recommendations and as specified in the EHASP. Where equipment is required to be inspected and or calibrated, documentation shall be maintained and available for review.

2.02 PERSONAL PROTECTIVE EQUIPMENT

A. All personnel employed by the Contractor and any visitors entering the job site shall be required to wear appropriate personal protective equipment (PPE) required as specified in the EHASP and the BWS EHS PPE Standard. The Contractor shall continuously provide and maintain adequate PPE.

PART 3 EXECUTION

3.01 EHS STAFF DUTIES

A. The Contractor's EHS staff is responsible for overseeing and managing the Contractor's safe and environmentally compliant performance of all Work.

B. EHS Professionals shall be required to initiate, review and implement measures to ensure the health and safety of all Contractor employees, and to protect property and the environment. Each EHS Professional is required to visit the Site and audit the Site conditions in accordance with the Contractor's EHS Management Program or as directed by the Engineer.

C. The EHS Professional will be held accountable to adjust his/her workload to enable proper performance of all of their EHS responsibilities in accordance with all requirements of this Section and all applicable regulations. DEP may request that the Contractor remove the EHS Professional for not meeting the Contract requirements.

D. The EHS Professional shall visit the Site prior to developing the Contractor's EHASP. The EHS Professional will arrange a visit with the Engineer and perform an inspection of the Site to understand the full scope of Work to be performed under the Contract. Contract Documents relevant to writing the EHASP can be reviewed and obtained at this time. Facility/Site specific information must be provided, reviewed, and documented in accordance with the BWS EHS Site Orientation Standard.

E. The EHS Professional shall visit all Work areas as frequently as necessary, but no less frequently than monthly, to verify that EHS compliance is being achieved. The EHS Professional shall review hazards, JHAs, and the foremen's and superintendent's preparation and communication of JHAs to workers. The EHS Professional shall review the Project team's compliance with and adherence to EHS requirements, as well as their proactive approach and planning for EHS.

F. The EHS Professional shall be available for consultation whenever necessary. Prior to and after each visit, the EHS Professional shall sign the visitors' log maintained at the Engineer's office.

G. The EHS Professional is expected to perform their inspections in concert with the EHS Rep, during which time the EHS Professional will not only inspect the Site, but shall also mentor and direct the EHS Rep. During the inspection, the EHS Professional will evaluate the Contractor and each subcontractor working under the Contract and clearly identify findings and who they are assigned to, using the EHS Professional checklist provided in the EHASP. Any findings that cannot be resolved immediately will be assigned to the EHS Rep for follow-up. The EHS Professional is expected to communicate with the EHS Rep to ensure all identified findings are closed out. The EHS Professional's inspection shall include programmatic issues such as adhering to the Contractor's EHS program, including, but not limited to, preparing and communicating JHAs and proactively minimizing EHS risks.

H. The EHS Rep will coordinate with the EHS Professional when questions arise requiring the EHS Professional's expertise. After each visit, the EHS Professional shall prepare a report, including photographs (where necessary), acceptable to the Engineer and BWS EHS, detailing the findings. The report shall include those hazards and violations discovered during the site visit and when and how they were or will be closed out. Any EHS items not covered or documented by the inspection checklist will be noted in the comments section of the checklist. The report shall be submitted to the Engineer within one business day of the Site visit.

I. The Electrical Safety Professional (ESP) shall be at the job site full time during all shifts whenever electrical work (medium voltage or greater) is in progress. The ESP is responsible for electrical safety planning and enforcing contractor compliance with electrical safe work practices.

J. The EHS Rep shall be at the job Site full time whenever work is in progress during all shifts.

K. The EHS Professional's and EHS Rep's responsibilities are as follows:

1. The EHS Professional is responsible for directing the Contractor's EHS program, ensuring implementation by the Contractor and all Subcontractors, and for directing and monitoring all activities of the EHS Rep. If the EHS Rep is not enforcing the EHASP, JHAs, or other elements of the EHS program, the EHS Professional shall either recommend retraining or removal of the EHS Rep from the Project by submitting a letter to the Engineer and the Contractor.

2. The EHS Rep must review JHAs to verify that the Work activity's EHS issues and hazards are accurately identified, addressed, and communicated. JHAs shall be regularly communicated to affected employees and must be made available in the areas where the affected employees are working. The EHS Professional is responsible for reviewing JHAs at least monthly to verify that they adequately reflect the recognized hazards and controls of

the tasks being performed. JHAs shall be provided to the Engineer or BWS EHS when requested.

3. Both the EHS Professional and the EHS Rep shall schedule and conduct EHS meetings and training programs as required. A specific schedule of these meetings and an outline of topics to be covered shall be provided with the EHASP. The Engineer shall be advised in advance of the time and place of such meetings, and DEP personnel shall be invited to attend the meetings.

4. All Contractor employees shall be instructed by the EHS Professional and the EHS Rep on the recognition of hazards, safe Work practices and environmental precautions, the contents of the EHASP, and the use of environmental, personal protective and emergency equipment. Such training shall be documented, recorded, and provided as part of the EHS monthly report(s). EHS Reps and EHS Professionals will attend regularly scheduled meetings held by the Engineer and BWS EHS including, but not limited to, the EHS Pre-Construction Meeting.

5. Determine that operators of specific equipment are qualified by training, certification and/or experience before they are allowed to operate such equipment. Ensure documentation of licenses, certifications and training by the appropriate agencies (for example OSHA, NYC DOB, NYC Fire Department, etc.) are on site and current, prior to start of Work.

6. Verify implementation of the BWS Emergency Action Plan (EAP) Standard.

7. Develop an effective Site communication plan that includes, signage, and verbal and written communication of EHS issues and notices.

8. Post all appropriate notices regarding EHS regulations at Site location(s) which afford maximum exposure to all personnel at the job Site.

9. Post appropriate instructions and warning signs regarding all hazardous areas or conditions which cannot be eliminated. Identification of these areas shall be based on experience, site surveillance, and severity of hazard. Such signs shall not be used in place of appropriate workplace controls.

10. The EHS Rep is to conduct EHS inspections a minimum of twice per shift to ensure that all machines, tools and equipment are in a safe operating condition, and that all Work areas are free of safety and environmental hazards. The EHS Rep shall take necessary and immediate corrective actions, where feasible, to eliminate all unsafe acts and/or conditions, and submit to the Engineer each day a copy of the findings on the inspection check list report forms established in the EHASP. Detailed checklists will be tailored to the EHS hazards and conditions on the Site, and will include a comments section to include findings not specifically listed on the checklist.

11. Whenever DEP and its agents perform both announced and unannounced inspections of the Contractor’s EHS performance, a member of the

Contractor's on-site EHS team shall be available during the inspections. The EHS Professional will coordinate inspections with the Engineer and DEP inspectors upon request. The Contractor shall take immediate corrective action, where feasible, to eliminate hazards identified by the Engineer, DEP inspectors, or any other entity. The Contractor, if requested, shall develop and implement a plan detailing corrective actions necessary to mitigate the presence of noncompliant conditions and actions following Incidents, citations, NOVs, or identification of patterns of noncompliant conditions and acts.

12. Notify the Engineer and BWS EHS immediately of all inspections by regulatory agencies, and submit to the Engineer and BWS EHS copies of all EHS reports, citations, and NOVs from regulatory agencies and insurance companies within one workday of receipt.

13. Implement an effective fire protection and prevention program at the Site throughout all phases of the construction Work in accordance with BWS's Fire Prevention Standard. The Contractor will ensure the availability of fire protection and suppression equipment adequate to control the degree of fire hazard encountered during construction.

14. Provide and document appropriate Site-specific orientation to Contractor employees, visitors, and Subcontractors communicating recognized hazards present at and surrounding the Site(s) and facility in accordance with BWS's Site Orientation Standard and DEP's Contractor Selection and Management Policy.

15. Perform all tasks and responsibilities as identified in the EHASP.

3.02 EPCRA AND RELATED HAZARDOUS MATERIAL REGULATIONS

A. EPCRA and Related Hazardous Material Regulations

1. The Contractor shall maintain a monthly inventory of hazardous substances or extremely hazardous substances used or stored on Site in accordance with the BWS-provided chemical inventory form. Documentation shall be maintained on Site and available for review.

2. The Contractor shall prepare and provide to the Engineer a Right to Know (RTK)/Emergency Planning and Community Right to Know Act (EPCRA) Annual Chemical Inventory Form for all hazardous and extremely hazardous substances that the Contractor used or stored during the previous calendar year. This shall be provided by January 15th of each year.

3. In addition to any requirements of the New York City Standard Construction Contract, in order to obtain Final Acceptance, the Contractor must satisfy all EPCRA reporting requirements for the final year of the Contract.

B. Temporary Protective Grounding Equipment

1. Temporary Protective Grounding Equipment (TPGE) shall be used at locations required by 29 CFR 1910.269. TPGE may be used at other locations, when specified in the EHASP.

2. TPGE shall not be used as a substitute for following lockout procedures.

C. Hot Work

1. The performance of Hot Work is prohibited unless performed under the issuance of a Hot Work permit from the Permit Authorizing Individual (PAI). The PAI shall be provided by the DEP.

   a. Where the DEP and Engineer are not routinely present, the Contractor may be allowed to obtain PAI certification for Contract employees.

2. The Contractor shall provide the Engineer with a JHA at least 48 hours prior to the performance of Hot Work. The JHA shall identify the following:

   a. The locations where the Work is to performed;

   b. Equipment to be used;

   c. Gases or vapors within or adjacent to the location that have the potential to create a combustible atmosphere;

   d. Controls required to mitigate or prevent the accumulation of gases or vapors in quantities that have the potential to create a combustible atmosphere; and

   e. Controls or methods to promptly discontinue the use of and de-energize equipment when a combustible atmosphere is detected.

3. For Hot Work in hazardous (classified) locations, refer to the requirements of Section 01351 – Working in Hazardous (Classified) Locations.

D. Electrical Equipment Lockout

1. Contractor is required to lock out all electrical equipment utilizing lockable disconnecting means that provide mechanical isolation followed by verification of no voltage, as according to OHSA 1910/1926 and NFPA 70E; equipment tag out is not sufficient. If a lockable disconnecting means is not available at the identified equipment due to equipment design or operational condition, the Lockout process will continue elevating to the next level of the system, electrical or otherwise, until a lockable disconnecting means is available providing mechanical isolation. Complex electrical systems and network power distribution systems require lockable disconnecting means at all isolation points from the main power source through the downstream equipment loads (e.g. systems with A and B bus sources or other multiple power sources). The lock out requirement will be performed to the greatest extent possible in consideration of plant operational impacts. When the plant operational impacts are too significant to environmental compliance, an alternative method may be utilized know as an Energized Electrical Work Permit (EEWP). An EEWP is a document,

defined by NFPA 70E, that clearly describes the following: the circuit, equipment, and location of the job/task at hand; the work that is to be done; justification of why the circuit or equipment cannot be de-energized or the work deferred until the next scheduled outage; performed by an Electrical Safety Worker (ESW); signatory authorization by the Plant Chief or Facility Manager.

E. Operability Assessment Program

1. An Operability Assessment Program as defined will be performed to verify the proper mechanical operation and lockout disconnecting means of the power distribution system equipment within the contract work scope. This program would start at the construction NTP and will be completed as the first contractor work activity. This program would need to be completed for each work area prior to any electrical work being performed. The program checklist for each unit of equipment will require sign-off by the Contractor ESP, CM, and Plant Chief.

3.03 VISITORS

A. Allowing visitors and members of the public to tour an active construction site is discouraged due to the potential exposures to hazardous conditions and materials associated with construction Work. However, where necessary, approved and authorized visitors of the Contractor, Subcontractors, or any other authorized agency, department, or other entity associated with the Contractor shall sign in at both the DEP/Contractor Security Booth and the Visitors' Log maintained at the Contractor's Site office. Visitors are required to receive Site orientation training, comply with all provisions of the EHASP, wear proper and appropriate PPE and be escorted at all times. All efforts should be made not to schedule site tours/visits at the time of the scheduled evacuation drills. Visitors must not be exposed to construction hazards without prior training with respect to those construction hazards.

3.04 ATTACHMENTS

A. Exhibit A - Standard Environmental, Health and Safety Specifications

B. Exhibit B – Bidder's EHS Performance and Program Review Questionnaire

END OF SECTION

EXHIBIT A

STANDARD ENVIRONMENTAL, HEALTH AND SAFETY SPECIFICATIONS

NO TEXT ON THIS PAGE

STANDARD ENVIRONMENTAL, HEALTH AND SAFETY SPECIFICATIONS

1. Scope

The goal of the New York City Department of Environmental Protection (DEP) is to run the safest operations and capital program in the country with the best environmental compliance record of any large water and wastewater utility. To achieve that goal, DEP strives to hire safe and environmentally compliant contractors and to systematically manage, monitor and evaluate contractors that are working on DEP projects and at DEP locations.

As such, DEP has developed procedures to ensure that contractors' environmental, health and safety (EHS) records and programs are evaluated when DEP is selecting a contractor or approving a subcontractor. These procedures require that all contractors are properly prepared and trained to safely complete the work and to adhere to all EHS laws, rules, and applicable standards as contractually required. DEP work sites are subject to requirements regarding qualification, supervision, and activities of contractors.

These contract requirements (Specifications) set forth the EHS eligibility standards for contract award as well as the applicable EHS training requirements and requirements specific to working on a DEP project. The Contractor must comply with applicable federal, state, and local codes and standards, including environmental and occupational safety and health requirements, as well as any additional special requirements invoked by other sections of the Contract.

Unless otherwise specified, these Specifications do not apply to:

- Contractors providing services with little likelihood of affecting DEP employee safety, DEP property, the public, and the environment, such as consulting services, light janitorial work, laundry, delivery (e.g., food and drink, furniture, filing cabinets), other supply services and shipping, or other products/services as determined by the contracting Bureau.
- Entities funded by DEP which do not directly provide labor or services to DEP, but which utilize funds to independently contract with others to provide services. Examples include other governmental agencies, grant recipients, and non-profit groups. Bureaus may require such entities to comply with the requirements of this policy by specifically adding these criteria into an agreement or contract;
- Other products or services, as determined by the contracting Bureau that do not have the potential to impact safety, public health or the environment.

2. Pre-Award

2.1 Contractor Safety Record Submittals

Within 5 business days of DEP request, the apparent low bidder shall provide the information specified below. Failure to provide the required information may result in a rejection of the bid.

2.1.1 NY Intrastate Experience Modification Rating (EMR) for past 3 years.

Bidder shall provide its NY Intrastate EMR for the past 3 years on its insurance broker's letterhead. EMR information provided by the New York State Insurance Rating Board is also acceptable. If the bidder does not have a NY Intrastate EMR, its out-of-state EMRs shall be submitted. DEP may also request a company's Workers Compensation Loss Runs to verify EMR.

Bidders that do not have an EMR shall provide, for the past 3 years, their: (a) Workers Compensation Loss Runs (this information shall be provided by their insurance broker); (b) OSHA Total Recordable Cases (TRC); and (c) Days Away, Restricted, or Transferred (DART) rates.

Note: if the bidder is not required to maintain such information, it shall provide an explanation for the exemption.

Bidders are expected to have an EMR of 1.0 or below. If a bidder's EMR is greater than 1.0 in any single year within the 3-year period, the bidder shall submit the following:

- An explanation and supporting documentation explaining why the EMR is greater than 1.0 and detailed steps that have been taken to improve the bidder's EHS performance.
- Five years of Workers Compensation Loss Runs (this information shall be provided by the insurance broker) and documentation of payroll during that same period.
- For each indicated loss, the bidder shall provide a summary of the loss facts and investigation, including a summary of corrective actions undertaken and modifications or development of EHS programs.
- If the bidder has been notified by the New York Compensation Insurance Rating Board (NYCIRB) within the past 3 years that they must participate in the Industrial Code Rule 59, Workplace Safety and Loss Prevention, program then the bidder shall provide a copy of their Consultation Report from a Certified Consultant, documentation of the implementation of the Report identified

corrective action(s) and recommendation(s), and a copy of the carrier required re-inspection. If the bidder elected to instead receive a worker's compensation premium surcharge, they shall so indicate.

2.1.2 Last 3 years of OSHA 300 Forms (Logs of Work-Related Injuries and Illnesses) and/or 300A redacted summary worksheets (as available, to verify accuracy of information provided).

Note: if the bidder is not required to maintain such information, it shall provide an explanation for the exemption.

If a bidder's EMR is greater than 1.0, the bidder shall submit their OSHA 300A redacted forms for the entire period covered by the work loss runs indicated in Section 2.1.1 above.

2.1.3 List of all federal, state and local regulatory agency (e.g., OSHA, NYSDEC, USEPA, USDOT, DEP, FDNY and NYCDOB, etc.) notices of violation, notices of deficiencies, and fines issued/received in the past 3 years; the letter listing these (or stating that no notices of violation, notices of deficiencies, and no fines have been issued/received in the past 3 years) shall be on company letterhead and certified as complete and accurate by the sworn, notarized statement of a principal or officer of the bidder.

2.1.4 List of reportable releases of chemical or petroleum products associated with the bidder's operations during, at a minimum, the last 3 years; the letter listing these (or stating that no reportable releases associated with the bidder's operations have occurred during the past 3 years) shall be on company letterhead and certified as complete and accurate by the sworn, notarized statement of a principal or officer of the bidder.

2.1.5 A written description of the bidder's EHS programs (and associated training), including any EHS programs and procedures employees will be required to follow while providing labor or services for DEP. Upon request by DEP, the bidder shall also provide a protocol for the EHS evaluation of any subcontractors that could be proposed by it for DEP approval.

2.1.6 A sworn, notarized certification from a principal or officer that, if the bidder is awarded the Contract, its EHS programs shall meet all OSHA, USEPA, NYS and local regulations, and the bidder shall abide by applicable DEP policies and procedures, as appropriate, and as provided by DEP. (Refer to Bidder's EHS Performance and Program Review Questionnaire/Checklist that is included with the bid submission materials in the Invitation for Bids package).

2.1.7 For bidders that are joint ventures, the above information must be provided and will be reviewed for the joint venture itself and the individual joint venture partners.

2.2 Responsiveness

The items submitted under 2.1 will be evaluated as the contractor's safety record. Further, the bidder's EHS submittals and training program descriptions must indicate that the bidder:

- understands its regulatory requirements
- has a proactive and acceptable EHS and training program in place
- has performed acceptably on prior DEP projects as applicable.
- has adequate EHS professionals available for the project
- has demonstrated an acceptable safety record for the time periods reviewed.
- has demonstrated an acceptable safety record on similar projects over the past three years; and
- has certified that its program and training comply with all regulatory requirements.

3. Proposed Subcontractors

3.1 The subcontractor approval process requires an information submittal that includes the proposed subcontractor's EMR, EHS program descriptions and certifications like those in sections 2.1 and 2.2.

3.2 The standards listed in Section 2.2, above, shall also apply to the approval of proposed subcontractors that would be performing a significant volume or aspect of the project.

4. Contractor Orientation

4.1 Prior to commencing any work at any DEP location, the Contractor shall be required to attend an orientation. After attending the initial orientation, the Contractor shall, in turn, provide an orientation to any of the Contractor's employees assigned to work at the DEP location. This training must also be provided to subcontractors, suppliers[1], and Contractor visitors who will be onsite.

4.2 During orientation, DEP will provide the Contractor with the most current:

4.2.1 Work site-specific hazardous conditions and related information (e.g., hazardous chemicals present at the work site, locations of Safety Data Sheets, and required safe work practices including minimum Personal Protective Equipment (PPE) requirements);

4.2.2 Facility-specific lockout/tagout requirements;

[1] This requirement does not apply to suppliers providing services or products that are determined by the Bureau administering the Contract to have little likelihood of affecting DEP employee safety, property, the public, or the environment.

4.2.3 Applicable sections of the work site's Emergency Action Plan and, at a minimum, the emergency contact numbers, facility map, notification procedures, evacuation procedures, evacuation routes, assembly areas, and description of alarms;

4.2.4 Access control procedure;

4.2.5 Location of restricted areas accessible from the work area or approaches to the work area (e.g., Process Safety Management/Risk Management Plan-covered processes, permit-required confined spaces, and other high-hazard areas) and procedures for working in and around restricted areas;

4.2.6 DEP's Workplace Violence Prevention Policy;

4.2.7 DEP's Possession of Firearms in the Workplace Policy;

4.2.8 All other applicable DEP policies and procedures that will, or may, be necessary for the work; and

4.2.9 Information on known constituents of concern in the work area, including areas known to contain, or having historically contained, lead, asbestos, PCBs, and mercury.

4.3 If provided one by DEP, the Contractor shall distribute to all workers who are to attend the orientation a hazardous material and safe work practices information package. If possible, it will be distributed at least two days prior to the orientation. The workers shall sign for the packages and indicate that they have reviewed the contents prior to their attending the orientation.

4.4 Prior to commencing any work, a responsible official of the Contractor shall certify that it understands its obligations to train its employees and that it has been informed of and will abide by applicable DEP policies and procedures while it is working at DEP work sites.

4.5 If the Contractor or a subcontractor needs to add additional or replacement worker(s) to its crews, the new worker(s) must be provided with the same information received by other workers and receive the orientation for the work site(s).

4.6 The Contractor shall use the Contractor Training Certification form provided by DEP (or an equivalent form), as the record of those Contractor and subcontractor employees who have completed the facility orientation.

5. Requirements During Work

5.1 When and where required by the DEP Bureau of Police and Security, the Contractor, and its subcontractors, and all their respective employees shall, always when working at the site(s), wear photo-identification badges.

5.2 The Contractor shall develop a work plan that identifies and addresses safety hazards and environmental requirements prior to starting any work.

5.3 PPE must be utilized in accordance with the work plan.

5.4 The Contractor and its subcontractors and all their respective employees shall, upon request, produce certificates, licenses, and other documentation that laws or regulations require them to obtain them to conduct activities they are performing (e.g., Asbestos Worker Certificate, FDNY Certificate of Fitness in New York City).

5.5 The Contractor's and its subcontractors' employees are restricted from entering all high-hazard process areas unless access is required to perform their work. In coordination with the Contract Supervisor, the Contractor or subcontractor employees entering such process areas must obtain permission from the on-duty operator or supervisor in person or by the telephone before entering these areas. Further, Contractor or subcontractor employees must inform the on-duty operator or supervisor in person or by telephone upon leaving and follow all other facility access control procedures.

5.6 Any worker who fails to abide by the EHS requirements presented in the safety orientation shall, at the sole discretion of the DEP, be denied access to the facilities and shall be replaced by the Contractor, as directed by DEP.

5.7 The Contractor shall immediately inform the DEP Contract Supervisor and the facility's most senior manager of all incidents and all near misses; and of any notices of violation (NOVs), notices of deficiencies (NODs), and fines issued by and/or received from regulatory agencies resulting from work performed. Initial written reports shall be submitted by the next day. Note that other specification sections in this Contract may include additional investigation and reporting requirements and must be consulted. The more stringent requirements will apply in the event of any conflict.

5.7.1 The Contractor must close out all NOVs, and all other violations/deficiencies, and pay the appropriate fines before final or subsequent payments can be made by DEP. The Contractor will not receive final payment if there are open violations or notices of non-compliance.

6. Evaluations of Contractor EHS Performance

6.1 DEP will perform evaluations of the Contractor's performance to ensure compliance with all EHS laws and regulations and DEP and facility EHS requirements. Such

evaluations will be considered when evaluating the Contractor's bids for future contracts.

6.2 The Contractor shall be rated on each category shown on the Contractor EHS Evaluation form a copy of which should be provided to the Contractor by the Contract Supervisor. ("NA" is acceptable where the requirement was not applicable). The Contract Supervisor may include other specific EHS categories under "Other" that are of particular importance to the project. The Contract Supervisor shall inform the Contractor prior to commencement of work when this is the case.

6.3 DEP considers compliance with and conformance to EHS requirements to be of the utmost importance, and recognizes that, on particular projects, the importance of compliance with certain requirements may carry more weight than others, as failure to comply may present a greater level of risk. The final rating for the job in such a case may be weighted more heavily on specific categories (one or two) if compliance with that/those program requirement(s) is paramount to worker safety and/or environmental protection. In this case, the Contractor shall be notified prior to the commencement of work or through the development of risk-based safety plans during the project.

6.4 The following rating scale shall be utilized in conducting the Contractor evaluations:

Excellent – Contractor exceeded EHS contractual, policy, and/or regulatory requirements. Work was accomplished with no observed deficiencies and no violations. Contractor proactively and effectively addressed potential risks. Contractor demonstrated EHS leadership and best practices and showed alignment with DEP's EHS goals.

Good – Contractor met or exceeded most EHS contractual, policy, and/or regulatory requirements. Work was accomplished with limited or minor observed deficiencies or minor violations. Correction and preventative actions taken by the Contractor were timely and effective.

Fair – Contractor met EHS contractual, policy, and/or regulatory requirements. Observed deficiencies or violations were satisfactorily corrected and did not indicate a pattern of repetition. The correction and preventative actions taken by the Contractor were completed in a timely manner.

Poor – Contractor did not meet some EHS contractual, policy, and/or regulatory requirements. EHS deficiencies and/or violations were identified, but the Contractor either did not identify corrective and preventative actions or proposed correction and preventative actions that appeared to be only marginally effective.

Unsatisfactory – Contractor did not meet a significant number of EHS contractual, policy, and/or regulatory requirements. EHS deficiencies and/or violations were identified, but Contractor did not develop a Corrective and Preventative Action Plan, or failed to implement a Corrective and Preventative Action Plan, or implemented an unsuccessful Corrective and Preventative Action Plan. Deficiencies and/or violations indicated a pattern of repetition.

6.5 A Contractor that disagrees with an overall evaluation of "Poor" or "Unsatisfactory" can submit a written request for reconsideration to the DEP Contract Supervisor within 10 business days after receipt of the written evaluation. The request for reconsideration must set forth all the relevant information and arguments and be accompanied by any documentation relied on in support of the request. The request for reconsideration will be reviewed by the Deputy Commissioner overseeing the Bureau or his or her designee. The Deputy Commissioner or designee will notify the Contractor of the determination of the request in writing. Such determination will be final.

6.6 If its evaluation (other than the final evaluation) is "Poor" or "Unsatisfactory," the Contractor must prepare a Corrective and Preventive Action Plan to correct and prevent recurrence of the deficiencies identified through the evaluation.

* * * * * *

EXHIBIT B

BIDDER'S EHS SAFETY RECORD AND PROGRAM REVIEW

QUESTIONNAIRE

NO TEXT ON THIS PAGE

DEP Contract Name or Number:		
Contractor Name:		
Location(s) and description of work to be performed (attach work summary from contract):		
Provide as part of the pre-award submittal:	☐	EMR Rating (1.0 or below)[1]
	☐	OSHA 300 logs and/or 300A redacted worksheets
	☐	Sworn, certified and notarized letter with information on all regulatory violations and reportable releases in the past 3 years
	☐	Sworn, certified and notarized letter from principal that if awarded the contract, its EHS programs shall meet all OSHA, US EPA, NYS and local regulations and shall abide by all DEP policies and procedures (with information on all reportable releases in the past 3 years
	☐	Written description of firm's EHS and training programs
Attach Table of Contents of Firm's EHS programs and describe below		
Describe employee EHS training below, including new employee training (or attach)		
Describe protocol for subcontractor approval and onboarding below (or attach)		

[1] Contractors with EMRs over 1.0 must provide the documents references in sections 2.1.1 of the DEP Contractor Selection and Management Policy Attachment A (Rev. 4).

Certifications
I certify that the EHS and Training Programs for:

(Company Name)_____

comply with applicable OSHA, USEPA, NYSDEC and NYC regulatory requirements and that the information presented on this form and attachments is accurate and complete. Our company is aware and understands its obligations under the OSHA, USEPA, state and NYC standards (if applicable).

Signature: _____ Title: _____

Print Name: _____ Date: _____

SECTION 01410
Regulatory Requirements

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Inspection by City, State and Federal Government

B. Permits, Licenses, Work Approvals and Certificates

C. Electrical Division, Department of Buildings

D. Existing Utilities

E. Existing Flows

F. Diversion of Water

G. Disposal of Water

H. Conformance to Industrial Code

I. Conformance to Other Codes and Standards

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01570 -- Temporary Controls

1.04 REFERENCE STANDARDS

A. New York City Construction Codes

1. Building Code,
2. Plumbing Code,
3. Mechanical Code,
4. Fuel Gas Code,
5. Electrical Code, and
6. Energy Conservation Code

B. Environmental Assessment of the project under City Environmental Quality Review (CEQR) Act

C. New York State Department of Environmental Conservation (NYSDEC) Regulations

D. Industrial Code, NYS Department of Labor

1.05 DESCRIPTION

A. Inspection by the City, State and Federal Government

1. The Contractor shall provide proper facilities for access to and inspection of the Work at all times for authorized representatives of the City, State and federal governments, the latter two in the presence of the Engineer.

B. Permits, Licenses, Work Approvals and Certificates

1. Unless otherwise specified in this Section, the Contractor shall obtain, pay for and comply with all necessary permits, licenses, approvals, certificates of inspection, and controlled inspection reports, and shall give all notices and pay all legal fees to local, City, State and federal departments having jurisdiction in connection with the Work of this Contract.

2. In order to obtain the necessary permits in a timely manner so as to not affect the design or construction schedules, DEP has initiated applications for some permits. However, the Contractor shall be responsible for following up on and updating these permit applications, as needed, for obtaining all required permits necessary for the performance of this Contract, for renewing permits before they expire, and for maintaining these permits by paying for them regularly and complying with their requirements during the period of performance of the Work.

a. *Permits being acquired by DEP for design phase activities:*

i. *New York State Department of Environmental Conservation Environmental Quality Review Act Compliance*

ii. *New York State Department of Environmental Conservation General Permit for Discharges to Waters of the United States*

iii. *New York City Public Design Commission Approval*

iv. *NYCDEP -- City Environmental Quality Review Environmental Assessment Statement*

v. *NYCDEP - Not an Asbestos Project Notification (Form ACP5)*

vi. USFWS – Informal Consultation

vii. NYSOPRHP – NY State Historic Preservation Office (SHPO) Consultation

viii. Town of Mount Pleasant – Site Plan Approval

ix. Town of Mount Pleasant – Town Building Permit

x. Town of Mount Pleasant – Stormwater Pollution Prevention Plan

xi. Town of Mount Pleasant – Curb Cut/Street Access Permit

b. *Other permits to be acquired for construction phase activities include but not limited to the following:*

i. *NYCDEP - Trailer Connection Permit*

3. All Work performed under the Contract shall conform to the applicable rules and regulations of the New York City Department of Buildings and all other City/Local, State and Federal government departments having jurisdiction.

4. Upon completion of the various stages of construction, the Contractor shall schedule inspections and obtain certificates of approval or acceptance from the various agencies and departments having jurisdiction and shall deliver these certificates to the Engineer.

C. Electrical Inspections, Department of Buildings

1. The Contractor, as mandated by law, shall make application for a certificate of electrical inspection to the Mount Pleasant Building Department for electrical work furnished under this Contract. Proof of filing for the certificate shall be submitted to the Engineer in the form of the notification email issued by the Building Department at the time of application. Such proof shall be submitted within fifteen (15) days after the date upon which the Contractor is notified by the City to commence Work.

2. After completion of the Work, the Contractor shall notify the Building Department, requesting that a final inspection be made.

3. Prior to Substantial Completion, the Contractor shall provide evidence to the Engineer that a Certificate of Inspection, has been filed and certifies that:

a. All material and workmanship comply in every respect with the rules and regulations of the Mount Pleasant Building Department and the New York State Electrical Code.

b. All materials and workmanship comply in every respect with the Contract Documents approved by the Building Department and fulfill the intent thereof.

D. Existing Utilities

1. All subsurface utility and structure information shown on the Contract Drawings were obtained from various plans, maps and field investigations; however, they are not guaranteed to be complete or accurate. It shall be the Contractor's responsibility to locate all such necessary utilities or structures by using field investigation methods acceptable to the Engineer prior to the start of construction. No separate payment will be made for field investigations.

2. During the progress of the Work, the Contractor shall protect from damage any existing utilities or services within the Work areas until, they have been re-routed, disconnected or capped off.

E. Existing Flows

1. The Contractor shall, as approved by the Engineer, provide and construct flumes, temporary sewers, dams and all incidental and related facilities necessary to divert or otherwise take care of groundwater and surface drainage, and to prevent any sediments from being conveyed into the existing storm sewer inlets, combined sewer inlets or watercourses.

F. Diversion of Water

1. The Contractor shall, as approved by the Engineer, provide and construct flumes, temporary sewers, dams and all incidental and related facilities necessary to divert or otherwise take care of groundwater and surface drainage, and to prevent any sediment from being conveyed into the existing storm sewer inlets or watercourses. All such structures, methods, and practices shall be in accordance with the existing stormwater pollution prevention plans (SWPPPs) at the site(s) of the Work and with the permits (e.g., NYSDEC) obtained for the site(s) and regulations governing such activity.

G. Disposal of Water

1. Water from open cut and/or sheeted excavations, manholes, structures, trenches, or from whatever source, shall be disposed of in accordance with regulations of authorities having jurisdiction, permits and methods approved by the Engineer. All such structures, methods, and practices shall be in accordance with the existing SWPPPs at the site(s) of Work and with permits (e.g., NYSDEC) obtained for the site(s) and regulations governing such activity.

H. Conformance to Industrial Code

1. The Contractor's attention is directed to requirements of the Industrial Code of the State of New York, Department of Labor, Board of Standard and Appeals, latest edition and amendments or supplements thereto (the Code).. New York State Industrial Code rules applicable to the Work include, but are not limited to, the following:

   a. Rule No. 2: Exit enclosures, vertical opening and floors in factory buildings.

   b. Rule No. 8: Construction, guarding, equipment, maintenance and operation of elevators, dumbwaiter, escalators, hoists and hoistways in factories, and mercantile establishments.

   c. Rule No. 16: Floor and stair surfaces, railings and toeboards.

   d. Rule No. 19: Guarding of dangerous machinery, vats and pans.

I. Conformance to Other Codes and Standards

1. All devices, materials and installations shall conform to the latest edition of the applicable requirements of the Administrative Code of the City of New York, the National Electrical Code (NFPA 70), ANSI, ASTM, IEEE, NEMA, OSHA, UL and the Contract Documents. In the event of a conflict between any codes or laws of the City of New York and any other applicable code or standard, the City of New York codes and laws shall take precedence.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01420
Reference Standards

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Use of Reference Standards

B. Schedule of Reference Standards

1.02 PAYMENT

A. No separate payment will be made for performing any work of this Section.

1.03 RELATED DOCUMENTS

A. Detailed Specification 01410 – Regulatory Requirements

1.04 REFERENCE STANDARDS

A. Most of the reference standards applicable to the project are listed in the Specification describing the work to be performed.

1.05 DESCRIPTION

A. Use of Reference Standards:

1. Products or workmanship specified by the referenced standards shall comply with the requirements of those standards, except where requirements that are more rigid are specified or required by applicable codes.

2. Referenced standards shall be current as of the time of bidding the Contract Documents, unless otherwise specified.

3. The Contractor shall obtain copies of the referenced standards when required by the Contract Documents.

B. Schedule of Reference Standards

1. Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization or body, it shall be construed to mean the latest standard, code, specifications or tentative specification adopted and published, unless otherwise specified by the Engineer.

2. When no reference is made to a code, standard or specification, the standards of the ASTM or the IEEE shall govern. Where an item of equipment is specified to be explosion- proof, it shall be so certified

by an independent agency recognized by the insurance industry, namely, UL, FM, etc. In all cases, materials and equipment shall be of the quality and character which, in the opinion of the Engineer, are best suited for the purpose for which they are required.

1.06 QUALITY ASSURANCE

A. To ensure proper use of reference standards in the preparation of shop drawings, the Contractor shall employ qualified personnel with at least five (5) years' construction project experience including the use of industry standards and compliance with construction codes and regulations.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01430
Approval of Product Manufacturers – Named or Equal

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for the use of Named Manufacturers of materials and equipment and the requirements for the use of equivalent materials and equipment.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 DEFINITIONS

A. "Named Manufacturer" shall mean a company cited by name in a Specification Section that manufactures, fabricates, assembles, and/or integrates materials, fixtures, equipment, appliances, or other fittings. Named Manufacturer does not mean a distributor, sales representative, and/or supplier.

1.04 DESCRIPTION

A. Approval of Manufacturers (General)

1. All transactions with manufacturers shall be through the Contractor.
2. Similar materials and equipment of one and the same kind, type or classification that are used for identical purposes shall be made by the same manufacturer, except that multiple manufacturers may be approved for commodity items including, but not limited to, such items as concrete, conduit and cable, at the discretion of the Engineer.
3. Approval of a proposed manufacturer is conditional upon compliance with the Specifications and Contract Drawings as determined by the Engineer during the subsequent review of the Contractor's submitted Shop Drawings.
4. Unless otherwise approved by the Engineer, the Contractor shall be granted approval for one manufacturer per item.
5. For items of significant import or requiring specialized manufacturing, the Engineer may deny approval based on a determination that the proposed manufacturer:

a. Does not have a plant of sufficient capacity with a production force and plant facilities of the type and size suitable to produce the specified equipment or material required;

b. Does not have an operating quality control department with an experienced and qualified staff;

c. Has not successfully produced similar equipment or materials for at least three (3) years; or

d. Has previously failed to adhere to product specifications, scheduling, delivery requirements, or warranty obligations in connection with City contracts and projects.

B. List of Named Manufacturers in the Bid Booklet

1. The bidder shall indicate on the form in the Bid Booklet (when included) entitled "LIST OF EQUIPMENT/MATERIAL MANUFACTURERS," which manufacturer the bidder intends to use for each item of equipment or material listed on that form, by either:

a. Writing in one of the Named Manufacturers specified in the Specifications for that equipment or material, in which case the indicated Named Manufacturer is not subject to approval by DEP and shall be utilized for that item as part of the Work of the Contract; or

b. As an alternative to selecting a Named Manufacturer, a proposed "or equal" may be submitted for any of the items. The proposed "or equal(s)" must be indicated in the designated column on the form. The submittal of more than one manufacturer for each item of equipment/material will not be permitted. No other requests for substitutions for these items may be submitted during the Work of the Contract, unless otherwise approved by the Engineer.

c. The bidder shall certify its selection of manufacturers by signing the List of Equipment/Material Manufacturers form.

2. The procedure for review by the Engineer for the "or equal" items proposed with a bid on the List of Equipment/Material Manufacturers form shall be as follows:

a. Within 14 days following bid opening, the apparent low bidder shall submit sufficient information to substantiate that the item proposed is the equivalent of that of the Named Manufacturer.

b. Wherever:

i. information substantiating the request for approval of a substitution is not submitted within said 14-day period, or

ii. the submission in support of proposed "or equal" material or equipment has been judged to be unacceptable by the Engineer,

then the bidder (if awarded the Contract) shall provide the material or equipment of a Named Manufacturer as specified in the Contract Documents and must submit, within seven calendar days after notice, a revised List of Equipment/Material Manufacturers form identifying the manufacturer of the material or equipment to be provided. If the Contractor fails to timely make this submission, the award may be rescinded and the bid rejected as non-responsive.

c. No Shop Drawing submittals shall be made for a proposed "or equal" item prior to written approval of the proposed "or equal".

C. Named Product Manufacturers Not on the List in the Bid Booklet

1. Whenever materials or equipment not included on the Bid Booklet List of Equipment/Material Manufacturers are indicated in the Contract Documents by referring to a particular Named Manufacturer, the naming is intended to establish the type, function, and quality required. Unless the Contract specifies an item as "Brand Name Only" with no substitution of any "approved equal" allowed, then materials or equipment of other manufacturers may be approved, if sufficient information is submitted to allow the Engineer to determine that the material or equipment proposed is equivalent or equal to that of the Named Manufacturer.

2. For such materials or equipment, proposed "or equals" may be submitted and reviewed as part of the Contractor's Shop Drawing approval process. The following shall apply to such determinations:

a. The Engineer will be the sole judge as to the type, function, and quality of any proposed "or equal" and the Engineer's decision shall be final.

b. The Engineer may require the Contractor to furnish additional data about the proposed "or equal."

c. Approval by the Engineer of an “or equal” item shall not relieve the Contractor of the responsibility for full compliance with the Contract Documents.

d. The Contractor shall pay all costs of implementing approved "or equal(s)”, including any redesign and changes to the Work necessary to accommodate the substitution. These shall include resulting costs incurred by other Contractors (if any) on the project.

D. The following provisions shall apply to all requests to substitute equipment or material manufacturers:

1. The Contractor may be granted approval for one manufacturer per item. However, during the performance of Work, multiple manufacturers may be approved for certain commodity items at the sole discretion of the Engineer, upon written request by the Contractor. The Contractor must include a justification in the written request.

2. The Engineer will evaluate each proposed “or equal” within a reasonable period of time.

3. No substituted item shall be ordered, installed, or utilized without the Engineer's prior written approval of the proposed “or equal.”

4. The bidder’s or Contractor’s substantiating information shall address the following factors, which will be considered by the Engineer in evaluating a proposed “or equal.”

a. Whether it is equal in construction, function and efficiency to that of the Named Manufacturer.

b. Whether acceptance of the proposed “or equal” will cause delay in the Contractor's achievement of Substantial Completion.

c. Whether acceptance of the “or equal” for use in the Work will require a change in any of the Contract Documents to adapt the design to the proposed substitution.

d. Whether incorporation or use of the “or equal” in connection with the Work is subject to payment of any ongoing license fee or royalty.

e. The availability of maintenance, repair, and replacement service. The proposed Manufacturer shall have a service agency that is staffed by properly trained personnel and maintains adequate spare parts, and is able to respond and complete repairs within 24 hours.

f. An itemized estimate of all costs that will result directly or indirectly from approval of such "or equal," including cost of any required redesign and potential claims of other Contractors affected by the resulting change.

g. Whether the proposed "or equal" item meets or exceeds the requirements listed in the appropriate Specifications.

E. Changes Resulting From Approval of Proposed "Or Equal"

1. The Specifications and Contract Drawings were prepared to accommodate the equipment furnished by the Named Manufacturers. All motor horsepower, connecting pipe sizes, equipment dimensions, etc., shown are based on the best information available at the time of design.

2. If proposed "or equal" equipment is different in dimensions, horsepower requirements, pipe connection sizes or other material characteristics from that provided for in the Contract Documents, and such difference is not the result of changes in design conditions or concept ordered by the Engineer, then the Contractor shall be responsible for the furnishing of all properly sized pipe connections, motor starters, motor control centers, and electrical wiring and connections, and all other Work required to properly install the equipment in complete operating condition.

3. Any necessary redesign resulting from any proposed "or equal" shall be submitted to the Engineer for approval, along with the submission of substantiating information in support of the proposal.

4. The cost of all such revisions shall be considered to be included in the bid price(s) on the Contractor's Bid Schedule of Prices.

5. The Contractor shall, at no additional cost to the City, be responsible for and pay all costs in connection with any proposed "or equal," including, without limitation, inspections and testing of equipment or materials submitted for review prior to the Contractor's purchase thereof, whether or not the Engineer approves the proposed "or equal."

F. The Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Engineer in considering an "or equal" proposed by the Contractor or by reason of the failure of the Engineer to approve a substitution proposed by the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01432
Contractor's Work Quality

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Contractor's Quality Assurance / Quality Control Requirements

B. Quality of Materials, Equipment and Work

C. Defective Work, Equipment or Materials

D. Welding Certification and Welding Inspection

E. Inspection and Testing of Concrete

F. Leakage Tests

G. Contractor's Surveyor

H. Field Measurements

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01434 - Witness Shop Testing and Quality Assurance Inspection

1.04 DESCRIPTION

A. Quality of Materials, Equipment and Work

1. All Work of assembly, installation, and construction shall be done in a neat, first class, and workmanlike manner. If the quality of the material, fixtures, fittings, supplies, equipment or work required by the Contract Drawings does not agree with that required by the Specifications, the better quality shall be supplied. In asking for prices on, or placing orders for, materials, fixtures, fittings, supplies, and equipment intended for use or installation under this Contract, the Contractor shall provide the manufacturer or dealer with such complete information from these Specifications as may in any case be necessary. In every case, it shall quote in full to each such manufacturer or dealer the text of this subparagraph, as well as the text of such other portions of the Specifications, as are appropriate.

2. The Contractor shall provide a suitable space for the Engineer and the Engineer's authorized representatives conveniently located near that part of each plant where materials or equipment to be furnished under this Contract are being manufactured, assembled, or shop tested. Each space shall be furnished with facilities for the making and keeping of records and correspondence. The reasonable use of a photocopier, telephone, and fax shall be provided, as required by the Engineer. Long distance communications shall be made using DEP telephone cards.

3. 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 as detailed in DS 01434 – Witness Shop Testing and Quality Assurance Inspection. 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 notify the Contractor that the inspection will be made at a point other than the point of manufacture; or notify the Contractor that inspection will be waived. In those instances where the DEP inspector(s) arrive at the agreed-upon location, at the agreed-upon date and time, and find that the article(s) to be inspected are not ready for inspection, the inspector(s) shall return to their home office and all expenses incurred shall be borne by the Contractor and shall be deducted from the Contractor's next payment, unless otherwise determined by DEP.

4. Inspection of the Work by the Engineer is made solely for the benefit of the City. The inspection of the Work shall not relieve the Contractor of any of its obligations to fulfill the Contract as herein prescribed, and defective Work shall be repaired or replaced at the Contractor's sole expense.

B. Defective Work, Equipment or Materials

1. Any defective or imperfect Work, equipment, or materials furnished by the Contractor which is discovered before the Final Acceptance of the Work, or during a warranty period, shall be removed immediately even though it may have been overlooked by the Engineer and approved for payment. The Contractor shall repair such defect, without compensation, in a manner satisfactory to the Engineer.

2. Unsuitable materials and equipment may be rejected, notwithstanding that such defective Work, materials and equipment may have been previously overlooked by the Engineer and accepted or approved for payment.

3. If any workmanship, materials or equipment shall be rejected by the Engineer as unsuitable or not in conformity with the Specifications or Contract Drawings, the Contractor shall promptly replace such materials and equipment with acceptable materials and equipment at no additional cost to the City. Equipment or materials rejected by the Engineer shall be tagged as such and shall be immediately removed from the Site.

4. The Engineer may order tests of imperfect or damaged Work equipment, or materials to determine the required functional capability for possible acceptance, if there is no other reason for rejection. The cost of such tests shall be borne by the Contractor, and the nature, tester, extent and supervision of the tests will be as determined by the Engineer. If the results of the tests indicate that the required functional capability of the Work, equipment, or material was not impaired, the Work, equipment or materials may be deemed acceptable, in the discretion of the Engineer. If the results of such tests reveal that the required functional capability of the questionable Work, equipment or materials has been impaired, then such Work, equipment or materials shall be deemed imperfect and shall be replaced. The Contractor may elect to replace the imperfect Work, equipment or material in lieu of performing the tests.

5. If, in the making of any test, it is ascertained by the Commissioner that the material or equipment does not comply with the Contract, the Contractor will be notified thereof, and it will be directed to refrain from delivering said material 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. Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Contract, the Contractor shall immediately proceed to furnish the named material or equipment.

C. Welding Certification and Welding Inspection

1. For Work performed within NYC limits, all field welding required under this Contract shall be performed by New York City certified welders in accordance with the latest provisions of the New York City Building Code. Additional certification requirements are as follows:

   a. Certification for Welding – For all field- and shop-welding, the following welding qualification provisions shall apply:

      i. For all field welding, all required permits and safety plans shall be in place and adhered to.

      ii. All shop welding shall be performed in accordance with the relevant work-specific requirements in the Specifications and Contract Drawings.

iii. If existing certification is not approved or not submitted, then the welders/welding shop/tack welders must be qualified in accordance with the above procedures and tests, as administered by an inspection agency approved by the Engineer. All costs associated with the required tests for certification and/or retests, if any, shall be borne by the Contractor. The Division of Design Services of the Bureau of Engineering Design and Construction shall be given a notice of not less than 5 business days prior to such tests and may elect to witness any or all of these tests. All costs associated with witnessing these tests shall borne by the City

b. Any deviation from the above shall not be permitted without a written waiver from the Engineer or the Engineer's designee.

2. For Work performed outside NYC limits, all welding, including welder certification, shall be performed in accordance with the requirements of either AWS D1, ASME IX (and the applicable construction code), or the New York State Construction Manual, as applicable and as approved by the Engineer.

3. Welding inspection in New York City shall be in accordance with the latest rules of the New York City Building Code. Additionally, for welding inspection in New York City and outside of City limits the following shall apply:

a. All welds shall be inspected visually by the engineer in accordance with Section V of the ASME Code.

NOTE: Welding Inspection and examination procedures shall be as required in project specific detailed specifications.

D. Inspection and Testing of Concrete

1. Inspection and testing of concrete shall be in accordance with the relevant work-specific requirements in the Contract.

E. Leakage Tests

1. All new pipelines and appurtenant structures and all new liquid containing structures shall be field tested for leakage after installation in accordance with the relevant work-specific requirements in the Contract.

F. Contractor's Surveyor

1. The Structures and Equipment Contractor shall retain the services of a licensed land surveyor, registered in the State of New York, to perform survey work including but not limited to establishing line and grade, in advance of the construction; and to perform other surveying services for

the Work included under the Contract. The surveyor shall be subject to the approval of the Commissioner. Survey drawings shall be submitted to the Engineer for approval.

2. The Contractor shall erect, install and maintain survey platforms, targets, benchmarks and similar facilities to be used by the Engineer in the performance of its inspection services; shall perform all survey work required before, during and after construction; and shall comply with the requirements specified under Article 9 - Surveys, of the General Conditions.

G. Field Measurements

1. The Contractor shall take all necessary measurements in the field to determine the exact dimensions for all Work and verify all pertinent data and dimensions shown on the Contract Drawings.

1.05 QUALITY ASSURANCE

A. The Contractor shall establish and execute a Quality Assurance/Quality Control (QA/QC) plan for the services and equipment which will be supplied under this Contract. The plan shall provide the Contractor with adequate measures for verification and conformance to defined requirements by its personnel and all subcontractors, fabricators, suppliers, and vendors. The Engineer's review and acceptance of the Contractor's QA/QC plan shall not relieve the Contractor from any of its obligation to perform the Work. The Contractor's assigned QA/QC personnel are subject to the Engineer's review and continued acceptance. No Work covered by the QA/QC plan shall start until the Engineer's written acceptance of the Contractor's QA/QC plan has been obtained.

1.06 SUBMITTALS

A. Within 15 days after the commence work date given in the Notice to Proceed (NTP), the Contractor shall provide its QA/QC plan to the Engineer for approval. At a minimum, the QA/QC plan should consist of the following quality elements:

1. Responsibilities
2. Management and Production Instructions
3. Material Control
4. Marking and Material Identification
5. Set-Up and Operational Procedures
6. Non-Conformances
7. Painting

B. Additionally, when required by the Engineer, the Contractor shall submit the following information prior to entering into a supply or service subcontracts:

1. Contract number, supplies or services to be provided and a general description of the proposed item(s), such as trade name, type, etc.

2. The name and address of the manufacturer or service company and the location of the plant at which supplies will be manufactured and tested as required, or at which the services will be performed.

3. Experimental and test data required to support the claimed performance of the supplies.

4. A description of the testing plant, including the hydraulic, electrical and other facilities, in sufficient detail to show that the plant is adequately equipped for performing the tests, if such testing is required.

5. Any additional information that the Engineer may deem necessary in order to determine the ability of the supply or service company to produce the item as called for by the Specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01434
Witness Shop Testing and Quality Assurance Inspection

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Witness Shop Tests

B. Quality Assurance Inspection

C. Inspection Expenses

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01432 - Contractor's Work Quality

1.04 DESCRIPTION

A. List of Equipment Scheduled for Witness Shop Testing

1. See Table 1 - List of Equipment Scheduled for Witness Shop Testing, attached at the end of this Section.

B. Advance Notice for Witness Shop Testing

1. The Contractor shall notify the Engineer in advance of all scheduled witness shop tests, as follows:

a. 60 calendar days in advance for witness shop tests in the continental United States;

b. 90 calendar days in advance for witness shop tests outside the continental United States

C. Witness Shop Testing of Additional Items

1. The City may require witness shop tests for items that have not been designated as such in the Contract Documents.

D. Contractor’s Presence during Witness Shop Testing

1. A duly authorized representative of the Contractor shall be present during each witness shop test.

E. List of Equipment Subject to Quality Assurance (QA) Inspection

1. See Table 2 - List of Equipment Scheduled for Quality Assurance Inspection, attached at the end of this Section.

2. DEP's Bureau of Engineering Design and Construction, Quality Assurance and Test Operations Section intends to perform QA inspection for specific items being supplied under this Contract.

3. The selected equipment is subject to QA inspection by the Quality Assurance and Test Operations Section during any or all stages of manufacture. The Contractor shall adhere to the QA inspection requirements indicated in the respective Specifications for the items designated for QA inspection. The related Specifications for each item furnishes specific inspection requirements for that item.

F. QA Inspection of Contract Items

1. The City may, as deemed necessary, perform QA inspection of any items that have not been designated as such in the Contract. The City also may remove items from the list of items designated for inspection, at its discretion.

2. The Engineer may require, at their discretion, inspection of any item required by the Detailed Specifications at any stage of manufacture, assembly, inspection or testing. Inspection or shop witness testing may be required even when not explicitly requested in the Contract Documents. The Engineer shall have access at all times, while work under this Contract is being performed, to all parts of the Contractor's or manufacturers' plants or other locations where the equipment, materials, fittings, supplies or any other articles required under this Contract are manufactured, assembled, tested, or inspected; and the Engineer shall be permitted to witness any or all of these operations as they may deem necessary to determine that all work is being performed in accordance with the Contract specifications and the approved shop drawings.

3. In the event that the City chooses to perform QA inspection of any items in the Contract, the City will issue a notice to the Contractor that identifies the items and provides direction to the Contractor to facilitate the inspections. This notice will be followed by formal inspection instructions for the QA inspection of each item.

4. For all equipment, the Contractor shall be subject to all requirements described for the manufacture of equipment in the Contract. Regardless of the level of QA inspection activities required by the City, the Contractor shall be responsible to submit, at a minimum,

all documentation and samples that are required in the applicable Specification.

G. Requirements for Inspection of Equipment Designated for QA Inspection by the City

1. The Contractor is responsible for facilitating the inspection process and shall coordinate the same by contacting the Chief of the Quality Assurance and Test Operations Section, DEP Bureau of Engineering Design and Construction, 96-05 Horace Harding Expressway, 5th Floor Low Rise, Corona, New York, 11368.

2. For items designated for QA inspection, the following statement shall appear on the face of purchase orders and shop drawings issued by the Contractor for work to be incorporated in this Contract. The Contractor shall also instruct the approved manufacturers or dealers to place this statement on purchase orders and shop drawings issued by them for such work.

> "This order is subject to inspection by the Bureau of Engineering Design and Construction of the Department of Environmental Protection of The City of New York and shall not be processed until inspection instructions have been issued by the Engineer. Please contact the Chief of the Division of Design Services, DEP Bureau of Engineering Design and Construction, 96-05 Horace Harding Expressway, Corona, New York 11368."

3. For items designated for QA inspection, the Contractor shall submit copies of each purchase order to the Engineer when placed with the manufacturer or dealer. Copies of preliminary/initial shop drawings, with detailed assembly drawings and bill of materials, shall be provided to the Quality Assurance and Test Operations Section as soon as they are available, or have been sent to the Engineer for review. Upon receipt of the purchase order and shop drawings, the Quality Assurance and Test Operations Section will issue inspection instructions to the Contractor (a copy of which will also be sent to the manufacturer/supplier.)

4. For items designated for QA inspection, the Contractor shall not proceed with the work until the inspection instructions have been issued. Once the receipt of the inspection instructions has been acknowledged and verified, the Contractor shall provide advance notice of readiness for inspection at the required witness points. A minimum notice of two (2) weeks shall be provided for items of domestic manufacture and eight (8) weeks for items of foreign manufacture. The inspection instructions will indicate what specific

phases of manufacture, QA inspections, and/or tests that the Quality Assurance and Test Operations Section inspectors intend to witness.

5. The Contractor shall provide Quality Assurance and Test Operations Section with the approved shop drawings as soon as possible after receiving approval from the Engineer. The Quality Assurance and Test Operations Section reserves the right to issue revisions/clarifications to the original inspection instructions based on the approved drawings, and/or as deemed necessary.

6. The requirements for inspection are in addition to and separate from any specified witness shop testing and shall in no way affect procedures or requirements with respect to the same.

7. The Engineer may reject any item or material if manufactured prior to inspection or where the requirements specified in the inspection instructions are not followed.

H. Selection of Inspection Agencies

1. The Engineer will select and designate all persons, firms or corporations to make or witness each and every and all inspections, tests or analyses, with or without reports unless indicated otherwise in the Specifications.

I. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in an approved facility in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. Tests shall be conducted in accordance with the test codes of the ASME and the IEEE.

1. The Contractor’s notification of Witness Shop Testing shall include the following information which will be subject to the approval of the Engineer:

a. A diagram of the proposed testing arrangement.

b. A description of the proposed manufacturer's inspection and testing facilities and procedures.

c. A list of all instruments the manufacturer proposes to use for the tests with initial and last calibration reports certified by an approved independent testing laboratory. (All instruments shall be of ranges suitable for the quantities to be measured.)

d. Sample test data sheets.

e. Sample calculations.

f. Descriptive matter on the testing equipment which shall contain illustrative photographs, drawings, and such other matter as may be requested by the Engineer.

g. The approved Shop Drawing(s) for installation of the equipment to be tested shall be listed in the Contractor's notice and made available to DEP representatives during witness shop testing.

2. The results of the shop tests shall be considered official and conclusive for the purpose of determining whether or not the equipment is in accordance with the performance requirements as specified.

3. No such equipment shall be shipped to the work site until the Engineer notifies the Contractor in writing that the results of such tests are acceptable. When the Specifications or the Engineer require witness shop tests, the only tests which will be accepted are those made in the presence of the Engineer or his or her representative.

4. Should the equipment or instrumentation not be ready, as per prior submitted approved data, the witness will return to the home office. The cost of the additional trip will be borne by the Contractor.

5. Inspection and shop test data and interpreted results thereof accompanied by a certificate of authenticity sworn to, before a notary, by an officer of the manufacturing company shall be forwarded to the Engineer for review and approval as required.

6. If a retest is required, the cost shall be borne by the Contractor.

7. When witness shop tests are waived by the Engineer, the manufacturer's actual test data and the interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be submitted to the Engineer for approval.

8. All equipment and material to be witness shop tested shall be identified with serial numbers and/or approved permanent type identification marks.

1.05 QUALITY ASSURANCE

A. Unless otherwise approved by the Engineer, all Witness Shop Tests for equipment shall take place at the point of manufacture / origin.

B. Witness shop testing of equipment shall be performed in accordance with the procedures of the Specifications.

C. Contractor to Maintain Traceability during Stages of Fabrication and Testing

1. The Contractor shall be responsible to maintain traceability of most equipment components such as castings, structural members, plate, forgings, piping, machinings, etc., and all other articles required under this Contract during all stages of fabrication and testing.

D. Contractor Responsible for all Tests

1. The chemical and physical tests, including the optional tests, called for in the ASTM, federal and other specifications cited in this Contract shall be made as specified, unless otherwise approved.

E. Testing Compliance

1. Contractor's testing personnel shall make the necessary inspections and tests. The reports thereof shall be in such form as will facilitate checking to determine compliance with the Specifications and shall indicate all the analyses and/or test data and interpreted results thereof.

F. Contractor to Provide Engineer with Advance Notice of Sampling and Testing

1. The Engineer shall be informed in advance of all times of sampling and testing, and shall witness these operations if the Engineer so desires.

G. Testing Performed in Engineer's Presence

1. When requested or specified, testing and examinations of all kinds and any weighing required under this Contract shall be done in the presence of the Engineer during the normal eight (8) hour shift, unless otherwise approved, and adequate advance notice of intent to schedule tests shall be given to the Engineer.

H. Contractor to Provide Engineer with Calibrated Instruments

1. The Contractor shall provide, for use by the Engineer, all measuring devices, instruments, and other appliances that the Engineer may deem necessary to carry out the designated inspection of the work. All such instruments and devices shall be calibrated, as per manufacturer's instructions, and shall bear the calibration marks, stamps, or seals of an approved testing body or agency with reference standards traceable to those held by the National Institute of Standards and Technology, or other approved standard. The Contractor shall maintain all instruments and devices in good working order and shall recalibrate them when so directed by the Engineer. The cost, if any, of providing and maintaining such

equipment shall be considered part of the normal expense of conducting business and therefore non-reimbursable.

I. Contractor to Provide Utilities, Equipment, and Services to Assist Testing

1. Electric power, instruments, gages, threaded fasteners, bulkheads, blind flanges, gaskets, piping, equipment, materials, tools, other appurtenances, services necessary for the various specified shop and field tests, scales for weighing, and assistance for measuring or weighing any of the materials shall be provided by the Contractor.

J. Contractor’s Responsibility for Testing Laboratory

1. The Contractor shall provide the services of approved testing laboratories to perform such physical and chemical tests and such examinations as required, if the manufacturer's testing facilities are not approved. In such a case, the Contractor shall provide and prepare test specimens and promptly submit reports of all tests.

K. Contractor’s Responsibility for Reports

1. The Engineer shall be provided with detailed daily and weekly schedules of plant operations pertaining to Work, sufficiently in advance of such operations, so that adequate preparation can be made for inspecting the Work. The sequence of operations for the complete manufacturing process as well as periodic production status reports shall also be provided. Any Work done without such sufficient advance notice to the Engineer is subject to rejection.

L. Approval of Work Subject to Contractor’s Inspection Reports

1. Completion of all requests for the approval of completed Work shall be accompanied by the Contractor's own inspection report of such Work, submitted on the form or forms previously approved and with the applicable approved shop drawings. Any equipment part which has been manufactured and/or assembled using uninspected or unapproved parts or materials shall be disassembled, as ordered by the Engineer, in order that it may determine the acceptability of such parts or materials by means of any tests or examinations it may require. The cost of such ordered disassembly and subsequent reassembly shall be borne by the Contractor.

M. No Shipping before Inspection

1. The Contractor shall comply with the foregoing before shipping any material.

N. Upon completion of the designated QA inspection activities at the facility where the inspection has occurred, the Contractor shall obtain from the

Engineer a formal release from inspection indicating that no further inspection is required prior to shipping.

1.06 SUBMITTALS

A. Procedure for each item scheduled for witness shop testing.

B. Advance notice for witness shop testing of each scheduled item.

C. Detailed report on witness shop testing for each scheduled item.

D. Certified Material Test Reports

1. When no direct test, inspection, or analysis of materials, products or equipment is required to be performed at the point of manufacture, and when the Commissioner so requires, the Contractor shall furnish authoritative evidence in the form of Certified Material Test Reports (CMTRs) that the materials, products, or equipment to be used in the Work have been manufactured and tested in conformity with the applicable material specification. The CMTRs shall indicate the results of physical tests and chemical analyses made directly on the same heat or heats from which any and all materials are furnished under this Contract. The costs of furnishing CMTRs and the results of tests or analyses shall be borne by the Contractor and shall be deemed to be included in the overall price bid for the Contract.

2. When materials or manufactured products comprise such small quantities that it is not practicable to make physical tests or chemical analyses directly on the materials or products furnished, a certificate stating the results of such tests or analyses of similar materials or products which were concurrently produced may, at the discretion of the Commissioner, be considered as the basis for the acceptance of such materials or manufactured products.

E. Submittal of Samples of Materials for Testing

1. When required or requested by the Engineer, specified samples of materials, equipment, and appliances, identified in a manner acceptable to the Engineer shall be submitted by the Contractor for approval by the Engineer. The samples shall be submitted sufficiently in advance of the time when the materials are to be used so that rejections thereof will not delay the approved construction schedules. Approved samples will be labeled and dated.

2. As directed and specified below, the Contractor shall be required to furnish and deliver to the DEP Bureau of Engineering Design and Construction Quality Assurance Chemical Laboratory located at 96-05 Horace Harding Expressway, Corona, New York 11368-5107, or any other designated location, samples of metals from vendor's

plants engaged in the manufacture of mechanical equipment and structural components.

3. A minimum of two (2) unmachined material samples of sufficient size shall be supplied from each material heat lot for the components identified as requiring samples for independent verification of both chemical and physical test results. Material samples shall be provided in accordance with the applicable material specifications (ASTM, etc.) and shall be provided with unique product markings in the form of a stamped-on heat number, etc. that is traceable to the applicable CMTR.

4. Samples shall be taken in the presence of the Engineer and at the location point determined by the Engineer, from material, equipment, or appliances at the work-site or at the manufacturing or testing facilities of the Contractor's vendors or sub-vendors during the normal eight-hour shift, unless otherwise approved.

5. Approved samples will be retained for record purposes at a location designated by the Engineer.

1.07 INSPECTION EXPENSES

A. Witness Shop Testing

1. For the equipment to be witness shop tested, whether of foreign or domestic manufacture, the Contractor shall be responsible for the costs for two (2) employees of the Engineer or the City including all transportation, food, lodging and miscellaneous expenses for each witness shop test.

2. The Contractor shall make all required travel and lodging arrangements that shall be in accordance with the New York City Comptroller’s Office Directive No. 6 or a later or equivalent City document. All arrangements shall be submitted for approval by the Engineer.

3. The duration of each witness shop test shall be as required for its proper performance, as determined by the DEP.

1.08 ATTACHMENTS

A. Table 1 – List of Equipment Scheduled for Witness Shop Testing

B. Table 2 – List of Equipment Scheduled for Quality Assurance Inspection

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

TABLE 1 (CRO-624G)
LIST OF EQUIPMENT SCHEDULED FOR WITNESS SHOP TESTING

Specification Reference		Equipment Scheduled for Witness Shop Testing
Section No.	Section Title	
		NONE

NO TEXT ON THIS PAGE

TABLE 1 (CRO-624H)
LIST OF EQUIPMENT SCHEDULED FOR WITNESS SHOP TESTING

Specification Reference		Equipment Scheduled for Witness Shop Testing
Section No.	Section Title	
		NONE

NO TEXT ON THIS PAGE

TABLE 1 (CRO-624P)
LIST OF EQUIPMENT SCHEDULED FOR WITNESS SHOP TESTING

Specification Reference		Equipment Scheduled for Witness Shop Testing
Section No.	Section Title	
		NONE

NO TEXT ON THIS PAGE

TABLE 1 (CRO-624E)
LIST OF EQUIPMENT SCHEDULED FOR WITNESS SHOP TESTING

Specification Reference		Equipment Scheduled for Witness Shop Testing
Section No.	Section Title	
16231	Standby Power	Electric Generator

NO TEXT ON THIS PAGE

SECTION 01511
Temporary Water and Sanitary Services

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary water service

B. Temporary sanitary service

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 DESCRIPTION

A. The Structures and Equipment Contractor shall provide and maintain temporary city water and sanitary services for the use of all Prime Contractor's personnel on the site. In addition, the Structures and Equipment Contractor shall provide all water required to perform the Work of this Contract.

B. The Structures and Equipment Contractor shall provide and maintain all temporary city water and sanitary services at the site during construction in compliance with all applicable State, City and local regulations. It shall be the Structures and Equipment Contractor's responsibility to obtain all necessary permits from the Bureaus within DEP and other City agencies or from local authorities having jurisdiction.

C. Potable water shall be used for testing of potable water lines and domestic needs.

D. The Structures and Equipment Contractor shall remove temporary services at the completion of the Work.

1.04 TEMPORARY SANITARY SERVICES

A. Toilet facilities, both exterior and interior, shall be furnished and installed for use by the Contractor's personnel. Toilet fixtures shall be furnished, installed and maintained in satisfactory operating condition. The Contractor shall keep the temporary toilet fixtures in a clean and sanitary manner.

B. Enclosures for the toilet fixtures shall be erected and maintained in a clean and sanitary manner.

C. Heating and lighting for the enclosures shall be furnished, installed and maintained by the Contractor.

1.05 TEMPORARY WATER SERVICES:

A. The Structures and Equipment Contractor shall extend branch piping with outlets located so City water is available by hoses with threaded connections. Temporary pipe insulation shall be provided to prevent freezing.

B. The Structures and Equipment Contractor shall be responsible for providing water meters and appropriate backflow preventers where necessary to protect against contamination of the City water supply.

C. The Structures and Equipment Contractor shall provide sufficient potable quality drinking water for all persons employed by the Contractor at the project site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01512
Temporary Heating and Ventilation Facilities

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Payment

B. General Requirements

C. Temperature Requirements

D. Method of Temporary Heat

E. Temporary Heating System

F. Method of Temporary Ventilation

G. Temporary Ventilation System

H. Operation and Maintenance

I. Electrical Power for Heating and Ventilation System

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 GENERAL REQUIREMENTS

A. In order to permit construction to continue as scheduled during all seasons of the year, the Work of the Contract shall be protected at all times from the harmful effects of low temperature and from accumulation of harmful gases such as chlorine, methane and hydrogen sulfide.

B. Labor may be required seven days a week and during other than Normal Project Working Hours for the period of time required by seasonal weather conditions.

C. The Contractor shall begin to supply temporary heat only when so directed in writing by the Engineer and shall continue to supply temporary heat until directed in writing by the Engineer to discontinue.

D. In prosecuting the Work of this Contract, the Contractor shall provide all temporary ventilation necessary for the protection of the Contractor's employees, all other persons at or about the Contractor's Work area, Work, and equipment of the Contractor. Temporary ventilation shall be in accordance with all applicable regulations of the Federal Occupational Safety and Health Act of 1970.

1.04 TEMPERATURE REQUIREMENTS

A. When directed by the Engineer, the Contractor shall provide sufficient heat to maintain the temperature requirements prescribed herein. Temperatures shall be maintained at a level sufficient to meet construction requirements, but in no event shall the temperature fall below 50 degrees Fahrenheit.

PART 2 PRODUCTS

2.01 METHOD OF TEMPORARY HEAT

A. Temporary heat shall be in conformance with all applicable Federal, State, and Local regulations and shall be subject to the approval of the Engineer.

B. The method of temporary heat shall:

1. Not cause the deposition of dirt or smudge upon any finished Work or any defacement or discoloration.

2. Not be injurious or harmful to personnel or materials.

3. Not interfere with the operation of the facility or with DEP Operations.

C. The following methods of heat shall not be permitted:

1. Open fires.

2. Electric heating.

3. Salamanders or other direct-fired equipment will not be allowed in construction areas.

4. Torpedo blowers and/or propane heaters will not be allowed in construction areas.

D. The method of temporary heat shall not require any unnecessary demolition or penetration through existing or new structures.

2.02 TEMPORARY HEATING SYSTEM

A. Systems shall include boilers, pumps, radiators, unit heaters, water and heating piping, insulation, controls, fuel storage and/or any other equipment as necessary, all furnished and installed by the Contractor.

2.03 METHOD OF TEMPORARY VENTILATION

A. Temporary ventilation shall be in conformance with all applicable Federal, State, and Local regulations and shall be subject to the approval of the Engineer.

2.04 TEMPORARY VENTILATION SYSTEM

A. The temporary ventilation system shall be forced or gravity type and shall include, but not limited to fans, motors, inlets, outlets, ductwork, heaters, controls and all appurtenances.

PART 3 EXECUTION

3.01 OPERATION AND MAINTENANCE

A. Temporary Heating

1. The Contractor shall coordinate operations in the Work of providing temporary heat to ensure sufficient and timely performance of the Work under this Contract.

    a. The Contractor shall maintain all permanent or temporary enclosures at no additional cost to the City.

2. The Contractor shall maintain the temporary heating system in operating condition at all times during the temporary heating period.

    a. Temporary heating system equipment shall be placed so as to comply with the requirements specified hereinbefore, and shall be connected, disconnected and suitably supported and located so as to permit construction Work, including finish Work such as wall plastering and painting, to proceed.

    b. The installation of the temporary heating system and the placing of ancillary system equipment and components shall be coordinated with the operations of all Subcontractors so as to ensure sufficient and timely performance of the Work.

B. The Contractor shall remove all portions of the temporary heating system when so directed by the Engineer.

C. Temporary Ventilation

1. The Contractor shall maintain the temporary ventilation system in operating condition at all times during the performance of Work.

a. Temporary ventilation system equipment shall be placed so as to comply with the requirements specified hereinbefore, and shall be connected, disconnected and suitably supported and located so as to permit construction Work, including finish Work such as wall plastering and painting, to proceed.

b. The installation of the temporary ventilation system and the placing of ancillary system equipment and components shall be coordinated with the operations of the Subcontractors so as to ensure sufficient and timely performance of the Work.

3.02 ELECTRICAL POWER FOR TEMPORARY HEATING AND VENTILATION SYSTEM

A. Temporary Heating System:

1. The Contractor shall provide all labor, materials, and equipment necessary to provide and maintain the temporary electrical system and power necessary for the operation of the temporary heating systems. The cost of providing, operating and maintaining this service shall be included within the lump sum bid price for the Contract.

B. Temporary Ventilation System:

1. The Contractor shall provide all labor, materials, and equipment necessary to provide and maintain the temporary electrical system and power necessary for the operation of the temporary ventilation systems. The cost of providing, operating and maintaining this service shall be included within the lump sum bid price for the Contract.

C. Temporary electrical system shall comply with the latest applicable regulations and codes referenced elsewhere in the specification.

END OF SECTION

SECTION 01513
Temporary Electrical System

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The temporary electrical system shall be furnished, installed, operated and maintained in accordance with the requirements of this Section and the Contract Drawings.

B. The temporary electrical system shall supply power and light as required for the construction related activities. The temporary electrical system shall be complete and shall include all auxiliary equipment necessary to support the construction.

C. The following index of this Section is included for convenience:

1.02 PAYMENT

A. There is no separate payment provision for this Section.

1.03 RELATED SECTIONS

A. General Specification 16061 -- Grounding.

B. Detailed Specification 01270 – Measurement and Payment.

1.04 REFERENCE DOCUMENTS

A. Temporary electrical system shall comply with the latest applicable provisions and recommendations of the following:

1. Electrical Code of the State of New York.
2. NFPA 70, National Electrical Code.
3. National Electrical Safety Code.
4. Local Codes
5. Local Utility Requirements
6. OSHA Regulations

1.05 SYSTEM DESCRIPTION

A. The Structures and Equipment Contractor shall make all necessary arrangements with the Utility and shall provide a temporary electrical service point connection. Connecting lines and service supply shall be of sufficient capacity to supply all temporary light and power required on the site.

B. Arrangements shall be made with the Utility immediately after notice to commence work in accordance with these Specifications.

C. The service shall have provisions for meter connections for each Contractor on the worksite and the Engineer’s field office. The service shall be branched and metered using circuit breakers or fused switches and meters.

1. The distribution from each meter to the Contractor’s field office and shops at the site shall be the responsibility of each Contractor.
2. The distribution from one (1) meter to Engineer’s field office shall be the responsibility of the Structures and Equipment Contractor.

3. The distribution from one (1) meter to the construction temporary light, power, and security system shall be the responsibility of the Structures and Equipment Contractor.

D. Each Contractor shall be responsible for making arrangements with the Utility to have a sealed meter installed and for payment of same.

E. The energy charges for each Contractor's field office and shop usage shall be the responsibility of each Contractor.

F. Energy charges associated with the work areas general power and lighting and the security site lighting shall be the responsibility of the Structures and Equipment Contractor. Energy charges associated with the Engineer's field office shall be the responsibility of the Electrical Contractor.

G. Each Contractor requiring additional temporary power and light, beyond that provided under by the Structures and Equipment Contractor as specified herein, shall arrange with the utility for such additional temporary power and light and shall bear the costs of all material and ancillary equipment necessary. Removal of such additional temporary power and light shall be at the expense of each Contractor.

1.06 DESIGN REQUIREMENTS

A. Each Contractor shall provide all systems and circuits in accordance with the Electrical Code of the State of New York, NFPA 70, the National Electrical Safety Code, local codes, utility codes, and OSHA requirements.

B. The temporary electrical system shall be provided in accordance with the following design requirements:

1. Each Contractor and the Engineer's trailer shall have a separate branch.

2. A separate branch shall supply the work area general lighting, power, and security. Receptacles (GFI type) shall be located throughout the work area. Receptacle connected equipment shall be suitable for 120 volt operation. Operating input shall not exceed 1500 volt-amperes. Illumination levels shall be as required by OSHA.

3. Security site lighting circuits shall supply a system of security lighting for the work area, field office complex(s), Contractors' staging areas, and all parking areas. Unless specifically shown otherwise on the Drawings or stated in the Detailed Specifications, the system shall be arranged to provide a minimum lighting intensity of 5 foot-candles in these areas.

4. A total of three (3) 200 amperes and three (3) 100 ampere meter pans and fused disconnect switches rated for 120/208 volt, 3 phase, 4 wire shall be furnished, installed and wired for the above.

5. See attached schematic diagram for Temporary Electrical System Arrangement.

1.07 SUBMITTALS

A. Each Contractor shall submit working drawings, shop drawings and material specifications for the approval of the Engineer and the utility in accordance with the requirements of Section 01330 – Submittal Procedures.

B. Working Drawings:

1. One line diagram representing the power distribution for the temporary system.

2. Location plan indicating the major distribution equipment.

3. Manufacturer's catalog cuts for the products proposed for use.

4. Panel loading, voltage drop, short circuit and other calculations, as required.

5. Security lighting layout.

1.08 QUALITY ASSURANCE

A. The temporary general lighting system shall provide lighting for access to and egress from the Work and for safe and expeditious construction within designated enclosed areas of the structure or structures.

B. All temporary electrical system equipment and components shall be of recent manufacture and of proper working order for the intended purpose.

C. The Structures and Equipment Contractor shall maintain in proper working order and repair the temporary electrical system.

D. The Structures and Equipment Contractor shall modify, extend, and relocate the temporary electrical system components, as needed, to support construction activities

E. The Structures and Equipment Contractor shall remove the temporary electrical system when directed by the Engineer.

1.09 DELIVERY, STORAGE AND HANDLING

A. The temporary electrical equipment shall be delivered, stored and handled in accordance with these Specifications and the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE CONNECTION

A. The Structures and Equipment Contractor shall provide a service entrance and distribution center at the service point. Service entrance and distribution equipment shall be in accordance with the following:

1. Enclosures shall be rated NEMA 3R.
2. Meter pans shall be suitable for revenue meters furnished by the utility.
3. Circuit breakers shall be thermal magnetic type. Circuit breakers shall be equipped with lockable handles.
4. Disconnect switches shall be fused type with current limiting fuses. Disconnect switches shall be equipped with padlocking features.
5. All equipment shall be approved by the Utility.

B. The Structures and Equipment Contractor shall also provide the following other equipment at the service point:

1. Eight foot high, steel chain link fence with gate shall enclose the service entrance and distribution center. The fence shall be arranged so to permit a minimum clearance distance of 6 feet between the fence and the equipment.
2. The fence shall include baked enamel, 14 by 10 inch caution signs. The signs shall read, “DANGER - HIGH VOLTAGE - KEEP – OUT”. The signs shall be bolted to the fence on each side of the fence and on the main gate.
3. A 4/0 AWG ground grid consisting of four ground rods, one at each corner, shall be provided. Maximum ground resistance shall be 10 ohms. Grounding shall be in accordance with Article 2.04.

2.02 RACEWAYS AND WIRING

A. All conductors shall be 600 volt, enclosed in properly sized raceways or be routed aerially using Type AC, MC or TC cable.

B. Conductors shall be provided for all devices, suitably sized for the intended purpose. Conductors installed in raceways shall be single conductor type THHN/THWN or equal to be approved by the Engineer and the utility. Armored cable, Type AC, metal-clad cable, Type MC or power and control tray cable, Type TC shall also be permitted.

C. Raceways where used shall be suitably sized for the conductors. Raceways shall be rigid metallic type.

D. Aerially routed cables shall be messenger supported from solid wood poles or other recognized means. Messenger shall be high strength galvanized steel.

E. Poles shall have a class suitable for the installation in accordance with the National Electrical Safety Code and the utility and shall be thirty feet length minimum. Poles shall be guyed at angle or corner runs and when eccentrically loaded.

2.03 LIGHTING FIXTURES AND DEVICES

A. Receptacles (GFI type) shall be grounded type, 120 volt, 20 ampere suitable for hand tools such as drills, hammers and grinders.

B. General lighting lamps shall be LED equivalent to 100 watt installed in suitable lamp holders. Security lighting lamps shall be LED equivalent to 400 watt high-pressure sodium installed within a floodlight type fixture suitable to illuminate the intended area.

C. Switches, breakers and miscellaneous equipment shall be suitable for the intended purpose, with voltage, current and short circuit interrupting ratings as required for the circuits.

2.04 GROUNDING

A. The temporary systems shall be grounded in accordance with the requirements of General Specification 16061 - Grounding.

PART 3 EXECUTION

3.01 INSTALLATION

A. Temporary wiring systems shall be installed without interfering with the work of other contractors.

B. The ground grid cable shall be installed in loop fashion completely around and outside the service point fence. The fence and distribution equipment shall be connected to the grid at a minimum of two locations.

C. The temporary general lighting system shall be installed progressively in structures as the designated areas are enclosed or as lighting becomes necessary because of partial enclosure. Lamps shall be installed to provide an even distribution of illumination over the work areas.

D. Receptacles shall be installed in such a manner so as to reach any point in the work areas with an extension cord not to exceed 40 feet in length.

E. Security lighting shall be installed on poles to illuminate the staging and parking areas.

F. Aerial conductors shall be installed at a minimum height of 14 feet above finished grade. When conductors cannot be routed at the proper height or where it will interfere with plant operations or construction activities, conductors shall be provided in rigid steel conduit and installed underground.

3.02 OPERATION

A. The Structures and Equipment Contractor shall keep the temporary power and lighting system alive each working day from 6:00 A.M. to 6:00 P.M., from Monday to Friday inclusive for the duration of the Contract. This requirement includes provision of one electrician available on-call at all times for incidental modifications of the temporary electrical system as directed by the Engineer or to maintain the electrical equipment and power distribution systems at the site. Areas of the Work designated by the Engineer as requiring the use of the temporary electrical system to function outside of the above hours shall be energized continuously or as directed by the Engineer. These areas include security lighting and the Engineer's trailer complex.

B. Any Contractor requiring the use of the temporary electrical facilities before 6:00 A.M. or after 6:00 P.M., from Monday through Friday or at any time on Saturdays, Sundays or holidays, shall bear the cost of energizing and/or de-energizing the system. If more than one Contractor uses the system during such periods, the cost thereof shall be prorated among each Contractor.

3.03 MAINTENANCE

A. The temporary electrical system shall be maintained and repaired until it is no longer required.

B. Lamps, fuses and other equipment shall be repaired and/or replaced, as required.

3.04 REMOVAL

A. At the conclusion of the work, when directed by the Engineer, the temporary system shall be removed by the Structures and Equipment Contractor in its entirety. The ground surfaces and structures disturbed by the work shall be restored to their original condition.

3.05 ATTACHMENTS

A. Schematic Diagram for Temporary Electrical System Arrangement

END OF SECTION

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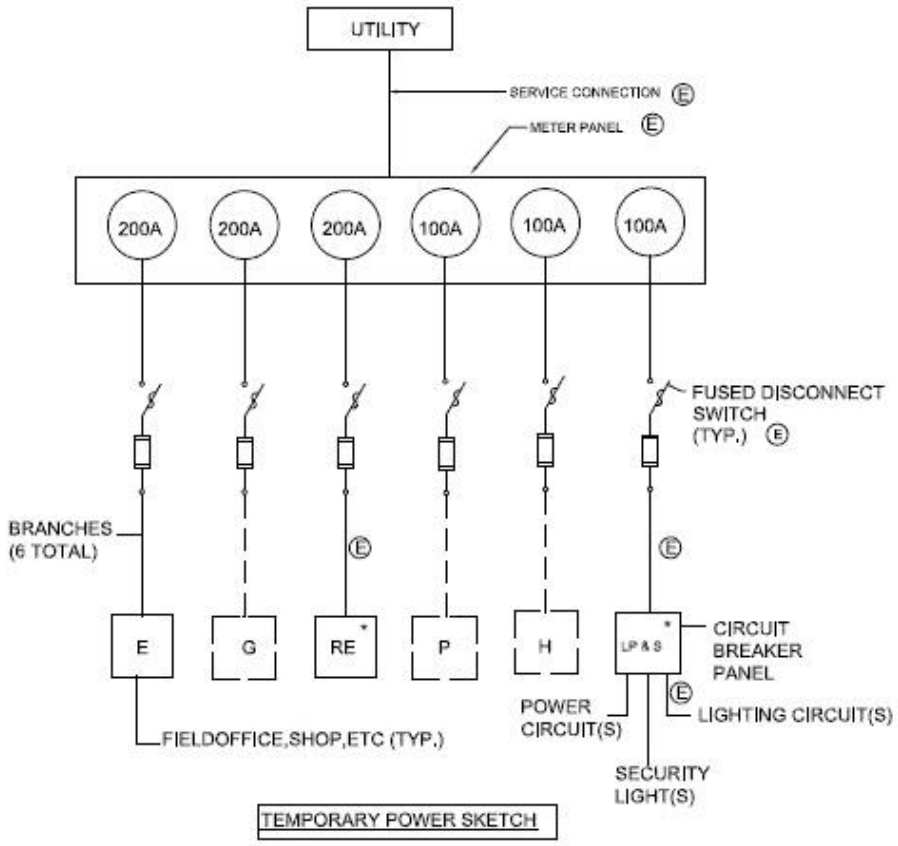
TEMPORARY ELECTRICAL SYSTEM ARRANGEMENT



TEMPORARY POWER SKETCH

——— BY ELECTRICAL CONTRACTOR
— — BY OTHERS
E - ELECTRICAL CONTRACTOR
G - GENERAL CONTRACTOR
RE - RESIDENT ENGINEER
P - PLUMBING CONTRACTOR
H - HEATING, VENTILATION & AIR CONDITIONING CONTRACTOR
* - SUPPLY WITH MAIN BREAKER

NO TEXT ON THIS PAGE

SECTION 01514
Interim Electrical System

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interim Electrical System shall be provided in accordance with the requirements of the Contract Drawings and Specifications and in accordance with NYS Electrical Code and all applicable standards, regulations and codes.

B. The following index of this Section is included for convenience:

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01513 – Temporary Electrical System

B. Detailed Specification 01711 – Maintenance of Operation and Construction Activities.

C. Detailed Specification 16076 – Labelling and Identification

D. Detailed Specification 16121 – Low-Voltage Wires, Cables and Accessories

E. Detailed Specification 16131 – Electric Conduit System

1.04 REFERENCES

A. Definitions

1. Low-Voltage as used in this Section and the Specifications shall meal all equipment, conductors, insulation systems and accessories intended for operation within the 600 V Class

2. Interim Facility/Interim Facilities – All facilities required to provide a bridge from existing operational facilities to the permanently installed facilities to be provided under this Contract. Interim Facilities are required to provide a level of service equal to that of the existing facilities or level of service which may be equal to that to be provided by the permanently installed facilities.

3. Interim Generator – An electric generator to provide electrical power to the Interim Facilities. The Interim Generator may be the sole electric power source or it may be provided in standby to the Electric Utility. See Contract Drawings

4. Service point – The point at which the Electric Utility or the Interim Generator connects to provide the Interim Facility with electrical power.

5. Electric Utility or Utility – All references to the Electric Utility or Utility shall mean the Local Electric Utility having jurisdiction as defined in this Section and the Specification.

6. Con Edison – Local Electric Utility having jurisdiction.

B. Reference Standards

The Interim Electrical System shall comply with the latest applicable provisions and recommendations of the following:

1.	NYSEC	-	New York State Electrical Code
2.	NFPA 70E	-	Standard for Electrical Safety in the Workplace
3.	NESC	-	National Electrical Safety Code
4.	OSHA	-	Rules of the Occupational Health & Safety Administration

1.05 SYSTEM DESCRIPTION

A. The Contractor shall furnish and install an Interim Electrical System to provide Interim electrical Power service to the Interim Facilities.

B. The Interim Electrical System shall consist of low-voltage power sources supplying the low-voltage electrical distribution system and associated controls.

C. The Interim Electrical System shall be required to keep the Interim Facilities in service for the periods required in the Contract Drawings and Specifications or as directed by the Engineer.

D. The power sources for the Interim Electrical Systems shall be service feeder/s of the Electric Utility and/ or Interim Generator/s.

E. The layout of the Interim Electrical System shall be as shown on the Contract Drawings.

1.06 DESIGN REQUIREMENTS

A. The Contractor shall design, furnish and install the Interim Electrical Systems all in accordance with the NYSEC, NESC, Local Codes, Utility and OSHA requirements.

B. Contractor shall coordinate and design the Interim Electrical System ensuring that the following are achieved:

1. The design of the Interim Electrical System shall ensure that the Interim Facilities shall be safely operated and in keeping with the requirements of NYSEC, NFPA 70E and OSHA

2. The design of the Interim Electrical System shall maintain the required level of tolerances limits of frequency, voltage, power and var support to all loads of the Interim Facilities.

3. The design of the Interim Electrical Systems shall provide for the detection and disconnection of faulty sources, loads and distribution equipment. Fault discrimination shall be achieved selectively.

C. Interim Electrical System design shall be completed and sealed by a NYS Licensed Engineer.

1.07 QUALITY ASSURANCE

A. All interim electrical system equipment and components shall be of recent manufacture and suitable for the intended purpose.

B. The Contractor shall maintain in proper working order and repair the Interim Electrical System.

C. Contractor is responsible for all costs for maintenance of the Interim Electrical System.

D. The Contractor shall modify, extend, and relocate the Interim Electrical System components, as needed, to support the Interim Facility operations.

E. The Contractor shall remove the Interim Electrical System when directed by the Engineer. All costs for removal of the system shall be included in the lump sum price bid.

1.08 SUBMITTALS

A. Contractor shall submit working drawings, shop drawings and material specifications for the approval of the Engineer and the Utility in accordance with the requirements of the Detailed Specification 01330 – Submittal Procedures.

B. Working Drawings

The following shall be submitted:

1. Manufacturer’s catalog cuts for the products proposed for use.
2. One line diagrams detailing and representing the Interim Electrical System.
3. Plans, Elevations and Sections showing the location of all Interim Electrical System equipment and loads.
4. Cable and Conduit Schedules showing all below ground and above ground routing of all conduits, duct banks and overhead raceways and cables.
5. All control wiring and schematics
6. All calculations showing details of the design of the Interim Electrical System including but not limited to conductor sizes, determination of voltage drops, establishment of breaker duties, fault calculations, protective device coordination, protective device settings, sizing of generators, sizing of Utility service feeders and determination of Arc Flash requirements..

7. Lighting layout, calculations and illumination levels for interior and surrounding environment of the Interim Facilities.

8. All Interim Electrical System design drawings shall be stamped and signed by the NYS Licensed Engineer.

9. Calculations and studies shall be submitted in a report format. Each report shall be stamped and signed by the NYS Licensed Engineer.

1.09 DELIVERY, STORAGE AND HANDLING

A. The Interim Electrical System shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 UTILITY ELECTRICAL SERVICE

A. The Electrical Contractor shall provide a service entrance and distribution center at the service point. Service entrance and distribution equipment shall be as shown the Contract Drawings and the following:

1. Meter pans shall be suitable for revenue meters furnished by the utility.

2. Circuit breakers shall be thermal magnetic type. Circuit breakers shall be equipped with lockable handles.

3. Disconnect switches shall be fused type with current limiting fuses. Disconnect switches shall be equipped with padlocking features.

4. All equipment shall be approved by the Utility.

2.01 GENERATOR ELECTRICAL SERVICE

A. The Contractor is responsible for delivering and installing an adequately sized Interim Generator at the service point. Service entrance and distribution equipment shall be as shown the Contract Drawings and as follows:

1. The Contractor shall be responsible for getting all applicable permits and certificates.

2. The Contractor is responsible for ensuring that the Interim Generator is completely fueled under all conditions of service of the Interim Facility.

3. The Interim Generator fuel tank shall be sized to run 24 hours as a minimum with the full load of the Interim Facility.

2.02 OTHER SEVICE POINT EQUIPMENT

A. Service Point

The Electrical Contractor shall also provide the following other equipment at the service point:

1. Eight foot high, steel chain link fence with gate shall enclose the service entrance and distribution center. The fence shall be arranged so to permit a minimum clearance distance of 6 feet between the fence and the equipment.

2. The fence shall include baked enamel, 14 by 10 inch caution signs. The signs shall read, "DANGER - HIGH VOLTAGE - KEEP – OUT". The signs shall be bolted to the fence on each side of the fence and on the main gate.

3. A 4/0 AWG ground grid consisting of four ground rods, one at each corner, shall be provided. Maximum ground resistance shall be 10 ohms. Grounding shall be in accordance with General Specification 16061 – Grounding.

B. Environmental Ratings

Enclosures at the service point shall comply with the following:

1. The service entrance equipment enclosure shall be as follows:

   a. Non-Hazardous Locations

      i. Indoor dry locations, enclosures shall be rated NEMA 12.

      ii. Outdoor locations, enclosures shall be rated NEMA 3R

      iii. Corrosive locations, enclosures shall be rated NEMA 4X

   b. Hazardous Locations

      i. Enclosures shall be NEMA 7.

   c. Indoor and outdoor enclosures in corrosive locations shall be constructed from 316 stainless steel.

2.03 RACEWAYS AND WIRING

A. All low-voltage conductors shall be enclosed in properly sized raceways or be routed aerially using in accordance with General Specification 16121 – Low-Voltage Wires, Cables and Accessories.

B. Conductors shall be provided for all devices, and suitably sized for the intended purpose. Conductors installed in raceways shall be single conductor type THHN/THWN or equal to be approved by the Engineer and the Electric Utility.

C. Raceways shall be rigid metallic type.

D. Aerially routed cables shall be messenger supported from solid wood poles or other recognized means. Messenger shall be high strength galvanized steel.

E. Poles shall have a class suitable for the installation in accordance with the NESC and the Electric Utility, and shall have thirty feet (30) minimum length. Poles shall be guyed at angle or corner runs and when eccentrically loaded.

2.04 LIGHTING FIXTURES AND DEVICES

A. Contractor shall provide lighting fixtures and devices as specified in the Detailed Specification 01513 – Temporary Electrical System.

2.05 NAMEPLATE AND SIGNS

A. Contractor shall provide all nameplates, signs conduit markers, conduit tags and Arc Flash Labels as specified in General Specification 16076 – Labeling and Identification.

2.06 GROUNDING

A. The Interim Electrical System shall be grounded in accordance with the requirements of Detailed Specification 16061 – Grounding and as shown on the Contract Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Interim Electrical System shall be installed without interfering with Work of the Contract.

B. The ground grid cable shall be installed in loop fashion completely around and outside the service point fence. The fence and distribution equipment shall be connected to the ground grid at a minimum of two (2) locations.

C. Lighting shall provide an even distribution of illumination in and around the Interim Facilities.

D. The layout of receptacles shall facilitate the use of extension cords in the Interim Facilities. The max length of extension cord used in the Interim Facilities shall be 20 feet.

E. Aerial conductors shall be installed such that a minimum clearance height of fourteen (14) feet above finished grade is maintained. When conductors cannot be routed at the proper height or where it will interfere with Interim Facility operations or construction activities, conductors shall be provided in rigid steel conduit and installed underground.

F. The Contractor shall make all necessary connections and fuel the Interim Generator during changes to the Electric Utility connections or Interim Facility operation.

3.02 OPERATION

A. The Contractor shall keep the Interim Electrical System in service until the Engineer determines that it is no longer required.

B. The Interim Electrical System shall be field tested.

1. The field test shall be witnessed by the Engineer.

2. The field test shall demonstrate the ability of the Interim Electrical System to maintain power to all Interim Facility loads within the specified limits of frequency, voltage and current loadings.

3. The field test shall demonstrate the Interim Electric System operation on the Electric Utility and on the Interim Generator.

4. The field test shall demonstrate the operation of switching equipment installed to facilitate the transfer of Interim Facility load from the Electric Utility to the Interim Generator and return to the Electric Utility.

5. The field test report shall be submitted for review and approval by the Engineer.

C. Contractor shall not modify or remove from service any existing arrangements providing power to existing operational equipment until the Interim Electrical System has been field tested, the field test report approved and date and time to commence continuous operation of the Interim Electrical System has been approved by the Engineer.

3.03 MAINTENANCE

A. The Interim Electrical System shall be maintained and repaired, until it is no longer required.

B. Lamps, fuses and other equipment shall be repaired and/or replaced, as required.

3.04 REMOVAL

A. When directed by the Engineer the Interim Electrical System shall be removed in its entirety. All ground surfaces and structures disturbed by the Interim Electrical System shall be restored to their original condition

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01521 – TEMPORARY FIELD OFFICE TRAILERS
CONTRACTS CRO-624 G, H, P, E

PART 1 GENERAL

1.01 SUMMARY

A. Field Office Trailers

B. Security Systems

C. Office Furniture

D. Kitchen

E. Bathroom Items

F. Attachments

1. Table 1 – Office Furniture

2. Table 2 – Kitchen Items

G. The following index of this Section is presented for convenience:

H.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Section 01511 – Temporary Water and Sanitary Services

B. Section 01513 – Temporary Electrical System

C. Section 01524 – Field Office Equipment and Supplies

D. Section 01733 – Construction Waste Management

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Temporary Engineer's Field Offices as specified herein.

B. Contractor's Field Office

1. The Structures and Equipment Contractor shall furnish and maintain a field office in accordance with the requirements of the General Conditions, Article titled "Temporary Structures". Field offices shall be located as directed by DEP.

C. Land for Contractor's Use During Construction

1. Each Contractor shall confine its construction activities to the Site as shown on the Drawings. Limited space will be made available on the site for construction staging and field offices for the Contractor. Space must be used by the Contractor, as required in the Contract Documents or as directed by the Engineer.

2. Each Contractor may require additional space for construction staging beyond the limited space available at the site. As such, the Contractor shall provide for space off-site at no additional cost to the City.

3. Each Contractor may be required to move its field office during construction in order to sequence the Work. All such moving costs shall be included in the lump sum price bid for the Contract.

4. The City reserves the option to require the Contractor to vacate any part of the land assigned for Contractor's use, including the Contractor's field office area, within sixty (60) days after notice by the City.

5. Each Contractor's field office shall present a clean and neat exterior appearance and shall be in a state of good repair. Temporary construction facilities, which, in the opinion of the Engineer, require exterior painting or maintenance, shall be repaired or replaced at the Engineer's direction.

6. Following the completion of the Contract, or as directed by the Engineer, each Contractor shall remove its plant, shanties, trailers, materials, equipment, etc., from the site and restore the site to its original condition, satisfactory to the Engineer.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submit for approval the following information:

1. Description of Resident Engineer's Field Office, including the street address and a listing of the office space (in square feet) by room.

2. Plan drawing of the Resident Engineer's Field Office, drawn to scale, indicating the Contractor's designed layout of all specified furniture and equipment.

a. Contractor shall provide interior design of Resident Engineer's Field Office suitable for accommodating four full-time individuals while performing construction management and inspection duties.

3. Data sheets for all products to be furnished under this Section.

4. Calculations to confirm that the design of the field office trailers was based on consideration of appropriate loads and is in conformance with all applicable codes. Such calculations shall be signed and sealed by a professional engineer licensed in New York State.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Temporary Field Offices shall be as manufactured by:

1. Williams Scotsman, Inc., Baltimore, MD;

2. Design Space International, Bala-Cynwyd, PA;

3. Nadler Modular Structures, Spring Valley, NY;

4. or approved equal.

B. Office Furniture shall be as manufactured by:

1. Hon Co., Newark, NJ;

2. Cole Business Furniture Co., New York, NY;

3. Or approved equal.

C. Ceiling mounted exhaust fan shall be manufactured by:

1. Nutone Corp., Cincinnati, OH;
2. Broan Co., Racine, WI;
3. Or approved equal.

D. Office Chairs shall be manufactured by:

1. Nightingale, Mississauga, Ontario, Canada;
2. Herman Miller, Zeeland, MI;
3. Steelcase, Grand Rapids, MI;
4. Exemplis, Chicago, IL.

E. Water Filter shall be manufactured by:

1. Aqua-Pure, Davisburg, MI;
2. Or Approved Equal.

2.02 MATERIALS / EQUIPMENT

A. Field Office Trailers

1. The Field Office Trailers shall be office type, new, pre-fabricated structure or a new mobile trailer.
    a. Provide a minimum of 720 square feet (SF)
2. Materials
    a. Exterior metal fully insulated walls and roof with a minimum of R-25 insulation.
    b. Interior walls insulated with R-11 insulation for sound attenuation.
    c. Ceiling height shall be 8 feet.
    d. Completely weatherproofed and insulated.
    e. Floor systems designed for 40 psf in addition to dead load.
    f. Roof system designed for 35 psf in addition to dead load.
    g. Exterior doors fully insulated (whole-unit U-factor less than 0.32, greater than R-3.0) metal type with, aluminum thresholds, heavy-duty closers and vandal-proof locksets with keys meeting building code requirements.
    h. Low VOC Paints and sealants and floor coverings

i. Exterior walls and roof finished with a high SRI material, minimum reflectivity of 0.65.

j. Interior doors solid wood with lock sets.

k. High-Performance Windows with a whole-unit U-factor less than 0.32 (greater than R-3.0)

l. Windows provided with adjustable blinds, operable sashes, screens, storm sashes and all hardware such as that required for security.

m. Underside of trailers completely sealed and insulated with minimum of R-19 insulation.

n. Resilient floor coverings with a minimum 20% recycled material content.

o. Passive solar window awnings on South-facing and West-facing windows.

3. HVAC

a. Ducted system with ducts concealed above the finish ceiling.

b. Sized to maintain the temperature in each room at 70 degrees Fahrenheit (F) when the outside temperature is 0 degrees F and 75 degrees F when the outside temperature is 100 degrees F.

c. Wall mounted heat/cool programmable thermostat.

d. Provide 40-gallon hot water heater.

e. Toilet rooms have a switchable ceiling mounted exhaust fan.

1) The fan shall be an 8-inch fan.

f. Fire suppression system for all rooms.

4. Electrical

a. The Electrical system shall have capacity for all loads, and be an armored cable system.

b. General interior lighting shall be light-emitting diodes with occupant or sensors.

c. Emergency lights provided as required by code.

d. Receptacles provided as required by code.

e. Trailer and electrical system to be grounded.

f. Work shall be in accordance with Section 01513 – Temporary Electrical System.

5. Plumbing

a. Plumbing work is to include all water supply, drainage and piping required for a complete system. Work shall be in accordance with Section 01511 – Temporary Water and Sanitary Services.

b. All soil, waste, vent and drainage piping shall be provided and connected to the sewer system.

c. Toilets to be low flush (1.28 gpf) or dual flush (1.6 gpf/0.8 gpf.)

d. Urinals to be low flush (0.5 gpf) or waterless

e. Shower Stalls shall be included in each of the male and female bathrooms, as specified herein and indicated on the Contract Drawings.

f. Showers and sinks to be provided with hot and cold water.

g. Water lines to be installed on the interior to prevent freezing and be concealed wherever possible.

h. One (1) exterior water faucet shall be installed at each trailer location.

i. Pipes subject to freezing shall be heat traced.

6. Room Areas for New Field Office Trailers: The room descriptions are solely for the purposes of indicating the intended use for the office/contractor supplier, and are not a binding use for the DEP.

a.	Resident Engineer Office	10’ x 15’
b.	Small Conference Room	12’ x 15’
c.	Inspector’s room	10’ x 10’
d.	Two (2) inspector bathrooms (with room for lockers, one for male and one for female)	8’ x 8’
e.	Unspecified occupant room	8’ x 10’
f.	Kitchen	8’ x 10’

7. Parking: A minimum of four (4) parking spaces shall be provided at the new Engineer’s Field Office Complex for the exclusive use of the Engineer.

B. Security Systems

1. The trailer(s) shall be provided with approved Fire, Panic, and Intrusion alarm systems. The alarm system shall be connected via the telephone service in the trailer to an approved central monitoring station so that continuous monitoring will be in effect.

a. Fire Alarm System. In each of the smaller offices, heat detectors rated at 135 degrees F shall be located in the ceiling and as close to the middle of the room as possible. The larger office(s) shall have a single unit that will detect both heat and smoke. The fire system shall

be wired directly to a central control panel. Upon activation of the fire system, sirens with a steady tone will sound the fire alert. All sirens will automatically shut down and re-arm after fifteen minutes.

b. Intrusion and Panic Alarm System. Each opening (doors and windows) shall be protected so that if they are opened while the system is activated, an alarm condition will result. Upon activation of the intrusion system, sirens with a modulating tone will sound an alert. All sirens will automatically shut down and re-arm after ten minutes.

1) Panic alarm units shall be installed in two locations as designated by the Engineer. When this system is activated, there will not be a siren response; this system will be activated in the silent mode.

2) A remote tamper proof turn off switch shall be installed on the outside of the trailer at a location designated by the Engineer so that the intrusion system can be shut down before entering the field office. The remote turn off switch shall not affect the fire or panic system; turn off switches for these systems shall be located as directed by the Engineer. The intrusion and panic system shall be connected to the central control panel located in the City's field office trailer.

c. Control Equipment

1) All wiring shall be to be current standards being used in the alarm industry and, where possible, all wires shall be hidden.

2) All contacts shall be recessed and moisture proof.

3) The single unit smoke and heat detectors shall be of a photoelectric type that provide quick response to flaming and smoldering fires and designed to permit easy entry of smoke from any direction. The heat detector portion of this unit shall be activated at 135 degrees F. The combined unit will also have a LED pulse located on the face of the unit to indicate that power is on. No radioactive materials will be permitted in this fire alarm sensor.

4) An 8-ohm siren will be provided. The siren will be installed in a tamper proof steel siren box located on the exterior of the trailer at least 10 feet above the top of the trailer roof.

a) The external siren shall be of 30-watt capacity with two separate and distinct alarm signals for both warble and continuous tone selections so as to differentiate between fire and burglar alarm. It shall be Ademco Model No. 715 "Blaster" electronic siren in tamper proof cabinet or approved equal. There shall be an amber strobe light attached on or adjacent to the siren box, wired so that it is activated when the siren is activated.

b) The outside wiring shall be installed in protective seal conduit.

5) Control panel shall be provided and installed in the field office trailer. The control panel shall be equipped with at least three channels - one for fire, second for intrusion and third for panic. The control panel shall also have DC batteries that will supply back-up power in the event that AC power is interrupted. Each channel of the control panel will be wired directly to a digital communicator. The control panel shall have one delay entrance exit channel. The control panel and system shall be a 12-volt system.

a) The control panel shall have indicating lights that indicate the mode of the:

(1) Protective circuit

(2) Alarm memory

(3) AC power on

(4) Armed and a switch for bell/battery test and fire reset

6) The digital communicator shall be provided furnished and installed adjacent to the control panel in the field office trailer. It shall be of a type that will notify the approved central station of the specific alarm condition (fire, intrusion, or panic). The digital communicator will also inform the approved central station of low power on the system. The Contractor shall arrange through the New York Telephone Company for the necessary interconnect equipment so that the digital communicator may be connected to the telephone service at the field office trailer. The connection of the New York Telephone Company shall have line seizure so that the outgoing signal from the digital communicator cannot be interrupted. The current

standards used by approved central station regarding "call back to verify" alarm conditions shall be employed.

a) The Contractor shall provide a minimum of four external floodlights to illuminate the Engineer's trailer and surrounding walkways. They shall be activated by a photoelectric unit with a backup timer.

7) The Contractor shall provide and install a complete security system as outlined above. All costs, including connection to the New York Telephone Company, central station monitoring and repair and maintenance charges shall be borne by the Contractor; the costs thereof shall be included in lump sum price bid for the Contract.

C. Office Furniture

1. All furnishings and equipment shall be provided new and unused. All furnished equipment shall be periodically provided with consumable ancillary supplies such as: toner, cartridges, paper and with maintenance / repair and servicing contracts for the entire duration of the Contract. The maintenance response time shall be not more than 24 hours from the time of notification.

2. Office furniture must comply with "Mayoral Directive No.1-91 Procurement and Ergonomic Standards for Video Display Terminals and Ancillary Furniture and Equipment" dated January 25, 1991.

3. Furnish and install office furniture as shown in Table 1, attached, and as directed by the Engineer.

D. Kitchen

1. The kitchen shall be provided with items as shown in Table 2, attached.

2. Under Counter Water Filter with Test/Odor Cartridge

a. The filter shall conform with and be listed under NSF Standard 42 (Class II).

E. Bathrooms

1. The bathrooms shall be properly ventilated and shall be equipped with the following:

Item	Quantity
Flush toilet	1
Shower stall with hot and cold running water	
Sink with hot and cold running water	1
Mirror	1

Medicine cabinet	1

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. General

1. The Structures and Equipment Contractor shall, as specified and approved in accordance with the requirements of all appropriate laws, ordinances, and regulations, furnish, install, equip, maintain, and service the Resident Engineer's Field Offices.

2. The Structures and Equipment Contractor shall obtain and pay for all permits.

3. The Structures and Equipment Contractor shall be fully responsible for providing and securing all necessary permits and approvals associated with potable water and sewage services for the Resident Engineer's Field Offices as well as the Contractor's Field Offices as described in this section.

4. Each office shall be complete with electrical and plumbing hook-ups to be available during the construction period for the exclusive use of the Resident Engineer. The trailers shall be installed at the sites at locations specified by the Engineer. All built-in movable equipment including, but not limited to: fire alarm system, new telephone system, computer system, security system, and portable bi-directional communicator shall be installed and made operable and ready for use by the Contractor.

5. Concrete block foundation walls shall be constructed as directed. The walls and footings shall completely enclose the bottom of each trailer. A wooden platform with stairs and handrails shall be provided adjacent to each entranceway. The site of the trailer shall be graded as directed by the Engineer.

6. All exterior items not factory painted shall be painted by the Structures and Equipment Contractor as directed by the Engineer.

B. Office Space

1. The floor space as stated herein and shall be a weatherproof and thermally insulated structure, and have separate and adequate means for easy and safe entry and egress. It shall have a sufficient number of windows to permit convenient use for engineering office work, as is appropriate, in normal daylight without the use of artificial light. The office shall be partitioned and furnished as specified herein. Install a fire, intrusion, and panic alarm system.

C. Electrical Installations:

1. The trailer and electrical system therein shall be properly grounded by the Contractor. The Contractor shall provide extended electrical service as required to service all equipment in the trailer and as indicated above. All electrical energy costs for the offices will be borne by the Contractor.

D. Heating and Air Conditioning Installations:

1. The Contractor shall place in operation and maintain the heating and air conditioning units. The system shall be maintained and repaired and kept in good operating condition during the performance of the Work. The HVAC system shall be serviced for maintenance 2 times per year.

E. Contractor's Field Office

1. Trailers utilized by the Contractors shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the opinion of the Engineer, require exterior painting or maintenance will not be allowed on the site.

2. The Contractor's Field Trailer shall be equipped with heating ventilation and air conditioning, suitable fluorescent lighting, potable water and sanitary connections, steel security mesh protection for each window, exterior security lighting, steps with railing to the trailer door and a security alarm to detect intrusion at each exterior window and door. The Contractor shall be responsible for all costs associated with providing these services.

3. The Contractor shall obtain 120/208 volt electrical service for the trailer and necessary outdoor lighting from a panelboard on-site to be identified by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Field Office Trailer Maintenance

1. The finishing of floors and the painting of exterior and interior surfaces of the field offices shall be as approved by the Engineer.

2. Keep the offices in first class condition during the occupancy by the Engineer and until the completion of all work under the Contract. Promptly replace any damaged or defective parts, including appliances, fixtures, computers and equipment.

3. Janitor Service: Provide full, daily janitorial services for all the offices, including, but not limited to, sweeping, mopping, vacuuming, dusting and garbage removal. The office floors shall be swept daily, and washed at least once per week. The bathroom shall be swept and mopped daily and the water closet, sink and shower shall be cleaned and disinfected daily. Furnish, replace and replenish electric light bulbs and fluorescent tubes, toilet paper, cloth and paper towels, soap, and all other items required to maintain the offices in clean and perfect condition. Windows shall be washed at least once every month. Hang, remove, and store window screens, storm windows, and screen and storm doors when ordered. All maintenance work shall be performed during normal working hours.

4. Furnish fuel and provide service for the heating, cooling and hot water systems, as required, to provide the specified heat, cooling and hot water.

5. Provide for the satisfactory disposal of sanitary and other wastes.

6. Keep the access roads, parking areas, and walks about the field office buildings free and clear of snow and ice.

B. Trailer Removal

1. The Structures and Equipment Contractor shall remove and dispose of the temporary field office trailer at the end of Contract in accordance with Section 01733 – Construction Waste Management.

END OF SECTION

TABLE 1
OFFICE FURNITURE

DESCRIPTION	QUANTITY
Book cases 41 inches high by 36 inches wide by 13 inches deep	Four (4)
55 gallon trash bin	One (1)
55-gallon paper recycling bin	One (1)
55-gallon metal/plastic recycling bin	One (1)
dry chemical fire extinguishers, UL listed 1A-10BC	Two (2)
Office desks with 60-inch by 30-inch tops, one box drawer, one deep file drawer, center drawer and locks	Four (4)
Swivel cushioned office chairs on casters, low back, seat width 20-1/2 inches, depth 17-3/4 inches, 3-1/4 inch thickness, seat height 17 inches	Four (4)
Stackable chairs with side arms	Twelve (12)
Folding tables with the following dimensions: 60 inches by 30 inches	Two (2)
Five-drawer vertical file cabinet, legal size with lock	Three (3)
Five-drawer vertical fireproof file cabinet, legal size with lock	Three (3)

TABLE 2
KITCHEN ITEMS

DESCRIPTION	QUANTITY
Wood kitchen cabinets with Formica counter tops	8 linear feet
Electric bottle-less water filtration system with hot and cold outlets	One (1)
Microwave oven, 1.2 cubic feet	One (1)
Automatic coffee maker	One (1)
Refrigerator, 20 cubic feet	One (1)
Overhead kitchen cabinets	8 linear feet
Tables, 60 inches long by 30 inches wide	Two (2)

NO TEXT ON THIS PAGE

SECTION 01524
Temporary Field Office Equipment, Supplies and Services

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Office Equipment

B. Office Supplies

C. Servicing of Resident Engineer's Field Office

1.02 PAYMENT

A. No separate costs will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01511 – Temporary Water and Sanitary Services

B. Detailed Specification 01513 – Temporary Electrical System

C. Detailed Specification 01521 --Temporary Field Office Trailers

1.04 SUBMITTALS

A. Data sheets for all office equipment, supplies and services to be provided under this Section including but not limited to the following:

1. Computers and Network
2. Printers and Copying Machines
3. Telephones and Facsimile Machines
4. Internet Service; Digital Subscriber Line (DSL). Cable Modem or Equal.

PART 2 PRODUCTS

2.01 OFFICE EQUIPMENT

A. Office equipment and furnishings shall be provided. All furnishings and equipment shall be new and unused. All furnished equipment shall be periodically provided with consumable ancillary supplies such as toner, cartridges, paper and with maintenance / repair and servicing contracts for the entire duration of the Contract. The Structures and Equipment Contractor shall obtain and pay for a service and repair contract with local

representative of the dealer or manufacturer for on-call, daily, on-Site service. The maintenance response time shall be not more than 24 hours from the time of notification. Service warranty and upgrades for software for each computer system shall be provided for the duration of the Contract.

1. COMPUTERS AND NETWORK: The Structures and Equipment Contractor shall install a LAN System. The Structures and Equipment Contractor shall furnish minimum of eight Computers with the following minimum requirements:

    a. Intel core i5 Quad 3.2GHz

    b. 500 GB Hard Drive

    c. Bus slots (4-PCI & 1-AGP)

    d. 56.6 V.90 fax/data internal modem

    e. Two (2) serial port

    f. Two (2) parallel port

    g. Two (2) to Four (4) USB 2.0 ports

    h. Internal sound card with speakers

    i. Microsoft mouse and keyboard

    j. 24x CD-RW/DVD combo drive

    k. SD card slot

    l. 17 to 21inch high resolution color monitor

    m. 8GB of RAM memory

    n. High speed internal graphics card

    o. 10/100 Ethernet NIC network interface card and equipment as required

    p. Microsoft Windows 10 or latest version

    q. Microsoft Office, latest version

    r. Acrobat Adobe Professional

    s. Symantec or Mcafee Antivirus software

    t. Compatibility with e-builder interface.

    u. All cable, conduit, and equipment (installed) necessary to provide a LAN interface from each computer station to the printer. Cable and conduit routing shall be non-invasive and as approved by the Engineer.

    v. A LAN System shall be provided.

w. A Wifi System shall be provided.

x. Underground installation of internet service.

2. PRINTER: The Structures and Equipment Contractor shall provide two printers, laser jet automatic feed type, compatible with the computers. The printers shall operate off the parallel port, and shall be capable of printing both 8-1/2 by 11-inch and 11- by 17-inch sheets with black and white and color printing and scanning capability. Furnish all cable, conduit, and equipment necessary to provide a LAN interface from each computer station to the printer. Cable and conduit routing shall be non-invasive and as approved by the Engineer.

3. COPY MACHINE: The Structures and Equipment Contractor shall provide one new office copy machine at each site. The copy machine shall be designed to produce 50,000 copies per month and shall be dust resistant.

   a. Copy machine shall employ a dry, electrostatic process and be capable of automatically feeding 8-1/2 by 11 and 11 by 17 originals and copying onto plain bond paper sheets at variable magnification from 50 percent to 200 percent. The machine shall have an automatic copy sorter. The paper tray for each size paper shall hold at least 144 sheets.

   b. The Contractor shall obtain and pay for a service and repair contract with a local representative of the copy machine dealer or manufacturer for on-call daily on-Site service. The Contractor shall furnish powders, cartridges, chemicals, or other materials required for proper operation of the copy machine and paper supply.

   c. Manufacturers, or Equal: The copy machine shall be the latest model from: Gestetner; Sharp; Xerox or an approved equal.

4. TELEPHONE SERVICE: Each telephone shall be a full feature push button telephone set with multiple lines and all equipment necessary for its operation. All telephones will be connected to a central switchboard having a minimum of ten independent touch-tone phone service lines. The phones and phone service shall be furnished and installed by the Structures and Equipment Contractor. Make arrangements and bear all costs for the installation of telephone cables and for supplying telephone service during the Contract period. The telephone lines shall be separate from the FAX line listed herein. Provide cable or fiber optic internet service at the site.

5. FACSIMILE MACHINE: The Structures and Equipment Contractor shall provide two FAX systems, Laser Fax, Model KX-FL511 as manufactured by Panasonic Corporation, or approved equal, to be installed on an independent touch-tone phone service line at each site. Provide a service contract and all necessary supplies (toner, paper, etc.) for the system for the duration of the Contract.

2.02 OFFICE SUPPLIES

A. The Structures and Equipment Contractor shall furnish all office supplies required by the Engineer and his staff during the course of construction. Items shall include but not be limited to note pads, pens, pencils, paper clips, rubber bands, labels, manila folders, envelopes, erasers, hanging folders for filing cabinets, ink pads, etc. and all ancillary supplies necessary to operate the fax, copy machine and computer.

PART 3 EXECUTION

3.01 GENERAL

A. Schedule

1. The Resident Engineer's field office shall be completely equipped with office equipment and supplies required under this Section and ready for operations within sixty (60) days after the issuance of the Notice to Commence Work and, thereafter, shall be continuously available for the use of the Engineer for the duration of the Work.

3.02 MAINTENANCE OF EQUIPMENT & SERVICES

A. Maintain and repair all office equipment and furnishings in first class condition for continuous operation.

B. Communication Service:

1. Telephone, FAX, and Internet service: Provide telephone and fax service, including all calling charges for the Resident Engineer's field offices, for the duration of the Contract. Provide internet service, cable or fiber optic, in order to adequately service the offices. Provide separate lines for telephone service, alarm monitoring and facsimile systems. Install all telephone cables required for supplying telephone service. Pay the costs for installation of the telephone cables and for supplying and maintaining telephone, alarm monitoring, facsimile, and internet service.

3.03 REMOVAL OF EQUIPMENT

A. At the completion of all Work and as directed by the Engineer, the Contractor shall remove and dispose supplied equipment which shall become the property of the Contractor. The Structures and Equipment Contractor shall have all services disconnected and capped to the satisfaction of the Engineer.

END OF SECTION

NO TEXT ON THIS PAGE

Section 01525
Temporary Guard Booths

PART 1 GENERAL

1.01 SUMMARY

A. Guard Booths

B. Guard Booth Installation

C. Disposition of Guard Booths and Equipment

D. The following index of this Section is presented for convenience:

E.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Guard Booths

1. The Structures and Equipment Contractor shall provide and maintain security guard booths at work sites as directed by the Engineer. The Contractor shall not order the equipment until approved by the Engineer.

2. The guard booths shall be completely equipped and ready for the Engineer's use.

   a. The Structures and Equipment Contractor shall provide a licensed electrical contractor to provide and maintain electrical power supply.

   b. The Structures and Equipment Contractor shall obtain and pay for all permits.

3. Security guard booths shall be 4 feet long and 4 feet wide, overall. These shall meet the following minimum requirements:

   a. The exterior of the guard booth shall be given an approved prime coat of paint followed by one coat of approved exterior enamel. The enamel finish coat shall be DuPont Lacquer, or an approved equal, color to be furnished upon award of Contract.

   b. The underside of the guard booth shall be blocked or skirted as necessary to prevent debris from accumulating underneath.

   c. All windows and doors shall have aluminum screens. All windows that are not fixed shall be covered on the exterior with an expanded metal screen covering the full window area. The Plexiglas shall be secured by means of carriage bolts through the wall with nuts fastened from the interior.

   d. Interior shall be finished in 1/4-inch plywood. Plywood shall be finished in natural color, with two (2) coats of varnish or lacquer.

   e. The heating system shall consist of thermostatically controlled built-in electrical baseboard heaters capable of maintaining 70 degrees F temperature in all rooms even with exterior air temperature being 0 degrees F.

   f. The air conditioning system shall be capable of maintaining a temperature of 75 degrees F in all rooms when the exterior air temperature reaches 95 degrees F. All air conditioning units shall have E.E.R. rating in excess of 9.9.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submit for prior approval the following information:

1. Plan drawing of the temporary guard booth, drawn to scale, indicating the Contractor's designed layout of all specified furniture and equipment.

2. Data sheets for all products to be furnished under this Section.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not used.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

3.02 IMPLEMENTATION

A. Guard Booth Installation

1. Installed locations of the guard booths shall be as directed by the Engineer.

a. Concrete block foundation walls shall be constructed as directed. The walls shall completely enclose the bottom of the Guard booths.

2. All exterior items not factory painted shall be painted by the Contractor as directed by the Engineer.

B. Services for Guard Booths

1. Electrical Service

a. The Structures and Equipment Contractor shall contract with a licensed electrical contractor to provide sufficient capacity in the temporary lighting and power system to furnish ample power for each guard booth.

b. Electric service shall be 120/208 volts, 3 phase, 60 hertz and of adequate capacity for all needs. Electrical service and all associated electrical needs shall be provided by the Contractor. The electrical installation shall conform to the requirements of the State of New York Electrical Code. The Structures and Equipment Contractor shall pay all costs of supplying energy and maintaining service.

2. Telephone Service

a. The Structures and Equipment Contractor shall pay all costs for supplying telephone service for calls within New York City as well as business calls outside the City limits.

b. Telephone service for the guard booths shall be brought from the nearest existing telephone manhole. The Structures and Equipment Contractor shall make the arrangements for service with the local telephone company approved by the Engineer and shall conform to the telephone company's requirements.

c. Telephone service for the security guard booths shall include one line for the telephone.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Disposition of Guard Booths and Equipment

1. At the completion of all Work, all guard booths shall become the property of the Structures and Equipment Contractor.

2. At the completion of all Work, all moveable equipment purchased under this Contract shall be relocated to a location within a 50-mile radius to be determined by the Engineer.

B. Following the completion of the Contract or as indicated on the Contract Documents or directed by the Engineer, the Contractor shall remove his field

offices, materials, equipment, etc., from the allocated site and restore the site to its original condition, satisfactory to the Engineer.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01550
Vehicular Access and Parking

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Maintenance of Traffic

B. Site access

C. Truck routes

D. Construction staff parking area

E. Contractor employees' parking area

1.02 RELATED SECTIONS

A. Detailed Specification 01555 – Maintenance and Protection of Traffic

1.03 MAINTENANCE OF TRAFFIC

A. The Structures and Equipment Contractor shall be responsible for maintenance and control of traffic in and out of all sites and at all points of vehicular ingress and egress affected by the Work.

B. All maintenance and protection of traffic shall be done in accordance with Specification Section 01555 – Maintenance and Protection of Traffic, this Contract Documents and the latest traffic stipulations by NYSDOT, Westchester County and Town of Mount Pleasant.

C. Construction-related vehicles and activities shall not impede or otherwise adversely affect the flow of regular traffic traveling on the roads leading to and adjacent to the Work location.

D. Construction-related vehicles and activities shall be understood as including vehicles operated and activities undertaken by the Contractor (including his employees, subcontractors and visitors). Regular traffic shall be understood as referring to all vehicles other than construction- related vehicles.

E. The Structures and Equipment Contractor shall ensure that construction-related trucks entering the work area do not queue on or along public roads. Queuing areas for all trucks entering or exiting the Site shall be limited to the areas of disturbance. Compliance with the restriction against the queuing of trucks on or along public roads shall be understood to be a material provision of this Contract.

F. The Structures and Equipment Contractor shall perform the Work required in this Contract in accordance with applicable traffic and safety rules, regulations, ordinances, and permit conditions.

G. Modifications to existing streets and traffic patterns shall be approved by and in accordance with the requirements of the Mayor's Office of Construction Mitigation & Coordination Council (OCMC). The Contractor shall be responsible for obtaining and paying for this approval whenever the construction operations require modifications to the existing streets or traffic patterns. Traffic safety devices shall be placed as per the Manual of Uniform Traffic Control Devices (MUTCD).

H. When equipment delivered under this Contract is transported as an "oversized load", the Contractor shall maintain traffic in accordance with the requirements of the various federal, State and City agencies having jurisdiction.

I. During the progress of the Work, the Structures and Equipment Contractor shall provide all temporary construction roads and walkways as required, and shall make ample provisions to prevent interference with the continued maintenance of vehicular traffic on roadways. Any roadways damaged by the Contractor or his/her Subcontractors or materialmen shall be restored to their original condition upon notification by the Engineer that such repairs are required. Such restoration of the roadway shall be at the Contractor's expense. Temporary walkways shall be removed, at the Contractor's expense, prior to acceptance of the Contract.

1.04 SITE ACCESS

A. Access to the site shall be at locations designated by the Engineer and is subject to change during the progress of the Project.

B. The Contractor shall provide traffic control signage and flag persons as required to ensure access to the site for the use of all subcontractors, suppliers and other traffic required for the expeditious completion of the work in accordance with Detailed Specification 01555 – Maintenance and Protection of Traffic.

1.05 TRUCK ROUTES

A. Unless otherwise approved by the City of the Engineer, during Progress of construction, trucks entering or leaving the site shall utilize only roads that permit truck travel as governed by the New York State, Westchester County and Town of Mount Pleasant regulations.

B. Notwithstanding the foregoing or any other Contract provision, the Contractor understands and expressly consents that the DEP has the right and authority at all times, in the discretion of the Commissioner and/or the

Engineer, to require and/or direct alterations, revisions and/or amendments in or to trucking and transportation plans, procedures and any related protocols. The Contractor further agrees that such right and authority includes the right to designate, alter revise and/or amend any such plans procedures and/or protocols including (without limitation of any kind) the truck and tractor-trailer routes to be utilized by the Contractor and all subcontractors and materialmen to and from Shafts, and including usage of local streets, and interstate, federal, state and/or local highways within the City or between the City and other destinations. No such designation, alteration, revision or amendment shall be deemed a Contract change entitling the Contractor to claim additional compensation unless the designation, alteration, revision or amendment relates to a change in routing outside the City and beyond any bridge or tunnel connecting the City to other jurisdictions.

1.06 CONSTRUCTION STAFF PARKING AREA

A. The parking area identified on the Contract Drawings is limited. The area shall be utilized solely by the Construction Management staff and visitors to the Construction Management Office.

B. The Contractor shall take appropriate actions to ensure that no personal vehicles of its employees, or employees of its subcontractors or materialmen will be permitted on all Sites.

1.07 CONTRACTOR EMPLOYEES' PARKING AREA

A. The Contractor Employees Parking Area(s) shall be adequately sized, and shall be provided for and maintained by the Contractor at its sole expense. Contractor agrees that the City shall have no obligation to assist in obtaining nor to make available publicly-owned property for such purposes. It is a contractual requirement that the Contractor implement and enforce this policy, and that Contractor take any necessary or appropriate actions to ensure compliance with such parking policy by its and its subcontractors' employees. The Contractor agrees to make appropriate efforts to encourage the use of public transportation and the practice of car-pooling by all such employees.

B. The Contractor shall issue parking badges or stickers to such employees for their personal vehicles, in such form and with such associated documentation as the Engineer may approve, require or modify.

C. The parking badges or stickers shall be displayed in a prominent location upon each employee's vehicle, as may be approved, required or modified by the Engineer.

D. The Contractor Employees Parking Area(s) shall be of a size and situated in location(s) acceptable to the Engineer, and unless otherwise authorized by the Engineer, within 0.5 miles of the Shaft 15B property line.

E. The Contractor shall be responsible for the safe and efficient movement of employees between the Contractor Employees Parking Area and the Contractor's Work area.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01555
Maintenance and Protection of Traffic

PART 1 GENERAL

1.01 SECTION INCLUDES:

A. Under this Section, the Structures and Equipment Contractor shall maintain and/or redirect both vehicular and pedestrian traffic and protect the public from all damage to person and property, within the limits of and for the duration of the Contract. Traffic shall be maintained over a smooth traveled way, as approved by the Engineer, which shall be so marked by signs, delineation and/or other methods that a person who has no knowledge of conditions can ride, drive or walk over all or any portion of the highway under construction where traffic is to be maintained.

B. The Contractor is placed on notice that the maintenance and protection of traffic during construction is considered as important and necessary as an item of Work as is the actual construction itself. The Contractor shall at all times conduct the operation in a manner to insure the safety of not only the motorist, but also the pedestrian and his or her own employees.

C. All Work performed and materials furnished under this provision shall be in strict conformity with the Contract Drawings, the Specifications, the final approved Maintenance and Protection of Traffic (MPT) Plan and Schedule of Operations, and subsequent modifications or amendments thereto approved by the Engineer and agencies and departments involved. If, in the opinion of the Engineer, maintenance and protection of traffic is not adequate, the City may order the work to be done by others and deduct the actual cost from payments to the Contractor.

D. The Contractor shall, prior to bidding, thoroughly familiarize himself or herself with the ordinances, rules, regulations and practices of the State of New York. The Contractor is referred to the U.S. Federal Highway Administration Manual of Uniform Traffic Control Devices (MUTCD) and the New York State Supplement to the MUTCD, which shall govern wherever applicable. BEDC EHS Standard for Work Zone Traffic Control shall apply to all work of this Section. The Contractor shall, prior to commencement of work, obtain copies of all said requirements, a copy of which shall be given to the Engineer.

E. As required, the Contractor shall provide all traffic control devices necessary to protect traffic at designated work zones. Traffic control devices specified herein include temporary signs, timber curbs, timber barricades, plastic barrels, temporary chain link fence, and temporary pavement markings. Maintenance and protection of traffic shall remain in place until

all proposed work is complete and fully operational in accordance with the Contract Documents.

F. Unless otherwise specified in these Contract Documents, the Contractor shall be responsible for the maintenance of the entire pavement, drainage, potable water and sewage facilities, and other street elements, both old and new, after the effective date of starting any field work and ending on the date the complete work is officially accepted by the Engineer.

G. In addition to the Work shown in the Contract Documents, the Contractor shall comply with the New York State Department of Transportation Standards.

1.02 RELATED SECTIONS

A. Detailed Specification 01560 - Temporary Barriers and Enclosures

B. Detailed Specification 02371 - Dust, Soil Erosion and Sedimentation Control

1.03 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.04 REFERENCES

A. U.S. Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD)

B. New York State Department of Transportation (NYSDOT) Supplement to the MUTCD for Streets and Highways

C. New York State Department of Transportation (NYSDOT) US Customary Standard Sheets

D. ASTM B589 - Standard Specification for Refined Palladium

1.05 SUBMITTALS

A. General:

1. The Contractor shall submit Working Drawings as specified herein, including the Plan and Schedule of Operations for the Maintenance and Protection of Traffic.

B. MPT Plan and Schedule of Operations

1. The Contractor, as the Work progresses, shall prepare and submit to the Engineer and any agencies and departments under which responsibility of roadways fall, a Plan and Schedule of Operations for the Maintenance and Protection of Traffic, showing in complete

detail the methods, sequences, procedures and facilities he or she proposes to install. Before the Contractor shall in any way or manner restrict or interfere with the normal flow of traffic, he or she must first secure written approval from the agencies and departments of his proposed plan. The MPT Plan and Schedule of Operations shall be prepared, signed and sealed by a Professional Engineer licensed in the State of New York.

1.06 QUALITY ASSURANCE

A. Standards:

1. The Contractor shall comply with standards specified herein and in accordance with the General Conditions.

2. The Contractor shall comply with the U.S. Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD), the New York State Supplement to the MUTCD, and all applicable Federal, State and Municipal codes including revisions to date of Contract.

B. Requirements of Regulatory Agencies:

1. Prior to proceeding with construction, the Contractor is responsible for submitting his or her MPT Plan and Schedule of Operations to the Westchester County Department of Transportation and Public Works (WCDPW) and the Town of Mount Pleasant (Town) for review and approval, and for obtaining final written Traffic Stipulations. The Contractor shall adhere to any and all requirements identified by the WCDPW and the Town, and in addition the Contractor must also adhere to the following:

a. The Contractor shall be required to organize and attend a pre-construction meeting with the WCDPW and the Town and shall comply with all requirements issued by WCDPW and the Town. The Contractor shall notify both the City & the Engineer of the scheduled meeting.

b. The Contractor shall notify WCDPW and the Town 30 days prior to the start of Work.

c. To permit finalization of traffic control measures, the Contractor, ten (10) days prior to the start of Work, shall arrange for an on-site field meeting with WCDPW and the Town -OCMC. The Contractor shall notify both the City & the Engineer of the scheduled meeting.

d. Access must be provided for local and emergency vehicles at all times. A copy of the final Traffic Stipulations shall be made available on the construction site at all times.

C. Permits:

1. The Contractor shall obtain all necessary permits required by the WCDPW and the Town. Such permits shall be maintained in effect for the total Contract time. Should the Contract time be extended, the Contractor shall obtain all necessary additional permits.

2. The Contractor shall obtain and pay for all required permits, fees and inspections by authorities having jurisdiction, including but not limited to the WCDPW and the Town Sidewalk Roadway and Closure Application.

3. The Contractor shall also comply with the requirements specified in Detailed Specification 01410 – Regulatory Requirements.

D. Qualifications of Manufacturers:

1. Products used in the Work of this Section shall be produced by manufacturers regularly engaged in the manufacturing, installing and servicing of similar items with a history of successful production acceptable to the Engineer as specified herein and in accordance with the applicable parts of the Contract Documents.

E. After Hour Work:

1. If at any time, the Contractor shall be required or deem it necessary to work outside the normal work day peak traffic time frames (7:00 AM to 6:00 PM), he or she shall obtain all necessary permits and shall notify DEP in advance.

1.07 MAINTENANCE OF TRAFFIC

A. During working hours, the Contractor shall be responsible for maintenance and control of his or her traffic in and out of the site at all points of vehicular ingress and egress and shall provide flagmen to warn vehicles on streets of vehicles approaching from the site. Flagmen shall be properly attired and equipped according to the regulations of the State of New York. All roadway closures and minimum lanes of traffic shall be in conformance with the final OCMC Traffic Stipulations.

B. Modifications to existing streets and traffic patterns shall be approved by and in accordance with the requirements of the OCMC. The Contractor shall be responsible for obtaining and paying for this approval whenever his or her construction operations require modifications to the existing streets or traffic patterns. Traffic safety devices shall be placed as per the MUTCD and the NYS Supplement to the MUTCD.

C. When equipment delivered under this Contract is transported as an "oversized load" the Contractor shall maintain traffic in accordance with the requirements of the various City agencies having jurisdiction.

D. During the progress of the Work, the Contractor shall provide all temporary construction roads and walkways as required, and shall make ample provisions to prevent interference with the continued maintenance of vehicular traffic on roadways and shall indemnify and save harmless the City and the Engineer from any expense whatsoever due to his or her operations over said roadways. Any roadways damaged by the Contractor or his or her subcontractors or materialmen shall be restored to their original condition upon notification by the Engineer that such repairs are required. Such restoration of the roadway shall be at the Contractor's expense. Temporary walkways shall be removed, at the Contractor's expense, prior to final acceptance of this Contract.

E. The Contractor shall provide the minimum lane width at the various work zones as specified in the final OCMC Traffic Stipulations or as directed by the Engineer. Vehicular traffic at driveways to adjacent properties is to be maintained at all times, other than at the time of construction, and shall provide temporary steel road plates at all times. Temporary traffic detours shall be implemented according to the approved MPT Plan or as directed by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. All temporary signs, temporary concrete barriers, fencing, delineators, barricades, lighting and other warnings and guiding devices shall be as approved by the Engineer, agencies and departments involved, and except as otherwise specified, will remain the property of the Contractor.

B. Temporary Signs:

1. All materials and the details of fabrication, erection, location, relocation, and assembly shall be per the approved MPT Plan and in accordance with the applicable rules and regulations of the NYS Supplement to the MUTCD where applicable and approved by the Engineer.

2. All signs and barricades shall conform to the New York State Supplement to the MUTCD.

3. All materials for the Temporary Traffic Signals shall comply with the latest version of the “City of New York, Department of

Transportation, Division of Traffic, Bureau of Signal and Traffic Operations Standard Specifications." The Contractor or an approved Subcontractor must perform this work.

C. Type III Breakaway Barricade:

1. The Contractor shall furnish and install Type III Breakaway Barricade units as necessary or required by the Engineer.

2. Type III Breakaway Barricades shall comply with the New York City Bureau of Highway Operations No. 1038.

3. If the Contractor elects to substitute any material not listed in this Specification, he or she shall submit evidence acceptable to the NYSDOT that the proposed material are not frangible.

4. If the Contractor elects to use an alternate design, he or she shall submit shop drawings in accordance with Article 4 of the General Conditions.

D. Timber Curb:

1. Timber and lumber shall be dense, structural grade Douglas Fir or Southern Yellow Pine.

2. Lag screws shall be 3/4" diameter by ten (10) inches long. Anchor spikes shall be one (1) inch diameter by not less than twenty-four (24) inches long. Splice spikes shall be 40d.

3. Striping shall be done with white and orange enamel as required by the standard drawing.

4. Reflective material shall conform to the requirements of ASTM Designation B 589 "Standard Specification for Refined Palladium."

E. Timber Barricades

1. Timber and lumber shall be dense, structural grade Douglas Fir or Southern Yellow Pine.

2. Reflectorizing materials shall conform to the requirements of ASTM designation B 589 "Standard Specification for Refined Palladium."

3. Battery operated flashing units shall be as approved by the Engineer.

F. Plastic Barrels:

1. The Work shall include the furnishing and installing of plastic barrels, sand ballast, and flashers (for every fourth barrel). The barrels are to be placed as indicated on the plans or as directed by the Engineer. The barrels shall be maintained and replaced as required during the various stages of construction. Barrels and

flashers shall be in accordance with NYSDOT Type III Construction Barricades Standard Details of Construction Drawing No. H-1049.

G. Temporary Construction Fencing:

1. All materials shall be in accordance with Detailed Specification 01560 – Temporary Barriers and Enclosures.

H. Temporary Pavement Marking Tape

1. As required, the Contractor shall provide, install and remove temporary paste-on pavement markings.

2. Pavement markings tape shall be 4-inch wide white "Flex-O-Line" as manufactured by FOL Tape, Fenton, MO., "Scotch Lane" as manufactured by 3M Company, St. Paul, MN, or approved equal.

I. Precast Concrete Median Barrier (Jersey Barrier):

1. The Contractor shall furnish and install precast concrete barriers as necessary or required by the Engineer. All materials shall be in accordance with NYSDOT Section 619 Temporary Concrete Details.

PART 3 EXECUTION

3.01 INSPECTION

A. Verification of Conditions:

1. The Contractor shall examine the areas and conditions under which work of this Section will be installed and correct conditions detrimental to proper and timely completion of the Work. He or she shall not proceed until all unsatisfactory conditions have been corrected.

3.02 GENERAL CONSTRUCTION DETAILS

A. Construction work shall be conducted in such a manner as to provide minimum interference of normal pedestrian or vehicular traffic. In some cases, it will be necessary to block walks and driveways. Prior to blocking or obstructing walks and/or driveways, the Contractor shall provide sufficient notice (48 hours) to a responsible person in each residence or commercial establishment.

B. The Contractor shall not close or obstruct any portion of a street, road or private way without first obtaining permits from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he or she shall make such repairs or provide such temporary

ways or guards as shall be acceptable to the Engineer and to the proper authorities.

C. The Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefore, shall maintain streets, roads, private ways, and walks not closed passable and safe.

D. Where streets or portions of streets, now in use, are included for paving or repaving work under this Contract, the Contractor shall be responsible for the maintenance of such streets or portions of streets, prior to the performance of said paving or repaving work. The maintenance of such streets shall include any repairs, as directed, including the filling of potholes, that may be necessary due to usage of the streets by traffic, and shall start from the date of written notice to commence work or actual start of work, whichever is earlier.

E. The Contractor shall notify the Police and Fire Departments in writing, with a copy to the Engineer, at least 24 hours in advance of a proposed closure of a street or roadway. He shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

F. The Contractor is required to submit to the Engineer, and appropriate agencies and departments responsible for the roadway involved, a plan and schedule of his method of operations on any detour. If the Contractor proposes any modifications, amendments or changes in location for detours as called for, or proposes new detours, such changes and additions to the maintenance of traffic must be brought to the immediate attention of the Engineer and responsible agencies and departments involved.

G. The Contractor shall furnish, erect and maintain at closures, intersections and at all other locations, where required, all necessary standard or approved barricades, suitable and sufficient lights, torches, approved reflectors, danger signals, warning and closure signs, directional detour signs and whatever additional measures the Engineer may deem necessary for proper control of traffic and for the safety of all concerned, all in accordance with the rules and regulations of the NYSDOT Standard Details for Work Zone Traffic Control. He or she shall indicate by day and by night the impassable and dangerous conditions existing on or adjacent to the site of the work. He or she shall provide a sufficient number of watchmen and take all necessary and legal precautions for the protection of the work and for the safety of the public, as required by the Contract. All barricades, danger signals, warning signs and obstructions shall be illuminated at night and all lights shall be kept burning from sunset until sunrise.

H. Barricades shall be placed parallel to, adjacent to and on both sides of excavations for curbs and sidewalks. Each line shall have a clear space of

not more than twenty-five (25) feet between barricades. Barricades shall be Type III Breakaway Barricades complying with the REGULATION MANUAL ON TEMPORARY TRAFFIC CONTROL BY STREET BARRICADES AND CHANNELIZATION issued by the NYSDOT. Each barricade shall have at least one (1) battery-operated, flash-type warning device of approved manufacture affixed thereon, as directed by the Engineer.

I. The Contractor shall furnish material, labor and equipment at any time, day or night, to immediately repair, remedy and prevent washouts, formation of holes, ruts and depressions, sunken trenches and the destruction or sinking of temporary pavements, both when the work is under way, and when the work is temporarily suspended for any period of time. Special attention shall be given to maintenance of a satisfactory travel way over weekends, holidays and nights.

J. In the case of traffic being diverted from the accustomed traveled way, onto the road shoulder or onto an area not immediately affected by the actual construction work, occasioned by the location of the trench, excavation, materials or equipment, the shoulder or areas outside of the project so affected, shall be restored to a condition equal or better than the original condition. This shall apply equally as well to those pavements or any detours or a designated area, over which traffic was routed.

K. The Contractor shall keep the travel way free of foreign objects such as rocks, timber and other items that may fall from transporting vehicles. Spillage of material carried by or dropped from the under-carriage of any carrying vehicle resulting from the Contractor's hauling operations along or across any public travel way, shall be removed immediately and such travel way, both within and outside of the Contract limits, shall be kept free of such spillage by the Contractor. Existing pavement and shoulder surfaces along or across any public travel way shall be cleaned at a minimum of once per week with a mechanical street sweeper. This shall include all truck routes to and from the project site. The Engineer shall approve all cleaning equipment prior to use. Cleaning shall continue until adequate cleaning results as determined by the Engineer.

L. Whenever dusty conditions resulting from the Contractor's operations occur, they shall be corrected by sweeping the area to remove excess materials and by spraying the area with water to control any dust in accordance with Detailed Specification 02371 – Dust, Soil Erosion and Sedimentation Control.

M. Whenever it becomes necessary to maintain and limit traffic to one lane, the Contractor shall provide adequate traffic controls on the section of highway or roadway on which vehicle operation is maintained. He or she shall employ a sufficient number of competent flagmen and/or temporary traffic

lights operating continuously during the time traffic is so maintained. In the event the length of the one-lane operation is extremely short and conditions are favorable to safe operation, the Engineer may, in writing, authorize the Contractor to dispense flagmen or traffic control signals.

N. The Contractor shall also provide a sufficient number of competent flagmen in areas where traffic is congested, particularly where construction equipment is operating.

O. The Contractor shall provide an adequate travel way as specified and devote particular attention to all drainage facilities, keeping them fully operative at all times.

P. The Contractor shall furnish and erect temporary fencing around all unattended excavations. Lighted barricades and warning signs shall also be used around the perimeter and at a significant distance away from the excavation in each traffic flow direction (whether vehicular or pedestrian) so as to warn vehicles or pedestrians of the existence of the excavation.

1. Temporary wire fences shall be furnished and installed at the site by the Contractor and shall completely enclose all excavations, steep embankments and other potentially hazardous locations as soon as such a condition is apparent and as ordered by the Engineer. This fence is in addition to any provision that the Contractor would normally follow to safeguard such Work operations as specified in Detailed Specification 01560 – Temporary Barriers and Enclosures, and in no way reduces his or her obligations as provided in the Contract Documents.

2. Excavation for basins, inlets, manholes, seepage basins, pipe connections, sewers and other miscellaneous structures shall be protected by installing a five (5) foot high, 2" x 4" mesh, #14 gauge, welded-wire fabric fence around the periphery. Stay wires shall be 2" apart; line wires 4" apart. Wire fabric shall be securely attached to approved posts which are driven into the ground. Maximum post spacing shall be eight (8) feet. The said excavation shall be further protected by the use of barricades.

3. The Contractor shall furnish, erect, relocate, maintain and remove all temporary fencing required under this Section.

4. The Contractor will be permitted to remove such portions of the fencing as may be required for his operations during working hours, providing that the public is continuously safeguarded by other satisfactory means during these operations. In all such cases the fence must be restored at the end of each workday.

5. The fence and warning devices shall be maintained in good repair throughout the duration of the work and shall be removed upon completion of the work.

Q. Decking, in general, shall consist of heavy, adequately sized, steel plates completely covering excavations where pedestrians and vehicular traffic make this decking operation necessary.

R. The Contractor shall construct and maintain at all times, where called for or as directed, temporary bridges or bridging across pipe trenches, excavations, obstructions and newly-laid pavements, to provide adequate ingress and egress for pedestrian and vehicular traffic to and from private driveways, business and commercial establishments or for main street intersections and heavily traveled crossings. The Contractor will be required, after the installation of all pipes and necessary appurtenances thereto, to immediately backfill and compact all trenches to existing grade, to permit the resumption of traffic without delay.

S. Steel plates shall be provided over all excavations in front of driveways and excavations over which pedestrian or vehicular traffic is to be maintained. Plates shall be of a thickness sufficient for the loads to be carried and shall have not less than two (2) feet of bearing on either side of an excavation. Width of plates for vehicular traffic shall not be less than ten (10) feet, and for pedestrian traffic not less than four (4) feet. Plates for pedestrian traffic shall be equipped and approved, dismountable handrails on both sides, for the full lengths of plates. The Contractor shall be responsible for the adequacy of all plates.

T. During all phases of construction, provisions shall be made for access for all emergency vehicles, such as firefighting equipment, police vehicles, ambulances, etc.

U. The Contractor shall furnish and maintain, as required and as directed by the Engineer, reflectorized signs for the information of the motorist, and to adequately and legally post the highway under construction as to its status.

V. The City shall have the right to open to vehicular traffic those areas adjacent to the structures upon which Work has been completed before the final acceptance of all Work. The Contractor shall carry on the remaining Work so as not to interfere with or endanger such vehicular traffic and shall make no claim for damages on account thereof.

W. At the conclusion of the Work, all temporary facilities shall be removed and the area restored to pre-work conditions or better, unless otherwise specified. The Contractor shall, when ordered, remove existing street signs; store, protect and keep them clean. Where necessary to remove such signs, the Contractor shall prepare a location plan prior to removal. He shall replace signs so removed in their original location or as directed, as

promptly as possible. Signs not to be replaced shall be cleaned and delivered to the Engineer as directed by him.

X. Signs or markers lost or damaged because the Contractor failed to properly install or maintain shall be replaced at the Contractor's expense.

Y. The Contractor shall maintain route marker signs during construction. Should relocation be necessary at various stages of construction, they shall be placed in locations visible to traffic, as directed.

3.03 TEMPORARY SIGNS

A. The Work shall consist of the fabrication, furnishing, installation, erection, assembly and maintenance of warning, detour, regulatory, guide and directional signs required to properly stage the Work and maintain traffic and shall include the furnishing and incorporation of sign supports and posts; the furnishing and installation of all fastening devices and miscellaneous appurtenances; and the relocation, removal and disposal of signs or sign assemblies.

3.04 TYPE III BREAKAWAY BARRICADES

A. All methods shall comply with NYCDOT Standard Details of Construction drawing No. H-1038.

3.05 TIMBER CURB

A. Construction of timber curb shall comply with the NYC Bureau of Highways' Standard Dwg. H-1012. Spike holes in 12" x 12" timber and in the 2" x 8" splice plates shall be predrilled. Reflective material shall be wrapped around posts, lapped and tacked on a side opposite the traffic face or side of post. After assembly, the front and rear faces and the top of 12" x 12" timbers shall be painted with alternate white and orange stripes. Two (2) coats of each color shall be used. White stripes shall be thirteen (13) inches wide and orange stripes shall be eleven (11) inches wide.

B. Timber curb units shall be placed where shown or directed with traffic faces flush. Abutting ends of units shall be spliced. Unless otherwise directed by the Engineer, both ends of all units shall be spiked into the ground or surface material. Timber curb shall be maintained in first class condition at all times to the satisfaction of the Engineer. Maintenance shall include the replacement of damaged components; refastening; repainting; anchoring or re-anchoring; replacing and re-affixing reflective material; and re-splicing; all, when necessary or ordered and directed by the Engineer. At the completion of the work or when directed by the Engineer, timber curb shall be removed and disposed of away from the work site.

3.06 TIMBER BARRICADES

A. The work shall consist of the construction, installation, erection, placement, maintenance, removal and disposal of lighted and unlighted timber barricades. It shall include the furnishing and incorporation, as required, of all timber, lumber, fastenings, anchors, reflectorizing materials, battery operated flashers and other warning devices; paints and painting; and furnishing all labor, materials, plant, equipment, insurance and necessary incidentals required and completing the work. Construction of timber barricades shall comply with the NYSDOT Section 619 Work Zone Traffic Control.

B. Lighted timber barricades shall be placed at the locations shown on the plans or designated by the Engineer. Unless otherwise shown on the plans or directed by the Engineer, barricades shall be constructed, installed, erected, placed, reflectorized and lighted in conformity with the applicable rules and regulations of the New York City Bureau of Traffic Operations, for Class I Barricade.

C. Barricades, at all times shall be maintained in a condition satisfactory to the Engineer. Maintenance shall consist of the replacement of all damaged or worn out components; repainting, as required or directed; replacement of reflectorizing materials; and general rehabilitation to keep barricades in good condition during the life of the Contract.

D. Lighting of barricades shall be by battery operated flashing units.

E. At the completion of the Work or when directed by the Engineer, barricades shall be removed and disposed of away from the work site.

3.07 PLASTIC BARRELS

A. Furnishing and installing plastic barrels will be for the purpose of traffic lane delineation during construction. The barrels shall be placed in a straight line 25 feet apart, within the work area. A flashing light shall be affixed to every fourth barrel. After placement, the barrels shall be filled with sand for one third of their height.

B. At the completion of the Work or when directed by the Engineer, the plastic barrels shall be removed and disposed of away from the work site.

3.08 TEMPORARY CONSTRUCTION FENCING

A. All methods shall be in accordance with Section 01560 – Temporary Barriers and Enclosures.

3.09 TEMPORARY PAVEMENT MARKING TYPE

A. Application shall be as recommended by the manufacture or as directed by the Engineer.

3.10 PRECAST CONCRETE MEDIAN BARRIER (JERSEY BARRIER)

A. All methods shall be in accordance with the NYSDOT Standard Sheet 606-36 Precast Concrete Barrier.

END OF SECTION

SECTION 01560
Temporary Barriers and Enclosures

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Maintenance and Protection of Traffic (MPT) devices

B. Fencing

C. Protection of Work, personnel and materials

D. Tree and plant protection

1.02 RELATED SECTION

A. Detailed Specification 01555 – Maintenance and Protection of Traffic

B. Detailed Specification 02230 – Site Clearing

1.03 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.04 REFERENCES

A. NYS Department of Transportation (NYSDOT) Standard for Work Zone Traffic Controls

B. OSHA Standards 29 CFR 1926

1.05 MPT DEVICES

A. Roads, Parking Areas and Sidewalks:

1. The Contractor shall provide, erect and maintain as necessary for the Work, all MPT devices as necessary and in accordance with Detailed Specification 01555 – Maintenance and Protection of Traffic. These devices shall include, but not be limited to temporary concrete barriers, timber curb, Type III barricades, barrels, construction signs, warning signs, wide angle reflectors, temporary striping and warning lights along all roads, parking areas and sidewalks that are accessible to the public or City personnel and in such other areas of the site as needed for the safety of all persons at the Site.

2. Sufficient barricades shall be erected to keep vehicles from being driven on or into work under construction in accordance with NYCDOT requirements.

B. Excavations:

1. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property.

2. The Contractor shall, at its own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workers. Bridges provided for access during construction shall be removed when no longer required.

3. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the City and Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the City and Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight.

4. The Contractor shall take precautions to prevent injury to the public or City personnel due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public or City personnel shall be well lighted from sunset to sunrise.

C. The Contractor's responsibility for the maintenance of barricades, signs and lights shall continue throughout the duration of the Work. The Contractor shall provide and maintain other warning signs and barricades in other work areas as may be required for the safety of all those employed in the work, plant operating personnel, or those visiting the site or plant.

1.06 FENCING

A. Temporary Construction Gates and Fencing:

1. As required or directed by the Engineer, the Contractor shall furnish and erect a new temporary 10-foot high chain link fence, gates and all necessary incidentals in accordance with NYCDOT Standard Highway Specifications, Volume II, Section 6.34 and NYSDOT Section 607 Fences:

B. Safety Fencing:

1. The Contractor shall provide and erect, when required or directed by the Engineer, temporary project safety fencing at the work sites.

2. The safety fencing shall be a high visibility, orange colored, high-density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10-foot centers.

C. Fencing shall be maintained by the Contractor during the period of the Contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site, unless otherwise directed by the Engineer.

D. Maintenance shall include, but not be limited to, graffiti removal, repair of cracks and breaks in the fencing, and re-painting of the fencing as directed by the Engineer.

1.07 PROTECTION OF WORK, PERSONNEL AND MATERIALS

A. Until permanent walls, railings, stairs, hatches, etc., are in place, the Contractor shall be responsible for the installation and maintenance of temporary barricades and temporary railings around openings, stairwells, on temporary or permanent stairs, around the perimeter of elevated floors, landings, permanent ramps, etc. The installation shall be in accordance with the requirements of OSHA Standards 29 CFR 1926 and the codes and regulations of authorities having jurisdiction.

B. During the progress of the Work and up to the date of Substantial Completion, the Contractor shall be solely responsible for the care and protection of all Work, personnel, and materials covered by the Contract.

C. In order to prevent damage, injury or loss, actions taken by the Contractor shall include, but not be limited to, the following:

1. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not interfere with the progress of the work or the work of any other Contractor or utility service company.

2. Provide suitable storage facilities for all materials which are subject to injury by exposure to weather, theft or breakage.

3. Place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work.

4. Clean up frequently all refuse, rubbish, scrap materials, and debris caused by his operations, to the end that at all times the site of the work shall present a safe, orderly and workmanlike appearance.

D. The Contractor shall protect the existing work and material from damage by his workers and shall be responsible for repairing any such damage at no additional cost to the City.

1.08 TREE AND PLANT PROTECTION

A. Protect existing trees, shrubs, and plants on or adjacent to the Site, shown or designated to remain in place, against unnecessary cutting, breaking, damage, or skinning of trunk, branches, bark, and roots.

B. Do not store materials or equipment or park construction equipment and vehicles within foliage drip lines.

C. In areas subject to traffic, provide temporary fencing or temporary barricades to protect trees and plants.

D. Open fires are not allowed onsite.

E. Within the limits of the Work, water trees and plants that are to remain to maintain their health during construction operations.

F. Cover exposed roots with burlap, and keep such burlap continuously wet. Cover exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by erosion, flooding, runoff, and noxious materials in solution.

G. If branches or trunks are damaged, prune branches immediately and protect cut or damaged areas with emulsified asphalt compounded specifically for horticultural use, in a manner acceptable to the Engineer.

H. When directed by the Engineer, remove and dispose of at location away from the Site damaged trees and plants that die or suffer permanent injury, and replace each damaged tree or plant with specimen of equal or better species and quality.

I. Other applicable methods of tree protection shall be as required by Detailed Specification 02230 – Site Clearing.

PART 2 PRODUCTS

2.01 MATERIALS

A. Temporary Construction Fencing

1. All materials shall comply with NYSDOT Section 607.

PART 3 EXECUTION

3.01 TEMPORARY CONSTRUCTION FENCING

A. All Methods shall comply with NYSDOT Section 607.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01561
Site Security

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Structures and Equipment Contractor shall furnish personnel, uniforms, equipment and supplies necessary to provide Security Guard Services at the Site 24 hours per day, 7 days per week, 365 days per year as described herein. The services shall be provided as specified and as directed by the Engineer.

1.02 PAYMENT

A. No separate payment will be made for performing any Work of this Section.

1.03 GENERAL REQUIREMENTS

A. The Structures and Equipment Contractor shall employ Security Guard Services to be used specifically and exclusively to safeguard the Site. The Security Services shall be provided 24 hours per day, 7 days per week, 365 days per year. The Security Services shall primarily consist of one (1) uniformed security guard per shift.

B. The Structures and Equipment Contractor will be directed in writing by the Engineer as to the date of commencement of the security services two (2) weeks prior to starting the actual services. Once the Security Service starts, it will be a continuous operation until project close-out.

C. The security guard shall be provided based on an 8-hour shift. No security guard shall be scheduled by the Structures and Equipment Contractor for more than twelve (12) hours in any twenty-four (24) hour period, including placements at other assignments.

D. The Structures and Equipment Contractor shall be responsible for the necessary supervision of the Guards and shall make unannounced visits to the property, for the purpose of monitoring each Guard's performance.

E. Photo identification cards shall be issued by the Structures and Equipment Contractor to each guard and shall either be a photo insert or a photo type card. The identification badges shall be worn by the guard in full view at all times while on duty. Each card shall indicate:

1. The Contractor's name
2. The full name of the guard

3. The guard's identification number
4. The guard's signature

F. The Structures and Equipment Contractor shall ensure that meal breaks are provided for each guard, and shall provide a relief guard if the guard takes the meal break away from the assigned post.

G. All Work pursuant to this Contract shall be performed in compliance with the DEP Bureau of Police and Security Site Security Personnel Requirements, attached at the end of this Section, and with all applicable Federal, State and local laws and regulations.

H. If a phone is not available at the Security Guard's booth, they shall be provided with a cellular phone, in order to be able to call police if necessary.

I. The Structures and Equipment Contractor shall provide security guards in accordance with the requirements of the General Conditions, Article 16, to safeguard the site of the Work and prevent access by unauthorized persons.

1.04 SUBMITTALS

A. Within thirty (30) days of Notice to Proceed, the Structures and Equipment Contractor shall submit to the Engineer the Security Service Firm for approval.

B. Within twenty-four (24) hours of employment, the Structures and Equipment Contractor shall be required to maintain a personnel folder on each Security guard employed under this Contract. Only guards for whom the following information is submitted may be assigned. The folder shall contain the following information:

1. Guard's name
2. Home address
3. Date of birth
4. Duplicate photo ID card
5. Social security number
6. Copy of employment application
7. Copy of New York State Division of Licensing Application Form 307
8. Copy of birth certificate
9. Copy of Alien Registration Form I-9 (if applicable)
10. Copy of high school diploma
11. Military record

12. Documentation of prior employment
13. Copy of New York State fingerprint card
14. Record of security training
15. Medical exam certificate
16. Certificate citing Security Guard's receipt of security contract scope of service
17. Result, if any, of criminal record check

C. The above referenced files shall be made accessible and delivered to the Engineer within twenty-four (24) hours of the request.

1.05 QUALIFICATIONS

A. The Structures and Equipment Contractor shall employ a Security Service Firm that is fully licensed under New York State Law to provide the required security guards. The Contractor shall provide a copy of a valid New York State Guard Service License prior to commencement of the work.

B. The Security Service Firm shall have been engaged in the business of providing uniformed security guard services for a minimum of five (5) years and shall provide details of this experience prior to commencement of the work.

C. The Structures and Equipment Contractor shall assure that all assigned Security Guards possess a valid security guard registration under New York State law and meet the following criteria:

1. Guards shall be at least eighteen (18) years of age and be a high school graduate or possess a General Equivalency Diploma.
2. Guards shall be able to understand, speak, read and write English fluently. They shall be able to intelligently communicate with visitors and prepare accurate written reports of any incidents.
3. Guards shall be United States citizens or aliens properly registered with the U.S. Immigration and Naturalization Service.
4. All guards shall have undergone fingerprinting pursuant to New York State Division of Licenses regulations.
5. Guards shall have no physical or mental disability or disability by reason of intoxication or the use of, addiction to or dependence on alcohol or drugs which, as determined by the NYS Department of State, renders the applicant unable to perform the essential functions of the security guard position, with or without reasonable

accommodation, or who, as determined by the NYS Department of State, poses a direct threat to health and safety.

6. Guards shall not have been convicted of a felony or other criminal offense which in the NYS Department of State determination would inhibit the guard's ability to perform the duties of a security guard in a reliable, competent and trustworthy manner in accordance with the Contract terms and conditions.

7. Guards shall perform their duties in full uniform.

8. Any security guard found not to meet the above qualifications shall be immediately replaced within 24 hours upon the direction of the Engineer. The replacement shall be made so that no interruption in security guard coverage takes place.

1.06 TRAINING

A. All guards employed under this Contract shall receive training as per Section 89-N of the New York State General Business Law and the NYS Security Guard Act of 1992.

B. Training shall include, but not be limited to, the following:

1. Radio communication principles and radio use.

2. Laws of arrest, search and seizure (New York State).

3. Emergency evacuation procedures.

4. Bomb threat procedures.

5. Procedures in reporting a violation of the law to a duly constituted law enforcement agency.

C. Guards shall receive a written copy of the training curriculum.

D. A representative from the City may attend any or all training sessions and shall receive a copy of the training curriculum upon request.

E. All guards shall receive a 2-hour DEP Police Training and shall meet all DEP security requirements.

1.07 MISCELLANEOUS

A. No guards shall be under the influence or carry the odor of alcoholic beverages while on duty, nor shall any guard carry or consume any alcoholic beverage while on duty.

B. No guard shall be under the influence of, carry or ingest a controlled substance as defined in the Penal Law of the State of New York while on duty, except as prescribed by medical authorities and then only if the guard's performance or his/her duties will not be impaired in any way. Any

such prescribed drugs shall be carried in a bonafide pharmaceutical container indicting the doctor's name, patient's name and date of issuance.

C. If any of the above articles are violated, the guard shall be immediately removed from his/her post and replaced.

D. Sanitary facilities for the guards shall be made available at the Contractor's field trailer.

1.08 REPORTING

A. All unusual occurrences that require a security guard to take official action must be reported immediately to the police and the Engineer as appropriate.

B. It is the responsibility of the Structures and Equipment Contractor to keep all reports in a binder according to location.

1.09 SITE SECURITY

A. Additional Security:

1. Should the Structures and Equipment Contractor consider the security requirements outlined above inadequate, he may provide such additional security as he thinks necessary. The additional cost of such approved increased protection shall be paid by the Structures and Equipment Contractor.

2. Nothing contained herein shall diminish in any way the responsibility of the Contractor for safeguarding and protecting his own work, materials, tools and equipment.

3. Warning signs, lanterns and other devices shall be provided and maintained as required for protection of the public and site working personnel. The cost of providing additional site security shall be deemed included by the Structures and Equipment Contractor in the lump sum price bid for the Contract.

PART 2 PRODUCTS

2.01 UNIFORM AND APPEARANCE

A. The Structures and Equipment Contractor shall supply all uniforms. All security guards appearance shall be neat and clean on every tour of duty.

B. The uniform and appearance shall be the following:

1. Cap with logo

2. Uniform trousers

3. Uniform shirt with badge or jacket with badge

4. Black shoes (polished and in good repair)
5. A name tag clearly identifying guard shall be worn on his/her uniform
6. Photo identification card
7. Whistle and flashlight

C. All guards' uniforms shall be matching.

D. All items of uniform shall be maintained in a clean, well pressed condition.

PART 3 EXECUTION

3.01 SECURITY GUARD DUTIES/RESPONSIBILITIES

A. Security guards shall be responsible for maintaining order and upgrading property in and near the posts to which they are assigned.

B. Guards shall be required to patrol accessible spaces and make periodic rounds of the assigned areas to ensure that no unauthorized persons are on the premises or grounds. Upon intrusion by an unidentified person, Guards shall make inquiry as to the authorization to enter the premises and take the necessary action.

1. Request the intruder to vacate the premises or
2. If a threatening situation or criminal activity occurs, notify the police.

C. The guard shall immediately notify the Structures and Equipment Contractor of the presence of any unauthorized person or incident which could cause or bring about harm or damage to the site or property.

D. Guards shall be responsible for preventing City property from entry by unauthorized individuals.

E. Guards shall be stationed at guard booth.

F. Guards shall not leave assigned posts until relieved.

G. Guards shall sign in and out upon arrival and departure. Log books and sign in sheets shall be provided by the Engineer for this purpose.

H. Guards shall keep a record of any security related incidents that occur during shifts.

I. All records generated as per above articles shall be the property of the City.

J. Guards must escort visitors to the appropriate individual when required by the Engineer.

K. Guards shall maintain their security post in an orderly manner.

L. Guards shall guard against loitering, theft, personal assaults and other types of suspicious, wrongful or unlawful acts. Guards shall cooperate with all law enforcement authorities.

M. Guards shall perform any other duties related to security as directed by the Engineer.

N. No guard shall carry packages, cartons, containers or luggage to or from any City post, unless permitted or directed by the City.

3.02 ATTACHMENTS

A. DEP Bureau of Police and Security Site Security Personnel Requirements

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01570
Temporary Controls

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Related Specifications

B. General Requirements

C. Submittals

D. Prohibited construction procedures

E. Noise Control

F. Dust Control

G. Pest and Rodent Control

H. Pollution Control

I. Care during Welding

J. Notification of Non-Compliance

K. Storm Water Runoff Control

L. Site Security

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 01330 – Submittal Procedures

B. Detailed Specification 01561 – Security Guard Services

C. Detailed Specification 01571 – Temporary Pest Control

D. Detailed Specification 02371 – Dust, Soil Erosion and Sedimentation Control

1.03 GENERAL REQUIREMENTS

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to assure adequate environmental protection including implementation of all erosion and sediment control measures as directed by the Engineer and specified herein.

B. In the performance of the Contract, the Contractor shall comply with all applicable federal, State and local laws and regulations concerning environmental protection, restoration and erosion and sediment control.

1.04 SUBMITTALS

A. Submit Shop Drawings as specified in Detailed Specification 01330 – Submittal Procedures.

1.05 PROHIBITED CONSTRUCTION PROCEDURES

A. The following construction procedures are prohibited:

1. Dumping or wasting of spoil material into any stream corridor, any surface waters or at unspecified locations adjacent to the Work area or at locations not approved by the Engineer.

2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridor or surface waters.

3. Dumping of silt-laden water directly into any stream corridor or surface waters without provision for treatment as noted herein.

4. Damaging vegetation adjacent to or outside of access roads or limited right-of-way for the work. All construction operations must be confined within the Contractor's work limits as shown and/or specified.

5. Disposal of trees, bush and other debris into any stream corridor, any wetlands or at unspecified locations.

6. Open burning of materials.

PART 2 PRODUCTS

2.01 COVER AND LINER FABRIC FOR STOCKPILES

A. Cover and liner fabric for stockpiles shall be as specified under General Specification 02371 – Dust, Soil Erosion and Sedimentation Control.

PART 3 EXECUTION

3.01 NOISE CONTROL

A. All sound attenuation measures shall comply with the following Town of Mount Pleasant Noise Ordinance -eCode360 quality criteria and

B. The Contractor's vehicles and equipment shall be operated and maintained so as to minimize noise to the greatest degree practicable. Noise levels shall conform to the latest regulatory standards and in no case will noise levels be permitted which interfere with the work of the on-site personnel.

1. All construction equipment powered by an internal combustion engine shall be equipped with a properly maintained muffler.

2. Air powered equipment shall be fitted with pneumatic exhaust silencers.

3.02 DUST CONTROL

A. The Contractor shall be responsible for controlling objectionable dust caused by his operation of vehicles and equipment, clearing or for any reason whatsoever. Contractor shall conduct all operations and maintain the area of activity to minimize creation and dispersion of dust.

B. The Contractor shall apply water to keep dust in the air to a minimum. The use of calcium chloride for dust control shall not be permitted.

C. Dust control for construction activities at all work areas shall be as follows:

1. Non-paved roadways and parking areas, which are used for construction traffic, shall be sprayed at least every other hour with water during the hours of construction unless otherwise approved by the City.

2. Contractor shall regrade unpaved roadways and parking areas once a week to the satisfaction of the Resident Engineer.

3. All other construction areas shall be hosed down twice a day with water during the hours of construction, or as deemed necessary by the Engineer

4. The Contractor shall erect runoff barriers or other means to ensure that runoff generated from dust control activities does not enter any surrounding water bodies.

D. The Contractor shall comply with the requirements of Detailed Specification 02371 - Dust, Soil Erosion and Sedimentation Control.

3.03 PEST AND RODENT CONTROL

A. Provide rodent and pest control as necessary to prevent infestation of construction or storage area.

1. Employ methods and use materials which will not adversely affect conditions at the Site or on adjoining properties.

2. All chemicals shall be approved by the Engineer prior to their use and shall be safe for use in drinking water environment.

B. The Contractor shall comply with the requirements of Detailed Specification 01571 – Temporary Pest Control.

3.04 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.

B. Provide equipment and personnel to perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.

C. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, or reactant of other classification, must show approval of the EPA and other recognized certifying agencies. Use of all such chemicals and disposal of residues shall be in strict conformance with regulatory requirements.

D. The Contractor's equipment used during construction shall conform to all current Federal, State, and local laws and regulations.

3.05 CARE DURING WELDING

A. Provide protection of City's workers from welding arcs during the construction by providing adequate welding shields.

3.06 NOTIFICATION OF NON-COMPLIANCE

A. The Engineer will notify the Contractor in writing of any non-compliance with the provisions of this Section and the action to be taken. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or its authorized representative at the Site of the Work, shall be deemed sufficient for the purpose.

1. If the Contractor fails or refuses to comply promptly, an order stopping all or part of the Work may be issued by the City until satisfactory corrective action has been taken.

2. No part of the time lost due to any such stop work orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor, unless it is later determined that the Contractor was in compliance with the provisions of this Section.

B. The Contractor shall be responsible for its Subcontractors' compliance with the provisions of this Section.

3.07 STORMWATER RUNOFF CONTROL

A. Prevent discharge of sediment to and erosion from the Site to surface waters, drainage routes, public streets and rights-of-way, and private property, including dewatering operations.

B. Prevent trash, demolition waste and construction debris from contaminating storm water runoff.

C. Provide berms, dikes, and other acceptable methods of directing storm water around work areas to drainage routes.

D. Storm water runoff controls shall be inspected daily. Problems and deficiencies shall be brought to the attention of the Engineer and corrected promptly.

3.08 SITE SECURITY

A. The Contractor shall comply with the requirements of Detailed Specification 01561 – Security Guard Services.

3.09 STOCKPILING OF MATERIALS

A. Stockpiling of excavated materials shall be handled in accordance with General Specification 02371 – Dust, Soil Erosion and Sedimentation Control.

NO TEXT ON THIS PAGE

SECTION 01571
Temporary Pest Control

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pest Control Service

B. Regulatory Requirements

C. Material Requirements

D. Packaging

E. General Procedures

F. Safe Operation

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 01270 – Measurement and Payment

B. Detailed Specification 01740 – Cleaning and Site Maintenance

1.03 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.04 DESCRIPTION

A. Pest Control Service:

1. The Structures and Equipment Contractor shall provide the services of a certified, licensed and insured pest control service for the purpose of exterminating and controlling pests at each of the Project Sites.

2. Rodent control during the entire year. The rodent (i.e., rat) traps shall be effective and adequate in number placed within the site perimeter and at locations directed by the Resident Engineer. Each trap shall be checked monthly to ensure that they are properly baited and in proper working condition. All traps shall be rebaited monthly as required.

3. Mosquito control during the summer months. The Contractor shall provide an extermination schedule prior to commencing spraying based on the recommendation of the pest control service and/or the chemical manufacturer.

    a. The Structures and Equipment Contractor shall identify standing water and eliminate as soon as possible. Where the standing water is not a part of the Contract work or is not under the control of the Contractor, the standing water shall be reported to the Resident Engineer. To the extent possible pools of standing water shall be removed rather than applying insecticide to any pools of standing water to control the breeding of mosquitoes.

4. The Structures and Equipment Contractor shall furnish all labor, equipment, and materials necessary to implement a Rodent and Insect Control Program specifically requested and authorized in writing by the Engineer.

    a. On and around the Resident Engineer's field office, parking lot, guard booth, and portosans.

5. All work shall be performed by an exterminator licensed in the State of New York and shall comply with all New York State Department of Health requirements for rodent and insect control. The exterminator shall only use products approved by the USEPA for rodent and insect control.

6. The Structures and Equipment Contractor shall perform one (1) full round of rodent and insect control on and around the areas specified in this Section once every two months from October through May and once every month from June through September.

B. Regulatory Requirements

1. The Structures and Equipment Contractor and the pest control service shall comply with all Federal, State, and local ordinances, codes and regulations regarding the following:

2. Performing the pest control service.

3. Utilizing only the pesticides recommended by the manufacturer for the purpose intended and which will not create a hazard to health or property.

4. Cleaning up and disposing of all pesticides and pests.

PART 2 PRODUCTS

2.01 MATERIAL REQUIREMENTS

A. Pesticides shall be approved commercially available products that are currently registered by the United States Environmental Protection Agency and the New York State Department of Environmental Conservation. Pesticides shall also have all required labels indicated that they are approved for the intended use.

B. Pesticides shall be mixed and used in strict conformance with the instructions on the label or supplemental labels.

2.02 PACKAGING

A. Pesticides shall be delivered and securely stored, until used, in the manufacturer's standard containers that have legible labels affixed in accordance with the provisions of the Federal, State and local pesticides laws, rules and regulations in effect at the time of delivery.

B. Pesticides that do not meet these packaging requirements, at any time, will be rejected by the Resident Engineer and shall be removed from the site immediately.

C. The Resident Engineer shall reject any pesticides that have become wet, caked or otherwise unfit for use.

D. The basis of acceptance shall be original, sealed, and properly labeled pesticide containers.

PART 3 EXECUTION

3.01 GENERAL PROCEDURES

A. Before performing any pest control work, the technician shall report to the Resident Engineer 24 hours prior to announce his presence and to ascertain if there are any special areas which need to be addressed.

B. Pesticides shall be stored, handled and used in accordance with the manufacturer's label and directions.

3.02 SAFE OPERATION

A. The pest control service shall exercise caution in the application of pesticides and other operations in order not to endanger or injure on-site personnel or the public. Rates and methods of application shall be in accordance with the manufacturer's instructions on the pesticide label.

B. All pesticides shall be delivered in original containers or packaging or in service containers properly labeled as required by law. All pesticides shall be secured at all times against unauthorized access.

C. Residual pesticides and containers shall be disposed off-site in accordance with the label instructions and applicable Federal, State and local regulations.

END OF SECTION

SECTION 01583
Construction Site Signs

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the requirements of the New York City Department of Buildings (DOB) for uniform display of project and safety contact information in the signage posted along construction fences and sidewalk sheds at government-owned or government-funded project sites. Under Local Law 47/13, all miscellaneous construction signs – including City, Contractor and 311 contact information are consolidated in one simplified project information panel. No other signage or permits, unless otherwise required by law, may be posted.

1.02 PAYMENT

A. No separate payment will be made for performing any work required under this Section.

B. No extra payment will be made for any update of contact information, including the changes of names and offices on the project information panel, necessitated by administrative changes during the course of the Project.

1.03 REFERENCES

A. New York City Local Law 47/13

B. Rules of the City of New York 3301-01 (RCNY 3301-01)

1.04 DESCRIPTION

A. The Structures and Equipment Contractor shall procure and erect a project information panel at the project site identifying the project. The panel shall be erected within twenty-one (21) days from the date the Contractor is ordered to Commence Work and shall be in accordance with the specifications and details included in this Section.

1.05 SUBMITTALS

A. Submit the following for approval prior to fabrication of the project information panel:

1. Detailed sketch showing all lettering, dimensions and colors
2. Detailed bill of materials indicating materials of construction for all project sign components.

PART 2 PRODUCTS

2.01 PROJECT INFORMATION PANEL

A. The project information panel shall be constructed in accordance with RCNY 3301-1, including the following requirements and as shown on Figure 1 attached to this Section. The Engineer will provide project specific information.

1. Project sign dimensions shall be in accordance with Figure 1.

B. Project information panels shall include the following information:

1. A rendering, elevation drawing, site plan, or zoning diagram of the building exterior that does not contain logos or commercially recognizable symbols;

2. A title line stating "Work in Progress:" and specifying the nature of the project;

3. Anticipated project completion date;

4. Website address to contact for project information;

5. The corporate name and telephone number of the contractor;

6. The following statement, in both English and Spanish, "TO ANONYMOUSLY REPORT UNSAFE CONDITIONS AT THIS WORK SITE, CALL 311";

7. When applicable, a copy of the primary project permits, with accompanying text "To see other permits issued on this property, visit: www.nyc.gov/buildings." The permit shall be laminated or encased in a plastic covering to protect it from the elements or shall be printed directly onto the project information panel.

8. The name(s) of government official(s) shall be incorporated into the panel in accordance with Figures 1 and 2. For projects outside the City, the lines for "Borough President" and "City Council Member" shall be removed.

C. The project information panel shall be constructed of ¾-inch thick plywood panel of the following quality or equal as approved by the Engineer:

1. High density overlaid exterior type fir plywood panels, 5 ply, B-B grade or better.

2. Each plywood panel shall be resin impregnated on both sides.

D. The content shall be written in the Calibri font or similar Sans Serif font style, with letters a minimum of 1 inch (25 mm) high, as measured by the upper case character. Such letters shall be white, on a blue background, with

such blue color of a shade matching Pantone 296, or RGB 15, 43, 84, or CMYK 100, 88, 38, 35.

2.02 MANUFACTURERS

A. The project information panel shall be manufactured by one of the following:

1. Mineola Signs, Mineola, New York; *http://mineolasigns.com/*

2. Or approved equal

PART 3 EXECUTION

3.01 INSTALLATION

A. Location: The project information panel shall be located in a prominent position as determined by the Engineer.

B. Panel Supports: Adequate supports for the project information panel, including the positioning and alignment of the sign, as determined by the Engineer, shall be provided by the Contractor.

C. Maintenance: The project information panel shall be maintained by the Contractor in good condition at all times for the duration of the Contract.

D. Removal of project information panel from Project Site: The Contractor shall remove the project information panel and supports from the site when ordered by the Engineer.

3.02 ATTACHMENTS

A. The following sketches are attached to this Section:

1. Figure 1 – Project Information Panel Layout

2. Figure 2 – Not used

END OF SECTION

NO TEXT ON THIS PAGE

FIGURE 1

PROJECT INFORMATION PANEL LAYOUT

Note: As directed by the Engineer, the wording below the rendering shall be deleted if the project is not funded under the NYS Revolving Loan Fund and the rendering shall be extended to fill in that space.

FIGURE 2

Not Used

SECTION 01615
General Electrical and Mechanical Requirements

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Equipment and appurtenances

B. Delayed approvals

C. Accessories included

D. Contractor's working equipment

E. Excessive loadings

F. Welding

G. Sole plates

H. Grouting

I. Operating instructions

J. Damage during tests and instruction periods

K. Work may be rejected at any time

L. Requirements for electrical work and electrical equipment

M. Service of manufacturer's engineer

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section and each Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 DESCRIPTION

A. Equipment and appurtenances. Equipment and appurtenances shall be designed in conformity with ASME and IEEE standards and shall be of rugged construction and of sufficient strength to withstand all stresses that may occur during fabrication, testing, transportation, installation and all conditions of operation. Adequate stays, braces and anchors shall be provided. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means and shall be fully lubricated by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear

covers and the like shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be mitered.

1. Machinery parts shall conform exactly to the dimensions shown on the working drawings. There shall be no more fitting or adjusting in setting up a machine than is necessary in assembling high-grade apparatus of standard design. The equivalent parts of identical machines shall be made interchangeable. These requirements will be rigidly enforced.

2. All equipment components shall comply with American standards, except where written permission is granted by the Engineer to deviate from such standards. Such standards shall include in part or in whole, but shall not be limited by, the standards, codes, specifications, or tentative specifications adapted and published by technical societies, organizations and bodies referred to under "Standard references" and "Use of abbreviations" in the Detailed Specifications of the Contract. Thread components made to metric, Whitworth or other foreign standards are unacceptable.

3. All grease lubricating fittings on equipment shall be button head type and samples thereof shall be submitted for approval.

4. All machinery and equipment shall be safeguarded in conformity with the safety codes of the ANSI, OSHA and the New York State Industrial Code.

5. All petroleum bulk storage tank installations shall be installed in accordance with the requirements of the Environmental Protection Agency, New York State Department of Environmental Conservation, the Fire Department and Departments of Buildings and of Small Business Services and all other agencies having jurisdiction. Each Contractor, at its own expense, shall obtain a facility registration certificate and all permits required. In addition, each Contractor shall submit a certified statement that the installation is in compliance with all regulations.

6. All electric motors shall be designed to conform to IEEE standards and to General Specification 16221 - Electric Motors. Characteristics of electrical energy and source of supply are given in the Detailed Specifications. Electric energy supplies at the site of the work is subject to commercial loads and operating variations. The voltage given in the Detailed Specifications is subject to correction for plant bus conditions and feeder drop. Adequate and proper provisions must be made so that all apparatus furnished hereunder will operate normally under such conditions.

7. Galvanized cast iron junction boxes or equivalent provisions for threaded conduit connections shall be furnished, unless otherwise specified or approved.

8. Equipment comprising several electrically operated devices shall be furnished completely wired and shall have all electrical appliances, conduit and connections that are integral parts thereof. Such connections shall terminate in a junction box of ample size.

9. Limit switches and other mechanically actuated switches shall be enclosed in cast metal boxes and be installed in the proper locations ready for rigid conduit connections. Switches shall be complete with all supports, stops, cams, arms, tripping and operating members which shall be adjustable where required for proper functioning. A complete statement of the scheme of control sequence and timing of operations required shall be submitted for approval. The electrical parts of mechanically actuated switches shall be encased as specified and be fully protected from shock and strain under all operating conditions. The manufacturer shall guarantee, for the service required, the electrical units and parts used in the assembly.

10. Electrical equipment shall be supplied only by manufacturers who maintain service facilities and spare parts stocks so that service and spare parts are capable of being furnished to a DEP specified location within a maximum time period of 48 hours. Service and stock shall be adequate for the equipment supplied, and evidence of such capability shall be presented when the equipment is submitted for approval.

11. Equipment manufactured outside continental U.S.A. shall be supplied only by manufacturers who maintain acceptable service facilities and spare parts stocks within continental U.S.A. Service and stock shall be adequate for the equipment supplied and evidence of such facilities shall be presented when the name of the manufacturer is submitted for approval.

12. Delayed approvals. The time spent in approving working drawings, samples, equipment or other data which does not conform in every respect with the Contract Documents will not be considered as the basis for a claim for an extension of the Contract time.

B. Accessories included. Each Contractor shall furnish, install and protect all necessary guides, track rails, bearing plates, anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be made of ample size and strength for the purpose intended.

1. Suitable templates and working drawings for installation shall be furnished.

2. Each Contractor shall furnish with each piece of equipment one complete set of suitably marked special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. It shall submit, for approval by the Engineer, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and equipped with good grade cylinder locks and duplicate keys.

3. All spare parts shall be furnished as herein specified. Approval of necessary electrical equipment not specified in detail is contingent on furnishing and installing such equipment complete with all appurtenances, enclosures, means for connecting to power supply, and supporting structures.

C. Contractor's working equipment. Each Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

D. Excessive loadings. Floor slabs shall not be subjected to excessive concentrated loads and in no case shall be maximum safe loads be exceeded.

E. Welding. All structural fusion welding and gas cutting shall conform to the requirements of the AWS, the NYBC and the BS&A. All welding of pipe, fittings and pipeline equipment shall be performed by qualified welders as specified by the latest requirements of the Code for Pressure Piping, ANSI B31.1 and its supplements.

1. Welders shall be certified in compliance with Section IX Welding Qualifications of the ASME Boiler and Pressure Vessel Code and shall be so qualified by an independent testing laboratory approved by the City.

F. Sole plates. All equipment mounted to concrete without cast iron or fabricated steel equipment bases shall be provided with a sole plate approved by the Engineer.

G. Grouting. Each Contractor shall, at its own expense, furnish all materials and labor for, and shall properly bed in epoxy grout each piece of equipment or its supporting base resting on masonry foundations.

1. The epoxy grout shall be pre-measured, fast curing, high strength, non-shrink, have good adhesion to concrete and steel, and resist degradation by oil, solvents and acids. All epoxy grouting material

and installation procedures shall be approved by the manufacturer of the equipment being grouted and the Engineer.

2. The storage, surface preparation, forming, mixing, and placing of the grout shall be as recommended by the grout manufacturer.

3. Flowability of the material shall provide self-leveling for ease of placement.

4. Epoxy grout shall completely fill the space between the equipment or base and the foundation and it shall generally average one inch in thickness. Leveling wedges shall not be removed and jacking bolts shall not be backed off before final set of grout. Voids left by wedges shall be pointed. Exposed surfaces of epoxy grout shall be finished to the satisfaction of the Engineer. Final alignment of the equipment shall be checked in the presence of the Engineer.

H. Operating instructions. Each Contractor, through qualified individuals, shall adequately instruct designated employees of the City in the operation and care of all equipment installed hereunder.

I. Damage during tests and instruction periods. Each Contractor shall be fully responsible for the proper operation of equipment during test and instruction periods and it shall neither have nor make any claim for damage which may occur to equipment prior to the time when the City formally takes over the operation thereof.

J. Work may be rejected at any time. If at any time an inspection, test or analysis of work reveals faulty design, inferior or defective materials, poor workmanship, improper installation, excessive wear or non-conformity with the requirements of the Contract Documents, such work will be rejected and shall be replaced with satisfactory work at the Contractor's expense.

1. Electrical appliances which have been subjected to injury by water shall be thoroughly dried out and put through a special dielectric test as directed by the Engineer, or shall be replaced by the Contractor, all at its own expense.

K. Requirements for electrical work and electrical equipment. Electrical work and electrical equipment shall be installed under the supervision of the Engineer and shall be subject to approval, inspection and test by the Engineer and by the NYS Department of Buildings (DOB) or the local Authority Having Jurisdiction (AHJ).

1. The Electrical Contractor shall file with the Department of Buildings or the local AHJ an application for a certificate of electrical inspection and shall pay all filing and inspection fees, as

required by the New York State Electrical Code (NYSEC) or local AHJ.

2. For service equipment rated 1000 KVA and larger, drawings shall be submitted by the Electrical Contractor for approval to the DOB Electrical Advisory Board, as required by the NYSEC; or as otherwise required by the local AHJ. The Electrical Contractor shall pay the filing fees required for each submittal.

3. The Electrical Contractor shall submit for the approval of the Engineer and as required by the DOB and the Electrical Advisory Board as applicable, complete working drawings covering electrical equipment furnished under this Contract. Drawings shall include dimensioned outlines showing provision for and locations of conduit connections, detailed wiring diagrams, schematic wiring diagrams, installation layouts, material schedules, test data and supplementary descriptive data.

4. Drawings shall be submitted to the Engineer for review before they are submitted to either the DOB's Electrical Advisory Board or the local AHJ. Upon receipt of approval or comments from DOB or the local AHJ, the Electrical Contractor will return drawings to the Engineer with the disposition noted.

5. After full completion of its work, the Electrical Contractor shall notify the local borough office of the DOB or the local AHJ, requesting a final inspection to be made.

L. Service of manufacturer's engineer. The prices bid for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent, from the company manufacturing the equipment, who shall assist the Contractor, when required, to install, adjust and test the equipment in conformity with the Contract Documents. After the equipment is placed in permanent operation by the City, such engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that such equipment is in proper and satisfactory operating condition.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01651
Transportation and Handling of Materials and Equipment

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Delivery of products

B. Handling of products

C. Inspection of items

D. Supporting heavy loads

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SPECIFICATIONS

A. Detailed Specification 01661 -- Protection of Materials and Equipment

1.04 GENERAL REQUIREMENTS

A. The Contractor shall make all arrangements for transportation, delivery and handling of materials and equipment required for installation and completion of the Work.

B. Storage space at the site is limited; the Contract Documents shall indicate the contract specifics for staging and available storage areas. Coordination is to be done with the Engineer as to whether on-site storage will be permitted. Any off-site storage locations or facilities are to be inspected by the Engineer prior to storing items.

1. When storage of materials and equipment is off-site, deliveries to the site shall be schedule to coincide with installation of the items. Protection, handling and storage of materials shall be performed as per Detailed Specification 01661 – Protection of Materials and Equipment.

2. If necessary to move stored materials and equipment during construction, the Contractor shall move or cause to be moved materials and equipment without any additional compensation.

C. Unless otherwise specified, the City’s docking facilities or hoisting equipment at or near the project site will not be available for the Contractor's use.

D. Transport and handle products in accordance with manufacturers' instructions and shall comply with all Federal, State and Local Laws.

1.05 DELIVERY OF PRODUCTS

A. The Contractor shall arrange deliveries of products in accordance with construction schedules and with ample time to facilitate inspection prior to installation.

B. The Contractor shall coordinate deliveries to avoid conflict with Work and conditions at the site and to accommodate the following:

1. Limitations of storage space

2. Availability of equipment and personnel for handling products

C. Materials and equipment shall not be delivered to Site until related Shop Drawings, including the manufacturer's recommended storage instructions, have been approved by the Engineer.

D. Materials and equipment shall not be delivered to Site until required storage facilities have been provided. Storage facilities and protection for products shall be as specified in Section 01661 – Protection of Materials and Equipment.

E. Products shall be delivered to the Site in the manufacturer's original, unopened, labeled containers. The Engineer shall be informed of all deliveries all materials and equipment.

F. Partial deliveries of component parts of equipment shall be clearly marked to identify the equipment, to permit easy accumulation of parts and to facilitate assembly.

G. Immediately on delivery, the Contractor shall inspect shipments to ensure:

1. Product complies with requirements of Contract Documents and approved Submittals.

2. Quantities are correct.

3. Containers and packages are intact and labels are legible.

4. Products are properly protected and undamaged.

1.06 HANDLING OF PRODUCTS

A. The Contractor shall provide equipment and personnel necessary to handle products in a manner that prevents soiling or damage to products or packaging.

B. The Contractor shall provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.

C. The Contractor shall handle products in a manner that prevents bending or overstressing.

D. Heavy components shall be lifted only at designated lifting points.

E. Materials and equipment shall be handled at all times in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them. Do not drop, roll or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

1.07 INSPECTION OF ITEMS

A. The Contractor shall inspect all items including all boxes, crates and packages containing materials and equipment for damage that may have occurred during shipment prior to their removal from the truck or other manner of conveyance. Any damage shall be reported immediately to the Engineer.

B. The Contractor shall then carefully remove the materials and equipment from the truck or trucks on which they were shipped. The materials and equipment shall then be transported to the place of installation at the job Site. The Contractor shall be liable for loss or damage to the materials and equipment that may occur while being unloaded, transported, stored or installed.

C. All materials and equipment that arrives at the job Site during normal working hours shall be unloaded as soon as practicable.

1.08 SUPPORTING HEAVY LOADS

A. In all cases where heavy loads or demolition may temporarily affect existing slabs, the Contractor shall confirm the slab's load sustaining ability. Whenever heavy loads are to be stored or temporarily imposed on slabs, or whenever the structures may be impacted by demolition, the Contractor shall submit for approval by the Engineer a plan of procedure prepared by a licensed professional engineer, indicating a structural analysis of the slabs and methods of distributing loads, and providing auxiliary support so that slabs and beams are not loaded in excess of their design loadings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01661
Protection of Materials and Equipment

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Handling and storage of products

B. Protection of materials and equipment

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 01651 -- Transportation and Handling of Materials and Equipment

1.03 PAYMENT

A. No separate materials will be made for providing any Work required under this Section.

1.04 STORAGE OF PRODUCTS

A. Transport, store and handle products in accordance with manufacturer's methods and instructions and as required in Detailed Specification 01651 of the Contract.

B. Handle and lift products only at designated lift points and by methods to avoid soiling, disfigurement, bending, overstressing and damage.

C. Store products on shelves, in bins, or in neat groups of like items, with seals and labels intact and legible, and in a manner to provide access for maintenance and inspection.

D. Store loose granular materials on clean, solid, flat surfaces and prevent mixing with foreign matter. Store fabricated products supported above the ground on skids or blocking. Provide erosion control and surface drainage to prevent erosion and ponding of water as per the contract documents or directed by the Engineer.

E. Cover products subject to discoloration or deterioration with impervious sheet covering and protect products from soiling and staining.

F. Store and protect products that are subject to damage by the elements in weather-tight or climate-controlled enclosures, and according to manufacturer's instructions. Maintain temperature, ventilation, and humidity within ranges stated in manufacturer's instructions.

G. Attach applicable manufacturer's storage service instructions labeled "STORAGE SERVICE INSTRUCTIONS ENCLOSED" to exterior of each stored product.

H. Inspect, maintain and service stored products on a regularly scheduled basis, consistent with manufacturer's instructions.

I. Record inspection, maintenance and services performed and keep log available for review by the City and Engineer.

1.05 PROTECTION OF MATERIALS AND EQUIPMENT

A. The Contractor shall make every effort to minimize extended storage periods of materials and equipment at the Site by judiciously scheduling deliveries to coincide with construction needs.

B. Unless otherwise specified, storage of any mechanical or electrical equipment or other ultraviolet or weather sensitive items out of doors at any time is prohibited regardless of the protection furnished. Storage of mechanical and electrical equipment within structures at the Site will not be permitted unless the structures are enclosed. A structure shall be considered to be enclosed when it is roofed and has protection of doorways, windows and other opening closures.

C. All mechanical and electrical equipment shall be coated, wrapped and otherwise protected from snow, rain, drippings of any sort, dust, mud, condensed water vapor, etc., during shipment, storage, and installation and until placed in service.

D. All storage areas for motors shall be heated. Space heaters shall be supplied, as required, in all enclosures being utilized for storage of motors. Motors equipped with space heaters shall be properly wired and the heaters activated while the motors are in storage.

E. Should storage of mechanical and electrical equipment become necessary before it can be stored at the Site, the Contractor shall provide storage in a weatherproof warehouse.

F. Materials may be stored out of doors if supported above ground surface on wood runners and protected with approved, effective and durable covers.

G. All storage and protection of materials and equipment at the Site shall be subject to the approval of the Engineer.

H. Prior to installation of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by a long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period.

As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective, and shall be removed and replaced at the Contractor's expense.

I. When stored materials and equipment are moved from the storage location to the Site, the Contractor shall move or cause to be moved the items without additional compensation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01711
Maintenance of Operations and Construction Staging

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Maintenance of site operations

B. General criteria and restrictions

C. Construction staging

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A.	Detailed Specification 01140	--	Work Restrictions
B.	Detailed Specification 01321	--	Progress Schedule
C.	Detailed Specification 01560	--	Temporary Barriers and Enclosures
D.	Detailed Specification 01570	--	Temporary Controls

1.04 DESCRIPTION

A. Maintenance of Site Operations

1. The Contractor shall perform its work in a manner such that the City can keep the existing site/facility in continuous dependable operation. Any temporary work that may be required to maintain the site/facility in operation shall be furnished by the Contractor at the direction of the Engineer at no extra cost to the City.

2. The Contractor shall keep the Engineer and designated representative of the facility/site informed of any Work that may interfere with normal operations. The Engineer and the facility/site representative must receive a written request at least 15 days in advance of proposed work.

    a. The CPM schedule shall not serve as prior notice. No work shall proceed prior to the written approval of the City.

3. Unless otherwise permitted by the facility/site representative, no existing valves or equipment shall be operated by the Contractor.

4. The employees of the Contractor or its Subcontractors may be prohibited from entering or using some areas of the site/facility.

B. General Criteria and Restrictions

1. The following general criteria and restrictions shall apply to the Work except where otherwise noted in the Contract:

   a. When the connection of a new pipeline to an existing structure or pipeline requires a shutdown of the existing structure or pipeline, the new pipeline except for the final connection shall be tested prior to proceeding with the shutdown. When the final connection is completed, the new pipeline shall be tested again in its entirety.

   b. The Contractor shall provide all pumps, piping, valves, etc., as necessary to dewater all conduits, channels, and pipes directly to a location approved by the Engineer.

   c. The Contractor shall provide all pumps, piping, valves, etc., as necessary, to remove unused chemicals from all pipes as described herein.

   d. The Contractor shall flush and clean all process channels, conduits, manholes, and tanks after they have been removed from service.

   e. Any modification to, relocation of, connection to or shutdown of an existing tank, vessel, conduit, channel, pipe, etc. shall not be scheduled or occur prior to the Engineer's written approval. The Contractor is advised that the conduits, channels and tanks may contain accumulations of putrescible materials which will remain on the walls and inverts. These materials emit noxious, odorous and hazardous gases such as hydrogen sulfide and methane. The Contractor is advised to ventilate and test the air of all confined spaces prior to entry.

   f. The Contractor is advised that existing valves, gates and other devices shall be considered as inoperable and subject to leaking. The Contractor shall be responsible for designing, furnishing, installing and removing all temporary devices, stop logs, plugs or bulkheads necessary to isolate or dewater pipes, channels, conduits, or tanks to perform his work.

   g. The Contractors shall install and maintain temporary drainage and containment, to the satisfaction of the Engineer, where the existing drainage and containment has been removed due to construction progress until the permanent replacement drainage and containment system has been installed.

   h. The Contractor shall coordinate its activities with the other contractors on the site so as to comply with the provisions of these specifications and their intent.

2. The following general restrictions shall be applied to all equipment and appurtenant utility systems:

   a. The restrictions provided herein serve to maintain the existing site facilities in continuous operation and to coordinate with other construction activities at the site.

   b. Work under this Contract shall be scheduled and conducted by the Contractor to adhere to the requirements specified herein. The Contractor shall execute work in coordination with other contracts as necessary. The Contractor shall not commence work until criteria or restrictions are satisfied or removed as deemed by the Engineer.

   c. Access shall be maintained to all equipment and appurtenant utility systems' work areas. Temporary access shall be provided as required by the Contractor and approved by the Engineer. Site Operations personnel must have access to all areas which remain in operation.

   d. Potable Water System:

      1) Potable water must be protected against contamination in accordance with the requirements of the authorities having jurisdiction.

      2) Existing fire suppression piping at / near work sites shall be operational at all times until replaced.

   e. Plumbing Facilities: All building plumbing systems such as sanitary facilities, roof and floor drains, pumping, etc., shall be maintained until turned over by site Operations for demolition.

   f. Storm Drainage: Storm drainage on the site shall be operational at all times. If necessary, the Contractor shall pump between manholes during the installation of new piping or underground utilities. Roof drainage shall be maintained at all times and no roof shall be permitted to accumulate standing water.

   g. All site drainage flows shall not be interrupted.

   h. Power, Light and Communication Systems: Electric power, lighting service, security camera systems and communications systems shall be maintained in uninterrupted operation in all areas that remain in operation. Individual units may be disconnected as required for replacement or relocation.

   i. Sump Pumps and Sumps: All existing sumps shall be maintained in an operable condition with either existing pumps

or temporary pumps. Interim piping, power and controls shall be provided as required.

j. Drainage Pipes and Conduits:

1) Unless otherwise specified, the contents of all pipes, conduits, pits or other liquid containing structures shall be transferred to a location approved by the Engineer using hoses, piping or pumps if hydraulic conditions so require them. The Contractor, whose work requires the draining, shall provide the pumps, piping and hoses.

2) If a drain is not available on the pipe to be drained, then a wet tap shall be made using a tapping saddle and valve. No uncontrolled spillage of a pipe's contents shall be allowed, nor shall a pipe's contents be discharged to a sump.

3) Any spillage shall be immediately washed down and the floor drains, sumps and sump pump discharge piping flushed out to prevent clogging and odors.

k. Temporary Partitions and Enclosures: The Contractors shall provide temporary partitions and enclosures as required by the Contract Documents where necessary to maintain dust-free, heated and ventilated spaces in areas which are adjacent to his work and which must be kept operational by site Operations personnel.

l. Seal Water and Service Water Piping: A supply of seal and service water and the necessary connections to existing equipment shall be maintained during construction. Interim piping shall be provided as required.

3. The following requirements shall be adhered to in development of the Circulation Plan to be submitted in accordance with the provisions of this Section.

a. Comply with all requirements of Detailed Specification 01140 – Work Restrictions, Detailed Speciation 01560 – Temporary Barriers and Enclosures, Detailed Specification 01561 – Site Security and Detailed Specification 01570 – Temporary Controls.

b. Construction-related vehicles and activities shall not impede or otherwise adversely affect the flow of regular traffic traveling on the roads leading to and adjacent to the Work location.

1) Construction-related vehicles and activities shall be understood as including vehicles operated and activities

undertaken by the Contractor (including his or her employees, subcontractors, and visitors). Regular traffic shall be understood as referring to all vehicles other than construction-related vehicles.

2) Personal vehicles are prohibited on site.

c. Perform the Work required in this Contract in accordance with applicable traffic and safety rules, regulations, ordinances, and permit conditions.

d. Sections of roadway being worked shall only be returned to DEP access after both the permanent (4) foot high fall protection fence, box beam and vehicle guide rails have been installed. The Contractor is responsible for safety in sections closed for roadwork. For temporary fall protection requirements, refer to Detailed Specification 01560 – Temporary Barriers and Enclosures. Maximum fence section removal shall be as determined by the Resident Engineer.

e. Stockpiling of materials shall be in accordance with the provisions of Detailed Specification 01570 – Temporary Controls.

f. Protect all open excavations per Detailed Specification 01560 – Temporary Barriers and Enclosures and, if required, cover open excavations with steel plates after working hours.

4. Any temporary work that may be needed to maintain the site facilities in operation, and that is made necessary by the requirements of the Contract or by the Contractor's activities, shall be provided by the Contractor as specified under the Contract Documents or at the direction of the Engineer at no extra cost to the City.

5. The Contractor shall observe all safety regulations in force at the site.

6. Work on-site shall not begin until submission and approval of construction sequence for all Work.

7. The Contractor shall not remove any items from service without written permission from the City. Upon receiving written approval from the City, the Contractor shall proceed with the Work and shall proceed continuously until the Work is completed, tested, and made ready for operation.

C. Construction Staging

1. The Contractor shall perform the Work as shown on the Contract Drawings and specified herein to meet the requirements of these

specifications regarding time of completion and maintenance of operations

2. The Work included under this Contract, shall be performed in accordance with the Contract Documents. Further, the Contractor shall submit a comprehensive work schedule to the Engineer to demonstrate that he shall rigidly adhere to these requirements.

1.05 SUBMITTALS

A. Circulation Plan: Before commencing any construction activity, a circulation plan shall be submitted by the General Contractor for approval. Circulation plan shall be developed in accordance with the requirements of this Section. The Circulation Plan shall propose to maintain access at all times during the construction of the proposed improvements, and shall not provide any interference with the regular operation and maintenance of the site/facility or the flow of regular traffic in the vicinity of the site. The circulation plan shall include the Contractor's coordination with other work occurring simultaneously on site. Notify the Engineer of any proposed changes to the Circulation Plan a minimum of one (1) week in advance. All changes must be approved prior to implementation. The Circulation Plan shall include, but not be limited to:

1. Construction vehicle access and exit points, including proposed maintenance and control of traffic
2. One-way and Two-way vehicular traffic within the access road
3. Stockpiling areas
4. Storage areas
5. Emergency exits
6. Temporary construction signage to direct site traffic
7. Temporary signage for vehicular speed limits as required by fence removal.
8. Temporary signage for vehicular maximum weight limits as required by fence removal.

B. Electrical Power and Site Security Plan: Thirty (30) days prior to commencing any demolition and/or construction activity, an Electrical Power Plan shall be submitted by the Electrical and General Contractor respectively for approval. Electrical Power Plan shall be developed in accordance with Detailed Specification 01140 Work Restrictions and Contract drawings. The Electrical Power Plan shall propose to maintain continuous operation of the critical loads at all times during the demolition as well as the construction of the proposed improvements, and shall not provide any interference with the regular operation and maintenance of the site/facility. The Electrical Power Plan shall include, but not be limited to,

1. Installation of concrete slab or canopy structure
2. Installation of underground duct work
3. Installation of Power and Instrument enclosure
4. Connection of loads
5. Protection of the installed equipment
6. Site Security Plan

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01715
General Construction Requirements

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Seismic requirements

B. General mechanical requirements

C. Diagrammatic drawings

D. Ratings approximate

E. Schematic wiring diagrams

F. Electrical supply characteristics

G. Special electrical equipment requirements

H. Uniform finishes

I. Temporary support structures

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 DESCRIPTION

A. Seismic Requirements

1. The Contractor is advised that all proposed structures, non-building structures, and architectural, mechanical and non-structural electrical components and systems, including associated equipment and appurtenances furnished and installed on this project shall be subject to the requirements of the most current New York State Building and Seismic Code in conjunction with the seismic provisions of the International Building Code (IBC) 2009 and referenced ASCE /SEI 7-10 for earthquake loadings. In designing and detailing non-building, architectural, mechanical and electrical non-structural components and systems required to be furnished as performance type submissions, seismic forces and subsequent details shall be developed in accordance with the New York State Building Code, Chapter 16 and the applicable chapters in ASCE 7-10 to the extent that the most stringent provisions are utilized in developing the design earthquake forces. The Contractor shall refer

to the structural notes on the Structural Drawings for site, structure and non-building systems specific seismic design criteria. All calculations, seismic certifications and construction details performed and developed as part of the requirements of performance type submissions shall be prepared and sealed by a Professional Engineer (PE) licensed to practice in the State of New York.

2. Shop drawings shall indicate that the equipment, equipment pads, piping, piping hangers and supports and all anchors required for a complete installation are capable of withstanding the seismic loadings.

B. General Mechanical Requirements

1. Where piping and ducts run in areas which have hung ceilings, such piping and ducts shall be installed in the hung ceilings.

2. The Contract Drawings are in part diagrammatic and show the general arrangement of the equipment, ducts and piping included in the Contract and the approximate size and locations of the equipment. The Contractor shall follow these Drawings in laying out the Work and shall familiarize itself with all conditions affecting the Work and the spaces in which it will be installed.

3. Connections to existing piping shall be made to permit ready disconnection of equipment with minimum disturbance of adjoining piping and equipment. The Contractor shall be responsible for the exact alignment of all piping with the associated equipment and under no circumstances will pipe springing be allowed.

4. The locations of utilities, equipment, piping, gates, outlets and similar underground systems as shown on the Contract Drawings are approximate only, and the exact locations shall be approved by the Engineer during construction. The Contractor shall obtain in the field all information of the actual Work and final locations required for the placing of this Work. In case of interferences with other work or erroneous location with respect to utilities, equipment or structures, the Contractor shall furnish all labor, materials and equipment, at no additional costs to the City, to complete the Work in an approved and acceptable manner.

5. The Contractor shall take necessary field measurements to determine clearances and required sizes of equipment. The Contractor shall verify all pertinent data and dimensions. Dimensions and elevations of existing structures, equipment and piping shown on the Contract Drawings are not necessarily correct and should be considered approximate only as they are based on as-built information from past contracts. Field checking of such

dimensions and elevations is necessary before submitting shop drawings for approval.

6. Until Substantial Completion is obtained, equipment shall be protected from water drippings or splashings at all times during shipment, storage and construction, by covering with waterproof material, effectively arranged. The Engineer will be the sole judge of whether equipment which has been subjected to damage by water shall be replaced or dried out. Equipment that is to be dried out shall be subject to confirmation of insulation integrity by dielectric testing. Equipment replacement or drying-out shall be at the Contractor's expense.

C. Diagrammatic Drawings

1. Various pipelines are shown on the Contract Drawings in diagram form. Where such pipelines are shown in diagram form, they shall be arranged clear of other pipelines, equipment and walking areas, and shall be accessible for maintenance. Such pipelines shall be fitted and installed in a neat and workmanlike manner in accordance with approved shop drawings. An adequate number of unions shall be provided in main pipe and branch pipe runs to facilitate dismantling or removal of pipeline sections without disturbing adjacent branch or connecting lines.

2. The final locations of valves, fittings and other such appurtenances included as a part of diagramed pipelines shall be as shown on approved shop drawings or as determined in the field by the Engineer.

3. Diagramed pipelines shall be furnished, fabricated, erected and otherwise installed to lines, elevations, locations and dimensions as shown, specified or required for a complete installation. The Contractor shall verify all dimensions shown on the Contract Drawings and shall take such field dimensions as may be necessary to properly show on shop drawings and install all diagramed pipelines.

4. In the vicinity of overhead roll-up doors and truck ways all pipe, conduit and appurtenances shall be installed a minimum of 14'-0" above the finished grade or floor elevation, and a minimum of 8'-0" above the finished grade or floor elevation in all walking areas.

5. Electrical conduits and wiring shown on the Contract Drawings are in part diagrammatic to show the general arrangement and routing of conduits and wiring and the approximate size and location of devices included in the Contract. The Contractor shall follow the

intent of these drawings in laying out the Work and shall verify the spaces allocated in which the Work will be installed.

D. Ratings Approximate

1. The ratings of the motors and devices shown on the Contract Drawings and Specifications are approximate only and indicate the probable power requirements to the extent they can be determined in advance of the purchase of devices. The ratings of the devices furnished may be either increased or decreased accordingly.

2. The Contractor shall verify the exact rating of each device before performing the Work required under his Contract and modify the size of conduit, wiring and control equipment accordingly.

E. Schematic Wiring Diagrams

1. Equipment furnished under the various Specifications will require interconnecting wiring. The Contractor's shop drawings, furnished in accordance with the Specifications, shall include comprehensive schematic diagrams showing wiring of each individual piece of equipment and all interconnecting wiring. Shop drawings shall be submitted for approval of the Engineer prior to commencement of Work.

F. Electrical Supply Characteristics

1. The characteristics of the Electrical Systems available or to be provided for the operation of all electrical equipment are shown on the Contract Drawings or provided in the Detailed Specifications.

G. Special Electrical Equipment Requirements

1. All electrical equipment and devices manufactured and furnished under these Contracts shall be of type that have been in satisfactory operation for not less than three years. Whenever similar devices or appliances are furnished, they shall be of one manufacturer and interchangeable within their ratings. If this is not feasible, the Contractor shall submit a statement for each manufacturer supplying devices, certifying the following:

   a. That he recommends the use of the device or devices for the specific function to be performed;

   b. That he fully guarantees the satisfactory operation of the device or devices in conjunction with the other elements of the equipment.

2. Whenever standard devices or devices of a named manufacturer do not exactly fulfill the specified conditions, they shall be modified or special devices shall be furnished. All electrical devices furnished

under the Contract shall be housed in metal enclosures with provisions for threaded conduit connections. The enclosures shall be designed to protect all electrical parts from local conditions.

3. Float switches, limit switches and other mechanically actuated electrical devices shall consist of an approved electrical system housed in rugged metal enclosures. They shall be adjustable without disturbing conduit connections. The switch actuating mechanism shall be mechanically and structurally correct for the required service and shall not subject the electrical parts to unnecessary stress or mechanical shock. Operating shafts shall be bushed and stuffed in dust-tight cases.

4. The Contractor shall, unless otherwise directed, furnish and assemble all special lamps, indicating lamps, annunciator lamps and pilot lamps with all accessories.

5. Electrical equipment shall have a power factor of not less than 85% under rated load conditions. Electrical equipment with a power factor less than 85% shall be corrected to at least 85% under rated load conditions. Installed power factor corrective devices shall be switched with utilization equipment.

6. Wire terminals on manufactured assemblies such as switchboards, bench boards, control panels, alarm boards, and motor control equipment shall consist of cup terminals, pronged washers, compression type solderless connectors or pressure type terminals furnished on devices.

7. All control and indication wires within motor control centers and other panels and cabinets shall be terminated on terminal blocks provided with marking strips for wire designation. The manufacturer shall identify all wires on the marking strips. All field wires will be terminated and identified by the Contractor.

8. Provision shall be made for wire and cables installed at the plant site to be terminated by the Contractor with approved solderless copper alloy lugs. Lugs may be of the compression type, clamp type or screw type with internal pressure bar, or may be pressure-tool applied solderless connectors. Pressure tool applied solderless connectors for wires 250 MCM or larger shall have long barrels to allow double indentation.

9. The Contractor shall consult with the manufacturer or its representative to ensure that the electrical items will have a shelf life of at least ten (10) years. Polychlorinated biphenols (PCBs) shall not be used in any equipment on this project. Manufacturers shall have maintenance facilities in the New York City metropolitan area.

a. Nameplates and warning signs shall be provided. Nameplates shall be 1/16 inch thick laminated plastic, white with a black core for black engraved lettering, and shall have beveled edges. They shall be provided for all controls on all power control panels and cabinets, lighting cabinets and operating devices, marked and positioned on the front panel as approved by the Engineer. Mounting shall be by stainless steel screws through predrilled nameplate holes, one at each end of the plate. The Contractor shall provide, as required or as directed, all warning signs required for the safe operation of the equipment. Such warning signs shall be of substantial material, porcelain enameled, of suitable thickness and as approved by the Engineer. All components within electrical control panels, switchgear and assemblies shall be identified with engraved stainless steel tags rigidly mounted at or near the respective device.

H. Uniform Finishes

1. A uniform finish shall be used for all hardware, metallic nameplates and similar exposed metal parts used on any equipment or group of equipment and, as far as possible, the same finish shall be used for all such equipment items.

I. Temporary Support Structures

1. The Contract Drawings show suggested design and construction requirements for the temporary support structures. The Contractor may submit an alternate design of any temporary support structure for approval by the Engineer. The Engineer may accept or reject the alternate design if the structure is not considered temporary or if it may impose instability to the adjacent existing structure due to lateral and vertical movements. The alternate design of the temporary support shall be performed, signed and sealed by a Professional Engineer registered in the State of New York who is qualified to determine the extent of work necessary to satisfy the temporary support requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01721
Protection and Restoration of Structures

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Each Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to complete the protection and restoration of structures.

1.02 PAYMENT

A. No separate payment will be made for performing any work of this Section.

1.03 GENERAL REQUIREMENTS

A. Each Contractor shall execute the Work to prevent damage or injury to the existing DEP structures and occupants thereof, which might result from Work or other causes, and so as not to interfere with the use, and free and safe passage to and from DEP structures and site Work.

B. Each Contractor shall erect and maintain barriers, lights, fences, and other required protective devices in accordance with the Contract Documents and the New York State (NYS) Building Code and the NYS Department of Transportation (NYSDOT) Highway Design Manual.

C. Each Contractor shall be responsible for taking all precautions, providing all programs, and taking all actions necessary to protect the Work and all public and private property and facilities from damage, injury, loss or vandalism.

D. In order to prevent damage, injury or loss, the Contractor's actions shall include, but not be limited to, the following:

1. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not interfere with the progress of the Work or the plant operations, utility services, or the work of any other contractor.

2. Provide suitable storage facilities for all materials which are subject to injury by exposure to weather, theft, breakage, or otherwise.

3. Place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work.

4. Clean up frequently all refuse, rubbish, scrap materials, and debris caused by its operations, to the end that at all times the site of the work shall present a safe, orderly and workmanlike appearance.

5. Provide barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, elevated walkways and other hazardous areas.

E. Each Contractor shall assume full responsibility for the preservation of all public and private property or facility on or adjacent to the site. If any direct or indirect damage is done by, or on account of, any act, omission, neglect or misconduct in the execution of the Work by the Contractor, it shall be restored by the Contractor, at his or her expense, to a condition equal to that existing before the damage was done. Each Contractor shall, at its expense, provide suitable drainage and erect such temporary structures as are necessary to protect the Work or materials from damage. The suspension of the Work or the granting of an extension of time from any cause whatever shall not relieve the Contractor of the responsibility for the Work and materials.

F. Whenever any notice is required to be given by the City or the Contractor to any adjacent or adjoining landowner or other party before commencement of any Work, such notice shall be given by the Contractor within the time limitations required for such notices.

G. All structures and appurtenances shall be adequately supported and safeguarded against all damage or injury in performance of work under this Contract. Each Contractor will be held responsible for any such damage or injury resulting from his operations and shall repair such damage immediately and to the satisfaction of the Engineer.

H. Each Contractor shall ascertain the location of underground pipe lines, conduits and other subsurface structures in those locations where the operation of his heavy construction equipment might damage such structures. The Contractor shall either avoid such locations or provide the necessary safeguards and repair any damage quickly at his own expense.

I. Each Contractor shall comply promptly with such safety regulations as may be prescribed by the Engineer or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of his employees. In the event of the Contractor's failure to comply, the Engineer may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility hereunder.

J. Prior to commencement of Work in the vicinity of property adjacent to the work site, the Contractor, at his own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall comply with Articles 44, 45, and 46 of the Standard Construction Contract.

K. Each Contractor shall provide a procedure for completing the inventory, storing, reconditioning, and reassembling all items that are presently part of the tunnel which have to be disassembled and/or moved.

1.04 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities such as, but not limited to electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers and all appurtenant structures.

B. Where existing utilities and structures are indicated on the Contract Drawings, it shall be understood that all of the existing utilities and structures affecting the Work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.

C. The Work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as required, to ensure no interruption of existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at his own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

D. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction Work, such support and protection shall be provided by the Contractor. All such Work shall be performed in a manner satisfactory to the Engineer and the respective authority having jurisdiction over such Work. In the event the Contractor fails to provide proper support or protection to any existing utility, the Engineer may, at this discretion, have the respective authority to provide such support or protection as may be necessary to ensure the safety of such utility, and the costs of such measures shall be paid by the Contractor.

E. During the progress of the Work, the Contractor shall protect from injury any existing utilities or services within the Work area until, if required, they have been re-routed, disconnected or capped off. Protection and re-routing shall conform to standards established by the utilities, agencies and governing codes.

1.05 UNDERGROUND STRUCTURES

A. Underground structures are defined to include, but not be limited to, all sewer, water, gas, and other piping, and manholes, chambers, electrical and signal conduits, tunnels and other existing subsurface infrastructure located within or adjacent to the Work area.

B. Underground structures known to the Engineer are shown for the assistance of the Contractor in accordance with the best information available, but is not guaranteed to be correct or complete.

C. The Contractor shall explore ahead of the trenching and excavation Work and shall uncover all obstructing underground structures sufficiently to determine their location, to prevent damage to them and to prevent interruption to the services which such structures provide. If the Contractor damages an underground structure, s/he shall quickly restore it to original condition at his or her own expense.

D. Necessary changes in the location of the Work may be made by the Engineer, to avoid unanticipated underground structures.

E. If the Contractor discovers utility facilities not identified in the Contract Documents or in a position different from that shown in the Contract Documents, s/he shall immediately notify the Engineer and the owner of the utility facility, in writing.

1.06 SURFACE STRUCTURES

A. Surface structures are defined as all existing buildings, structures and other facilities above the ground surface. Included with such structures are their foundations or any extension below the surface.

B. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks and all other facilities that are visible above the ground surface.

1.07 PROTECTION OF UNDERGROUND AND SURFACE STRUCTURES

A. Each Contractor shall sustain in their places and protect from direct or indirect injury all underground and surface structures located within or adjacent to the limits of the Work. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such

structure. Before proceeding with the Work of sustaining and supporting such structure, the Contractor shall satisfy the Engineer that the methods and procedures to be used have been approved by the owner of the structure.

B. The Contractor shall be responsible for all damage and expense for direct or indirect injury caused to any structure by the Work. The Contractor shall repair immediately all damage caused by the Work, to the satisfaction of the owner of the damaged structure.

C. The fact that any structure or facility is not shown on the Contract Drawings shall not relieve the Contractor of the responsibility of protecting and preserving the structure or facility.

D. All other existing surface facilities, including but not limited to, guard rails, posts, guard cables signs, poles, markers, and curbs which are temporarily removed to facilitate installation of the Work shall be replaced and restored to their original condition at the Contractor's expense once the protective and relocation work is no longer needed.

1.08 RESTORATION OF PAVEMENTS

A. Restoration of pavements shall be made in conformity with the requirements of the NYS Department of Transportation Highway Design Manual, latest edition. The Bidder shall acquaint himself with such requirements before submitting his bid. The Contractor shall give the Department of Highways four weeks written advance notice before proceeding with final restoration of pavements, walks and curbs.

1.09 COORDINATION AND RELOCATION OF STREET UTILITIES

A. Coordination and relocation of street utilities with utility companies shall be done in conformance with the Contract Documents and all applicable laws and regulations.

1.10 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies

1. The Contractor shall comply with NYS Industrial Code Rule 753

2. The City shall not be liable for any costs incurred by the Contractors as a result of the compliance, non-compliance, or improper compliance of any regulations.

3. The City shall not be liable for any costs incurred by the Contractors for the support, protection and maintenance of underground facilities owned by franchised operators of such facilities.

1.11 SUBMITTALS

A. For any existing structure that is to be relocated or restored, the Contractor shall submit for approval a relocation plan including plan and profile with information related to the existing and final condition of the structure with fittings, appurtenances, thrush blocks, restraints and any applicable supports, signed and sealed by a Professional Engineer licensed and registered in the State of New York.

B. During the progress of Work, the Contractor shall keep an up-to-date set of the Protection and Restoration Drawings showing field and working drawings modifications. Immediately upon completion of Work, the Contractor shall provide As-built Drawings showing the actual Work performed under this Section as specified in the Contract Documents. Restoration Drawings shall include all necessary plans, sections and details, with all reference dimensions and elevations required for complete As-built Drawings of the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01732
Installation of Equipment

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete foundations, bases, dowels and anchor bolts

B. Sleeves, recesses, openings, chases and related concrete installation items

C. Supervision by manufacturers' representatives

D. Workmanship

E. Clearance and safeguards

F. Alignment and leveling

G. Cutting and patching

H. Lubrication

I. Maintenance of installed equipment

J. Protection of installed equipment

1.02 PAYMENT

A. There will be no separate payment for performing any Work required under this Section.

1.03 DESCRIPTION

A. GENERAL

1. The Contractor shall have adequate resources on site, including labor, materials, construction tools and equipment, to perform the Work.

2. The Contractor shall be responsible for locating, aligning and leveling all equipment and shall employ a New York State licensed surveyor to set all lines and levels of equipment to the accuracy required.

3. Complete manufacturer's installation instructions, including permissible tolerances, shall be furnished in duplicate with each unit of equipment or set of identical units.

4. All equipment shall be installed in accordance with the approved shop drawings; inclusive of manufacturer's specifications, drawings and tolerances; and under the direct supervision of the required

manufacturer's representative. In no instance shall the directions of the manufacturer's representative contravene the Engineer's direction.

5. Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the drawings unless directed otherwise by the Engineer during installation.

6. As a condition precedent to acceptance of equipment installed and operating, the Contractor shall provide the Engineer with written certification, obtained from each company manufacturing equipment for the Project that the equipment is installed and does operate in accordance with the Specifications and manufacturer's recommendations.

B. Concrete Foundations, Bases, Dowels and Anchor Bolts

1. The Contractor shall provide all reinforced concrete foundations, bases, dowels and anchor bolts for all equipment and piping furnished under this Contract.

   a. All reinforced concrete bases and supports shall be steel reinforced and dowelled to floor slabs. Where possible, dowels shall be in place before new floor slab concrete is placed.

2. Where not explicitly stated in the Contract Documents, the Contractor shall utilize foundation bolt drawings or templates for the installation of equipment requiring concrete bases.

3. Dowelling into existing work shall be provided under this Contract.

   a. Anchor bolts penetrating into existing reinforced concrete work shall be drilled in place, shall be of the expansion type, and shall have sufficient length and configuration to resist the imposed loadings when installed in accordance with the Contract Documents, the manufacturer's recommendations, and as approved by the Engineer. Dowels and anchor bolts in existing concrete shall be installed using a bonding agent approved by the Engineer.

   b. All concrete bases for equipment shall be treated with an approved sealer to prevent oil and grease from seeping into the concrete.

4. Installation of reinforced concrete bases and the installation of dowels and anchor bolts into existing and new reinforced concrete work shall be in accordance with the Contract Documents and the

manufacturer's recommendations, and shall be subject to the approval of the Engineer.

C. Sleeves, Recesses, Openings, Chases and Related Concrete Installation Items

1. The Contractor shall make provisions as shown on the Contract Drawings, specified, or otherwise required for sleeves, recesses, openings, chases, and related items for installation of the equipment and materials under its Contract.

2. When the Contract requires the placing of conduits, saddles, boxes, cabinets, sleeves, inserts, foundation bolts, anchors and other similar work in floors or walls of buildings and structures, they shall be promptly installed in conformity with the Contract Documents. The Contractor shall arrange the work in strict conformity with the approved construction schedule and avoid interferences with the work of other contractors.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SUPERVISION BY MANUFACTURERS' REPRESENTATIVES

A. The Contractor shall provide the services of qualified technical representatives of the equipment manufacturers who shall adequately supervise the installation and testing of all equipment furnished under this Contract and instruct the Contractor's personnel and City operating personnel on maintenance and operation of its equipment.

1. The manufacturers' representatives shall devote, at a minimum, the entire amount of time specified under the relevant Specification sections for the equipment. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor.

2. The manufacturers' representatives shall sign in and out in a log for this purpose kept by the Engineer on every occasion they are on the Site and shall indicate time of arrival and departure.

3.02 EXAMINATION / PREPARATION

A. Concrete foundations for equipment shall be of approved design and shall be adequate in size, suitable for the equipment erected thereon, properly reinforced, and tied into floor slabs by means of reinforcing bars or dowels. Foundation bolts of ample size and strength shall be provided and properly positioned by means of suitable templates and secured during placement of

concrete. Foundations shall be built and bolts installed in accordance with the manufacturers certified drawings.

B. Before mounting equipment on a foundation, the Contractor shall clean the top surface; if necessary, rough it with a star chisel and clean again; and clean out all foundation bolt sleeves.

1. The Contractor shall provide a sufficient number of steel plate shims about 2 inches wide and 4 inches long, and of a varying thickness from 1/8 to 1/2 inch. A combination of these shims shall be placed next to each foundation bolt to bring the bottom of the bedplate or frame about 1/8 inch above the final setting. The equipment shall be lowered by changing the combination of shims. The Contractor shall use brass shim stock of various thicknesses, and continue to level the equipment a little at a time and in rotation until it is at the correct elevation in both directions.

2. When the equipment is level, the Contractor shall tighten down on the foundation bolts a little at a time, in rotation, to make certain the equipment remains level and does not shift on the shims. A preliminary alignment check shall be made before grout is placed.

C. Equipment shall be set, aligned and assembled in conformance with manufacturer's instructions. Runout tolerances by dial indicator method of alignment shall be plus or minus 0.002 inches or as directed by the manufacturer, whichever is more stringent.

D. All blocking, wedges, shims, filling pieces, or other materials required for the proper support and leveling of equipment during installation shall be furnished by the Contractor. All temporary supports shall be removed, except steel shims, which may be left in place with the approval of the Engineer. Any grinding necessary to bring parts to proper bearing after erection shall be done at the expense of the Contractor.

E. Each piece of equipment or supporting base, bearing on concrete foundations, shall be bedded in grout. The Contractor shall provide a minimum of 1-1/2 inch thick grouting under the entire base plate supporting each pump, motor drive unit and other equipment.

F. When motors are shipped separately from driven equipment, the motors shall be received, stored, meggered once a month, and the reports submitted to the Engineer. Space heaters shall be supplied in all enclosures being utilized for storage of motors. After driven equipment is set, the motors shall be set, mounted, shimmed, mill righted, coupled and connected complete.

G. Moving parts shall be rotated a minimum of once weekly before and after installation to ensure proper lubrication and to avoid metal-to-metal welding and to prevent "flat-spotting" of bearings.

H. Anchor and expansion bolts shall be furnished by the Contractor as specified and required by this Contract Documents.

I. At threaded connections, a molybdenum disulfide anti-seize compound shall be applied to all threads in mechanical connections such as bolts, studs, cap screws, tubing, etc., unless otherwise indicated.

3.03 WORKMANSHIP

A. The following erection details are not intended to be all-inclusive, but only to cover some of the important practices. In all cases, only the best methods known to the trades are to be employed.

B. Only those mechanics skilled in the handling, setting, alignment, leveling and adjustment of the type of equipment supplied shall be employed in the Work.

C. An oil bath heater shall always be used to expand couplings, gears, etc. They shall not be forced or driven on equipment shafts, nor shall they be subjected to an open flame or torch.

D. Wedging will not be permitted. Only the least number of flat shims are to be used in leveling equipment (shims are to be clean and free of slag). All shims, filling pieces, keys packing, red or white lead grout, or other materials necessary to properly align, level and secure apparatus in place shall be furnished by the Contractor. All parts intended to be plumb or level must be proven exactly so. Any grinding necessary to bring parts to proper bearing after erection shall be done at the expense of the Contractor.

E. Proper tools shall be used in the assembly of equipment and materials to prevent marring the surface of shafts, nuts or other parts.

F. Connections requiring gaskets shall be tightened evenly all around to ensure uniform stress over the entire gasket area.

G. No equipment and materials shall be altered or repaired, and no burning or welding will be permitted on any parts having machined surfaces, except by written permission of the Engineer.

H. No rigging shall be done from any structure without the permission of the Engineer, and the Contractor shall be completely responsible for any damage to the structure due to its operations.

I. Only such equipment and materials as will not damage the structure or equipment and materials shall be used on the Work.

J. The Contractor shall be responsible for the exact alignment of equipment with associated piping and, under no circumstances, will "pipe springing" be allowed.

K. Misaligned holes shall be reamed, as excessive driving of bolts or keys will not be permitted.

L. The Contractor shall furnish and install all necessary plugs in lubrication holes to prevent entry of foreign material.

3.04 CLEARANCES AND SAFEGUARDS

A. All devices, equipment and systems furnished under this Contract shall be fabricated and installed so that adequate clearances are provided for operation, maintenance, repair and replacement. It is the Contractor's responsibility to review the Contract Drawings and ensure that adequate clearances are available and to notify the Engineer in the event that such clearances cannot be obtained.

B. The construction arrangement, assembly locations and guarding of all equipment shall conform to the latest ANSI safety practices, the New York State Industrial Code and all standards specified in the Specifications.

3.05 ALIGNMENT AND LEVELING

A. All couplings shall be aligned while the equipment is free from all external loads.

B. Both angular and parallel alignment shall be checked, and the degree of misalignment shall be recorded and submitted to the Engineer.

C. Dial indicators shall be used for the checking of angular and parallel alignment. During rotation of the held couplings in performance of this test, they shall be maintained in the same relative position, and the dial indicator readings shall be taken at the same place on the circumference of the coupling.

D. Misalignment shall not exceed the manufacturer's tolerances.

3.06 CUTTING AND PATCHING

A. Whenever it becomes necessary to cut existing work, the location and size of cut and method of cutting shall be as approved by the Engineer and adjacent work shall not be damaged. On completion of the cutting, all affected areas shall be restored satisfactorily by skilled workers.

3.07 LUBRICATION

A. All lubrication shall be performed by the Contractor in accordance with the lubricant specifications and directions furnished by the manufacturer. The Contractor shall furnish the lubricants for the equipment until it is accepted.

B. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.

3.08 MAINTENANCE OF INSTALLED EQUIPMENT

A. During the period between installation and Substantial Completion, the Contractor shall maintain all equipment in accordance with the equipment manufacturer's instructions as approved by the Engineer.

3.09 PROTECTION OF INSTALLED EQUIPMENT

A. The Contractor shall provide protection of installed products, as required, to prevent damage and remove protection devices/facilities, when no longer needed, prior to completion of work.

B. Projections such as wall corners, jambs, sills and soffits of openings, shall be covered in areas used for traffic and for passage of products in subsequent work.

C. Equipment for which shop finish paint is required shall be protected in the shop and during transportation and installation to prevent injury and abrasion. Such equipment shall be scheduled for installation when a building is considered enclosed and as late as possible in the construction schedule. However, maintenance of schedules may require the installation of such equipment in unheated areas and in areas where masonry work, concrete finishing, steel erection, painting, and other work will be in progress.

1. Shop finished Work shall be protected during and after installation by waterproof wrappings sealed to prevent condensation on surfaces. Wrappings shall be sufficient to protect surfaces from damage by drippings from masonry and painting work, and additional covering or sheathing shall be provided to protect equipment from contact damage that might result from work in progress in adjacent areas.

2. Prior to Substantial Completion, wrappings and coverings shall be removed, equipment shall be cleaned and all scratches and abrasions shall be refinished.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01733
Construction Waste Management

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section includes the requirements for construction waste management for a project that requires measurable quantities and tracking documentation, including but not limited to those that may be submitted for USGBC certification under Leadership in Energy and Environmental Design (LEED), Envision Certification under the Institute for Sustainable Infrastructure, or another third party sustainability rating system.

1.02 PAYMENT

A. There is no separate payment provision for this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01355 – Hazardous Materials Control

B. Detailed Specification 01356 – Environmental Health and Safety (EHS) Requirements

C. Detailed Specification 02105 – Soil Sampling and Analysis

1.04 REFERENCE STANDARDS

A. ISO 14001: 2015 Environmental Management Systems – Requirements with Guidance for Use

B. ISO 15270: 2008 Plastics – Guidelines for the Recovery and Recycling of Plastics

C. New York State Department of Environmental Conservation (NYS DEC)

1. 6 NYCRR Part 360 - Solid Waste Management Facilities
2. 6 NYCRR Part 364 - Waste Transporter Permits
3. 6 NYCRR Subpart 374-3 - Standards for Universal Waste
4. 6 NYCRR Part 370 - Hazardous Waste Management System – General
5. 6 NYCRR Part 371 - Identification and Listing of Hazardous Waste
6. 6 NYCRR Part 372 - Standards Applicable to Generators of Hazardous Waste

7. 6 NYCRR 373-3.10 - Interim Status Standards for Owners and Operators of Hazardous Waste Facilities, Tank Systems
8. Use of Enforcement Discretion for Discarded Mercury-Containing Equipment, NYS DEC Commissioners Policy (CP-39)
9. Mercury Added Consumer Products Law (Chapter 145 Laws of New York 2004 and Chapter 676 Laws of New York 2005)

D. Environmental Protection Agency (EPA):

1. 49 CFR Part 172 - Hazardous Materials Regulations
2. 40 CFR Part 260 – Hazardous Waste Management Systems: General
3. 40 CFR Part 261 – Identification and Listing of Hazardous Waste
4. 40 CFR Part 262 – Standards Applicable to Generators of Hazardous Waste
5. 40 CFR Part 263 – Standards Applicable to Transporters of Hazardous Waste
6. 40 CFR Part 264 – Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
7. 40 CFR Part 265 – Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
8. 40 CFR Part 266 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
9. 40 CFR Part 267 – Standards for the Owners and Operators of Hazardous Waste Facilities Operating Under a Standardized Permit
10. 40 CFR Part 268 – Land Disposal Restrictions
11. 40 CFR Part 270 - EPA Administered Permit Programs: The Hazardous Waste Permit Program
12. 40 CFR Part 271 – Requirements for Authorization of State Hazardous Waste Programs
13. 40 CFR Part 272 – Approved State Hazardous Waste Management Programs
14. 40 CFR Part 273 – Standards for Universal Waste Management

E. The Federal CRT Rule [Federal Register: July 28, 2006 (Volume 71, Number 145)];

F. The Federal Circuit Board Rule [Federal Register: May 26, 1998 (Volume 63, Number 100)];

G. Environmental Conservation Law Article 27 Title 26 – Electronic Equipment Recycling and Reuse.

H. Toxic Substances Control Act (TSCA)

I. United States Department of Transportation:

1. 49 CFR Part 171 – General Information, Regulations, and Definitions
2. 49 CFR Part 172 – Hazardous Materials table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans
3. 49 CFR Part 173 – Shippers: General Requirements for Shipments and Packages
4. 49 CFR Part 174 – Carriage by Rail
5. 49 CFR Part 175 – Carriage by Aircraft
6. 49 CFR Part 176 – Carriage by Vessel
7. 49 CFR Part 177 – Carriage by Public Highway
8. 49 CFR Part 178 – Specifications for Packages
9. 49 CFR Part 179 – Specifications for Tanks Caps
10. 49 CFR part 180 – Continuing Qualification and Maintenance of Packages

1.05 DEFINITIONS

A. Diversion: To remove, or have removed, from the site for recycling, reuse or salvage, material that might otherwise be sent to a landfill. Diversion does not include using the material as alternative daily cover at a landfill site, nor does it include burning, incinerating or thermally destroying waste.

B. Electronic Waste as defined by:

1. 40 CFR Parts 260 – 272;
2. 6 NYCRR Part 370: Hazardous Waste Management System – General
3. 6 NYCRR Part 371: Identification and Listing of Hazardous Waste;
4. 6 NYCRR Part 372: Standards Applicable to Generators of Hazardous Waste;
5. The Federal CRT Rule [Federal Register: July 28, 2006 (Volume 71, Number 145)];

6. The Federal Circuit Board Rule [Federal Register: May 26, 1998 (Volume 63, Number 100)];

7. Environmental Conservation Law Article 27 Title 26 – Electronic Equipment Recycling and Reuse.

C. Hazardous Waste: Material shall be considered a hazardous waste when it exhibits any of the following: ignitability, corrosivity, reactivity, or toxicity for Volatile Organic Compounds (VOCs), semi-VOCs, metals, pesticides, or herbicides, as defined in 6 NYCRR Part 371 or 40 CFR Section 261. Under New York State (NYS) regulations, a material that contains 50 ppm or greater of PCBs is considered a hazardous waste. The Environmental Protection Agency (EPA) considers a material that contains 50 ppm or greater of PCBs to be a Toxic Substances Control Act (TSCA)-regulated waste. All hazardous waste shall be considered unsuitable, and shall be disposed of at an approved permitted hazardous waste landfill.

D. Universal Waste as defined by:

1. 40 CFR Part 273: Standards for Universal Waste Management;

2. 6 NYCRR Subpart 374-3: Standards for Universal Waste;

3. 6 NYCRR 373-3.10: Interim Status Standards for Owners and Operators of Hazardous Waste Facilities, Tank Systems;

4. Use of Enforcement Discretion for Discarded Mercury-Containing Equipment, NYS DEC Commissioners Policy (CP-39);

5. Mercury Added Consumer Products Law (Chapter 145 Laws of New York 2004 and Chapter 676 Laws of New York 2005);

6. 49 CFR Part 172: Hazardous Materials Regulations.

1.06 QUALITY ASSURANCE

A. Regulatory Requirements: Contractor(s) shall meet all applicable federal, state, and local regulatory requirements as well as DEP EHS Policies and Procedures for the on-site management, transportation, and recycling or disposal of all construction waste materials generated during construction.

1.07 SUBMITTALS

A. Construction Waste Management Plan: The Contractor shall be responsible for the development and implementation of the Construction Waste Management Plan ("Plan") for the Project. Waste and recyclable materials shall be collected, sorted, and deposited in accordance with the approved Plan.

1. The Contractor shall prepare and submit the Plan for review and approval by the Engineer 30 days after receipt of Notice to Proceed

and prior to the removal of any construction waste from the Project site. The Plan shall be based on the construction waste recycling percentage goal ("percentage goal") established via the Design Sustainability Program. The percentage goal of 25% end-of-Project rates of salvage/recycling of construction waste is detailed in the Construction Waste Estimate Report ("CWER") generated by the Design Engineer and is included in the bid exhibit documents. The CWER dated December 31, 2019 is expressly excluded from and is not a part of this Contract and is available for information purposes only. Copies of this document have been provided on CD for reference.

2. The Plan shall contain the following:

   a. Construction and Demolition Diversion: Estimate of the total proposed construction and demolition waste to be generated, and the percentage of this waste to be diverted from landfill (including types and quantities) during prosecution of the Work. Identify at least five materials (both structural and non-structural) targeted for diversion. Approximate a percentage of the overall Project waste that these materials represent. This diversion shall be developed based on the estimates included in the CWER. Percent diverted from landfill shall be calculated using the following formula:

$$Diversion\ Percentage = \frac{Total\ Estimated\ Waste\ Diverted\ from\ Landfill}{Total\ Estimated\ Waste\ Produced\ by\ Project}\ x\ 100$$

The estimates shall be calculated by weight (tons). The list of construction waste materials shall be specific to the project site and may include, but not be limited to, the following materials:

i. Acoustical tile and panels
ii. Aluminum
iii. Asphalt
iv. Bricks
v. Bronze
vi. Cardboard
vii. Carpet/carpet pads
viii. Cast iron
ix. Cement

x. Ceramic
xi. Clean dimensional wood
xii. Concrete
xiii. Concrete masonry units (CMU)
xiv. Copper wiring
xv. Electronic waste
xvi. Electrical wires
xvii. EPDM rubber
xviii. Equipment
xix. Extruded polystyrene
xx. Fencing
xxi. FRP
xxii. Glass
xxiii. Grout
xxiv. Gypsum
xxv. HDPE
xxvi. HVAC/Ductwork
xxvii. Land clearing debris
xxviii. Lighting
xxix. Mercury containing light bulbs
xxx. Metals from rebar, sheetrock studs, framing, etc.
xxxi. Paints, solvents, and other hazardous fluids
xxxii. Piping
xxxiii. Plastics
xxxiv. Plumbing fixtures
xxxv. Plywood
xxxvi. PVC
xxxvii. Recyclable office wastes such as paper and toner and ink cartridges
xxxviii. Roofing
xxxix. Sprinklers
xl. Steel
xli. Stone
xlii. Stucco
xliii. Terracotta
xliv. Valves

xlv. Wood

b. Soil Diversion: Estimate of the total proposed excavated soil to be generated, and the percentage of this soil to be diverted from landfill via onsite and/or offsite reuse (including types and quantities) during prosecution of the Work. Soil diversion may be achieved through onsite or offsite reuse. Whenever possible, reuse of excess excavated soils on site should be prioritized over off site reuse. Refer to 02 24 20 - Soil Sampling and Analysis for sampling and regulatory requirements. The estimates shall be calculated by weight (tons). Percentage of soil diverted from landfill shall be calculated using the following formula:

$$Soil\ Diversion = \frac{Total\ Estimated\ Soil\ Diverted\ from\ Landfill}{Total\ Estimated\ Soil\ Produced\ by\ Project}\ x\ 100$$

c. Materials handling procedures. A description of the means by which any waste materials will be protected from contamination via segregation, and a description of the means to be employed in recycling the above materials consistent with the requirements for acceptance by recycling processors to be utilized and the New York City Department of Sanitation (NYCDOS). Hazardous waste, universal waste, and used oil must be separated and stored in their own dedicated storage areas and managed in compliance with NYSDEC Hazardous Waste, Universal Waste and Used Oil Regulations, USDOT 49 CFR Hazardous Material Transportation Regulations, and in accordance with DEP EHS Policies and Procedures.

d. List of waste transporters, transfer stations, beneficial use facilities, disposal facilities and recyclers with addresses, phone numbers, and permits, which the Contractor intends to utilize during the Project for the purpose of complying with the Construction Waste Management Plan. The Plan should list where both recyclable and non-recyclable materials will be recycled, reused, or disposed, and how those materials will be transported.

3. Hazardous wastes: The Plan shall specifically note the proper method of disposal for anticipated hazardous wastes or potentially hazardous wastes as detailed in 01 35 45 – Hazardous Materials

Control. The Plan shall state that the hazardous waste transporter must hold a current New York State Part 364 Waste Transporter Permit in accordance with NYCRR Part 364. The permit must authorize the transporter to take the hazardous waste to the Transportation, Storage and Disposal Facility (TSDF) identified in the permit. The Construction Waste Management Plan must state that the hazardous waste will be transported in compliance with USDOT Hazardous Materials Transportation regulations in Title 49 of the CFR.

4. Non-hazardous wastes: The Plan shall specifically note the proper method of removal of anticipated non-hazardous waste. The Plan shall state the transporter must hold a current New York State Part 364 Waste Transporter Permit to transport the waste to a TSDF that accepts non-hazardous waste.

5. The Plan shall include the method of recycling office materials such as clean white paper, mixed paper, toner cartridges for laser printers, copiers, fax machines, and other electronic waste. Each item shall be recycled in accordance with the manufacturer's instructions.

6. The Plan shall include the coordination of product deliveries to designated prepared areas in order to minimize site storage time and potential damage to stored materials and the return of packing materials, where economically feasible.

B. Final Submittal: The Contractor shall submit a Construction Waste Management Final Summary Report ("Final Summary Report") upon Substantial Completion. The Summary Report should tabulate total waste material, quantities diverted from landfill and means by which it is diverted, and shall include a statement noting that the recycling/diversion goal outlined in the CWER has been met.

C. Monthly Submittals: Monthly waste and soil generation/diversion/disposal data shall be tracked in accordance with Section 01 35 27 – Environmental Health and Safety Requirements, paragraph 1.07.C Monthly Contractor EHS Report.

D. Project Meetings: The Construction Waste Management Plan and implementation shall be discussed at the following meetings:

1. Pre-construction Meeting

2. Regular monthly Progress Meetings

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 IMPLEMENTATION

A. The Contractor shall be responsible for the implementation of the approved Construction Waste Management Plan. The Contractor shall be responsible for the provision of containers and the removal of all waste, non-returned surplus materials, and debris from the site in accordance with the Plan and in compliance with all federal, state, and local regulations, as well as DEP EHS Policies and Procedures.

B. Monies received for recycling and/or salvaged materials shall remain with the Contractor, except for items specifically identified in the Contract Documents.

C. Contractor(s) shall use construction and demolition methods and processes to ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

D. When encountered as part of the Work, the Contractor shall dispose of construction waste by recycling methods in accordance with the NYC Recycling Law: Local Law 19 (1989) and Local Law 87 (1992), and NYC's Commercial Recycling Regulations: Rules Governing the Recycling of Private Carter-Collected Waste (September 1993).

All material to be recycled shall be separated from normal refuse, per NYCDOS Rules. Material not required to be recycled shall be disposed of by the Contractor as specified and in accordance with all applicable federal, state, and local regulations and DEP EHS Policies and Procedures.

E. When encountered as part of the Work for sites outside New York City, the Contractor shall dispose of construction waste by recycling methods in accordance with all federal, state, and local regulations and DEP EHS Policies and Procedures.

3.02 HANDLING AND STORAGE

A. The Contractor shall designate separate receiving/storage areas for delivered materials and equipment to minimize waste due to excessive materials mishandling, misapplication, weather and other 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.

B. Periodically inspect stored products to assure products are undamaged and are maintained under required conditions.

C. Training of employees for handling and storing waste materials shall be in accordance with DEP EHS Policies and Procedures.

D. The requirements herein shall supersede any conflicting statements wherever they may appear in the Contract Documents.

3.03 ATTACHMENTS

A. Sample Construction Waste Management Quantities Tracking Tool

B. Sample Construction Waste Removal Tracking From

END OF SECTION

SECTION 01740
Cleaning and Site Maintenance

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements of Regulatory Agencies

B. Scheduling of Cleaning Operations

C. Cleaning Materials

D. Site Maintenance Requirements

E. Snow and Ice Removal

F. Disposal of Waste Materials

G. Final Cleaning

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 01270 - Measurement and Payment

B. Detailed Specification 01733 - Construction Waste Management

1.03 PAYMENT

A. No separate payment will be made for the work under this Section.

1.04 GENERAL REQUIREMENTS

A. The Structures and Equipment Contractor shall collect and dispose of all debris and rubbish resulting from the Work of all the Contractors, not including each Contractor's staging and storage areas. Cleaning shall be performed daily and trash removal shall be performed weekly, or more frequently, as directed by the Engineer, whenever the debris and rubbish interferes with the Work under any Contract, plant operations or presents a fire hazard and as noted below.

B. Specifically excluded is any material or debris resulting from the demolition work specified, shown or required as part of the Work for each respective Contractor. Such material shall be disposed of by the Contractor responsible for the demolition work.

C. If the Structures and Equipment Contractor receives a determination of substantial completion prior to any of the other Contractors, then the remaining

Contractors associated with this project shall be responsible for collection and off site disposal of all debris and rubbish resulting from their Work and Work of their Subcontractors.

D. Cleaning work shall be coordinated by the Contractors with the work specified under Section 01733 - Construction Waste Management.

1.05 REQUIREMENTS OF REGULATORY AGENCIES

A. In addition to the requirements herein, each Contractor shall maintain the cleanliness of the Work areas and surrounding premises within the Work limits so as to comply with federal, state, and local fire and safety laws, ordinances, codes and regulations.

B. The Contractors shall comply with all federal, state and local anti-pollution laws, ordinances, codes and regulations when disposing of waste materials, debris, rubbish, snow and ice.

1.06 SCHEDULING OF CLEANING OPERATIONS

A. The Contractors shall schedule trash removal and cleaning operations a necessary and at intervals as directed by the Engineer.

1. So that dust, wash water or other contaminants generated during construction do not damage or mar painted or finished surfaces.

2. To prevent accumulation of dust, dirt, debris, rubbish and waste materials on or within the Work Site or on the premises surrounding the Work Site.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

A. Each Contractor shall use only cleaning materials recommended by the manufacturer of surface to be cleaned.

B. Each type of cleaning material shall be used on only those surfaces recommended by the cleaning material manufacturer.

C. The Contractor shall use only cleaning materials which will not create hazards to health or damage to property.

PART 3 EXECUTION

3.01 SITE MAINTENANCE REQUIREMENTS

A. Each Contractor shall keep their staging and storage areas free of accumulations of dirt, dust, waste materials, debris and rubbish.

B. Each Contractor shall keep dust generating areas wetted down.

C. Each Contractor shall provide suitable containers in sufficient quantity for storage of waste materials, debris and rubbish.

D. Each Contractor shall dispose of waste materials and surplus materials off site at a regulatory-approved disposal site at intervals as needed.

3.02 SNOW AND ICE REMOVAL

A. The Structures and Equipment Contractor shall remove snow and ice from the following areas:

1. The sidewalks and parking areas associated with the Engineers field office.

2. All construction access roads.

3. Any site walkways which cannot be accessed by the site's snow removal equipment due to construction activities.

4. Any additional areas designated by the Engineer.

5. Snow and ice removal shall be before 7:00 AM whenever there is a snowfall storm and before 7:00 AM on the day following the termination of the snowfall storm.

6. In addition, when directed by the Engineer, snow and/or ice removal shall be started immediately (within one (1) hour of directive to proceed) by the Contractor.

7. The Structures and Equipment Contractor shall haul the removed snow and ice for disposal as per the applicable local requirements,

8. Spreading of Salt and Sand

a. The Structures and Equipment Contractor shall furnish all labor, tools, equipment, and materials necessary to provide the following services specifically requested and authorized in writing by the Engineer:

b. Spread calcium chloride over all areas of the Resident Engineer's parking lot and spread sand on the steps and platforms at the entrances to the Resident Engineer's field office.

c. Salt and sand shall be spread prior to a snowstorm.

d. Upon termination of a snowstorm, the Structures and Equipment Contractor shall remove all sand from the steps and platforms at the entrances to the Engineer's field office.

e. Disposal of sand shall be the responsibility of the Structures and Equipment Contractor.

3.03 DISPOSAL OF WASTE MATERIALS

A. Contractors shall not burn or bury rubbish and waste materials on the Work Site.

B. Contractors shall not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains or on the ground.

C. Contractors shall not discharge wastes into waterways.

3.04 FINAL CLEANING

A. At the completion of the Work, each Contractor shall remove all rubbish from and about the Site of the Work, and all temporary structures, construction signs, tools, scaffolding, materials, supplies and equipment which it or any of its Subcontractors may have used in the performance of the Work. Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.

B. Each Contractor shall thoroughly clean in its work areas all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces; dirty filters and burned-out lights replaced as required; all glass surfaces cleaned and floors cleaned and polished so as to leave work in a clean and new appearing condition.

C. Each Contractor shall remove spatter, grease, stains, fingerprints, dirt, dust, labels, tags, packing materials and other foreign items or substances from interior and exterior surfaces, equipment, signs and lettering in its respective work areas.

D. Each Contractor shall clean and restore all equipment and material nameplates, labels and other identification markings in its respective work areas.

END OF SECTION

SECTION 01750
Spare Parts and Maintenance Materials

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Spare parts and maintenance materials

B. Inventory, storage and delivery of spare parts

1.02 PAYMENT

A. No separate payment will be made for performing any work of this Section.

1.03 RELATED SECTIONS

A. Section 01661 - Protection of Materials and Equipment.

1.04 DESCRIPTION

A. Furnish spare parts and maintenance materials as specified in the individual Detailed Specifications of each Contract.

B. Provide data for each distinct part in paper and electronic format.

C. Attach bar-code tag (sticker), transmitted by the Engineer, to each distinct part.

D. All parts and materials required under the detailed specification of this contract shall be turned over to the City in as-new condition and shall be furnished in manufacturers' unopened cartons, boxes, crates or other protective covering suitable for preventing corrosion or deterioration for the maximum length of storage which may be normally anticipated. They shall be clearly marked and identified

E. Schedule delivery of all parts from this contract over a reasonable period of time in coordination with City Plant personnel and the Engineer. Parts and materials shall be delivered to the City upon completion of the Work or when the City assumes beneficial occupancy or as directed by the City or the Engineer. Contractor shall then place them in permanent storage rooms or areas approved by the City.

F. Provide a letter of transmittal for each parts shipment for all contracts including the following:

1. Date of letter and transfer of parts and materials.

2. Contract title and number.

3. Contractor's name and address.

4. A complete inventory of the parts and materials, listing the applicable Specification Section and equipment item for each.

5. A place for the City to sign and confirm receipt of the parts and materials.

6. Plant personnel reserve the right to inspect each part upon delivery for adherence to approved submittals and condition and reject any part or parts in accordance with said inspection.

G. Each Contractor shall be fully responsible for loss or damage to parts and materials required under its Contract until they are accepted by the City.

1.05 SUBMITTALS

A. The CRO-624 - G Contractor shall prepare a list of all spare parts and requisite data to be inventoried and stored under Paragraph 3.01 of this Specification in a format provided by the Engineer. The spare parts data shall be submitted in paper and electronic format. The electronic format shall be a spreadsheet that allows data to be uploaded into a commercial database system owned by the City.

B. The spare parts data shall be submitted to the Engineer at least 120 days prior to delivery of spare parts to the storage location.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INVENTORY, STORAGE AND DELIVERY OF SPARE PARTS

A. The CRO-624 - G Contractor shall provide the following services related to the inventory and storage of spare parts provided under Contracts CRO-624 - G, H, P and E.

1. Data for each distinct part, per approved submittals, shall be entered into an existing computer database provided by the City and as directed by the Engineer. Data shall include, but not necessarily be limited to, contract number, Specification Section number, description of equipment for which part is being provided, equipment number (per DEP numbering system), manufacturer of part, manufacturer's part number, supplier / vendor for part, unit price of part, quantity required to be delivered. No parts will be accepted unless all parts data have been first entered into the database and barcodes are applied. Reference Spare Parts Schedule at the end of this Section.

2. Submit a schedule of intended dates of parts delivery. Parts delivery shall require a minimum notice of 7 days.

3. Attach bar-code stickers, provided by the Engineer, to each approved part prior to delivery. The sticker for any given part shall be affixed to shipment packaging for that part. If additional stickers are required for split deliveries or re-delivery of rejected parts they shall be provided by the Engineer.

4. During construction, store parts in buildings or trailers with floor, roof and closed sides and in accordance with manufacturers' recommendations. Protect from weather, condensation and humidity.

5. Plant personnel reserve the right to inspect each part upon delivery for adherence to approved submittals and condition and reject any part or parts in accordance with said inspection. Packaging shall be opened by the Contractor to allow such inspection. Plant personnel reserve the right to reject any part or parts per such inspection. Any parts rejected shall be taken back by Contractor and a new part resubmitted.

6. Accepted delivered parts shall be placed in the storeroom by the Contractor at the location directed by City Plant personnel. All spare parts provided under Contract CRO-624 - G, CRO-624 - H, CRO-624 - P, and CRO-624 - E shall be identified, assigned a bar-code sticker, assigned a storeroom and location as directed by the City, delivered, shelved, and logged into the shelf or bin via the existing database.

B. All items tagged and staged for pickup and delivery shall be organized in containers and protected in accordance with Section 01661 - Protection of Materials and Equipment.

C. At the designated warehouse location, spare parts shall be placed in the assigned location as directed by the City. If the assigned location is inappropriate, an alternate storage location shall be used, as designated by the City.

D. Upon placement of each item in a storage location, the item bar-code sticker or tag shall be scanned into the City Database along with the shelf bar-code sticker using hand held Radio Frequency Computers.

3.02 ATTACHMENTS

A. Spare Parts Schedule Form.

END OF SECTION

NO TEXT ON THIS PAGE

SPARE PARTS SCHEDULE

CONTRACT _____ **SUBMITTAL DESCRIPTION _____**

EQUIPMENT SPEC. SEC _____TRANS # _____REVIEW # _____

PART DESCRIPTION	MANUFACTURER NAME	MANUFACTURER **PART NO.**	**VENDOR NAME**	**VENDOR PART NO.**	**COMPONENT Y/N?**	**COMPONENT SERIAL #**	**QUANTITY ON ORDER (PER SPEC)**

NO TEXT ON THIS PAGE

SECTION 01781
Project Closeout

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Items to be completed

B. Final record documents

C. Special tools and appliances

D. Spare parts and maintenance materials

E. Lubricants

F. Piping and equipment identification

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01332 – Final Record Documents

B. General Specification 15076 - Piping and Equipment Identification

1.04 ITEMS TO BE COMPLETED

A. As construction of the Project enters the final stages of completion, the Contractor shall, in concert with accomplishing the requirements set forth in the Contract Documents, attend to or have already completed the following items as they apply to his Contract:

1. Scheduling equipment manufacturers' visits to site.
2. Required testing of project components.
3. Scheduling start-up and initial operation.
4. Scheduling and furnishing skilled personnel during initial operation.
5. Correcting or replacing defective work, including completion of items previously overlooked or work which remains incomplete, all as evidenced by the Engineer's "Punch" Lists.
6. Attend to any other items listed herein or brought to the Contractor's attention by the Engineer.

B. In addition to any requirements of the New York City Standard Construction Contract, before the determination of Substantial Completion is issued, the Contractor shall accomplish the cleaning and final adjustment of the various building components as specified in the Specifications, including but not limited to the following:

1. Clean all glass and adjust all windows and doors for proper operation.
2. Clean all finish hardware after adjustment for proper operation.
3. Touch up marks or defects in painted surfaces and touch up any similar defects in factory finished surfaces.
4. Wax all resilient flooring materials.
5. Remove bitumen from gravel stops, fascias, and other exposed surfaces.
6. Remove all stains, marks, fingerprints, soil, spots and blemishes from all finished surfaces, tile, stone, brick and similar surfaces.

C. In addition to any requirements of the New York City Standard Construction Contract, before the determination of Substantial Completion is issued, the Contractor shall submit to the Engineer all required records, certifications, etc., which are specified in the Contract Documents. A partial list of such items appears below, but it shall be the Contractor's responsibility to submit all items which are required by the Contract Documents:

1. Test results of project components.
2. Performance Affidavits for equipment.
3. Certification of equipment or materials in compliance with Contract Documents.
4. Operation and maintenance instructions or manuals for equipment.
5. One set of neatly marked-up record drawings showing as-built changes and additions to the work under his Contract.
6. Any special guarantees or bonds.

D. The Contractor's attention is directed to the fact that required certificates and information listed above, must be submitted earlier in accordance with other Specifications.

1.05 FINAL RECORD DOCUMENTS

A. In addition to any requirements of the New York City Standard Construction Contract, in order to obtain Final Acceptance, the Contractor

shall furnish Final Record Documents in accordance with Detailed Specification 01332 – Final Record Documents.

1.06 SPECIAL TOOLS AND APPLIANCES

A. Special tools and appliances which are needed to adjust, operate, maintain or repair the equipment furnished under this Contract shall be provided in accordance with the applicable General Specifications and Detailed Specifications.

B. The Contractor shall submit a complete list of special tools and appliances to be furnished, for approval by the Engineer, as a part of the shop drawing submittals.

C. Special tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with heavy duty cylinder locks and duplicate keys.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. Spare parts and maintenance materials shall be furnished in accordance with all applicable General Specifications and Detailed Specifications.

1. Two complete spare sets of all lamps supplied as a part of electrical control equipment shall be furnished by the Contractor, unless otherwise called for in the Detailed Specifications.

B. All parts shall be securely boxed and tagged, and clearly marked on the box and individually for identification as to the name of manufacturer or supplier, applicable equipment, part number, description and location within the equipment or system that the part is installed. Complete information shall also be provided for use and reordering of spare parts. All spare parts shall be protected and packaged for a shelf life of at least ten (10) years.

C. A complete list of spare parts and maintenance materials to be furnished shall be submitted to the Engineer for approval as part of the working drawing submittals.

D. Upon acceptance of the spare parts by the Engineer, the Contractor shall deliver the spare parts for storage to the location designated by the DEP upon request by the Engineer.

1.08 LUBRICANTS

A. The Contractor shall furnish and deliver to the Engineer such oil, grease and any special lubricants that are necessary for proper operation of all equipment furnished under this Contract. Identification and listing of such lubricants shall be made as part of the working drawing submittals. The

quantity furnished shall be sufficient for equipment start-up, operation prior to final acceptance of the Work, and for operation during the guaranty period as defined in Article 24 of the Agreement. The grade of lubricants furnished shall be in accordance with the recommendations of the equipment manufacturers made on the approved equipment working drawings.

B. The Contractor shall furnish lubricants for all equipment supplied under this Contract in one delivery consisting of a minimum number of products, reflecting the results of the lubrication survey, as hereinafter specified.

C. A lubrication survey, made by a lubricant supply firm, subject to the approval of the Engineer shall be provided by the Contractor.

1. The lubrication survey shall list all equipment furnished, under this Contract, with the equipment manufacturer's lubrication recommendations and an interchangeable lubricants tabulation standardizing and consolidating lubricants whenever possible.

1.09 PIPING AND EQUIPMENT IDENTIFICATION

A. The Contractor shall furnish and install identification signs for all equipment, control panels, valves and piping identification in accordance with General Specification 15076 - Piping and Equipment Identification.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01811
Preliminary and Final Field Tests

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Field Test Schedule & Updates

B. System Test Procedures

C. Contractor Responsibilities

D. Preliminary Field Tests of Equipment

E. Preliminary Field Tests of Systems

F. Final Field Tests of Equipment

G. Final Field Tests of Systems

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01321 - Progress Schedule

B. Detailed Specification 01432 - Contractor's Work Quality

1.04 DEFINITIONS

A. "System": A System, for purposes of testing, is defined as consisting of the component equipment, valves, piping, instrumentation, controls, ducts, accessories, etc., which are required for the proper functioning of each piece of equipment and the System as a whole. The purpose of the System testing is to demonstrate the capability of the equipment, interconnections and accessories to perform as specified.

1.05 DESCRIPTION

A. All field tests, including equipment and Systems tests, shall be performed in accordance with the requirements of the Specifications and this Section. The requirements contained herein shall apply, whether or not this Section is specifically referenced elsewhere in the Detailed Specifications.

B. Field tests shall include preliminary and final field tests of equipment and Systems.

1. Preliminary field tests of equipment and Systems shall be made with water and air in lieu of the wastewater components and chemicals for which the equipment and Systems are designed.

2. Final field tests of equipment and Systems shall utilize the wastewater, wastewater components, chemicals and air for which the equipment and Systems are designed.

3. All tests shall be performed in strict compliance with applicable manufacturer's and Engineer's instructions.

4. No testing of Systems shall commence before the associated pipelines have been satisfactorily tested for leakage in accordance with the requirements of the Contract.

C. For a successful test of equipment or System, the equipment or System shall operate trouble free for the continuous period of time, as specified below. If there are any interruptions in operation during the test, the test shall be repeated until the equipment or System operates trouble free for the specified time period.

D. System Test Procedures

1. The following are to be considered a part of all System test procedures:

   a. Variable capacity equipment shall be operated over the full capacity range of the maximum, minimum and at least three (3) intermediate points for a minimum of 30 minutes at each point.

   b. Multiple equipment groupings are to be operated both singly and together up to the maximum capacity of the System.

   c. Headered and cross-connected groups of units are to be operated using all connecting combinations.

   d. All equipment items, including standby units are to be tested. It may be necessary to repeat System tests at maximum condition to insure that standby units are included in System tests.

   e. Each operating unit shall be run for at least one hour alone (equipment field test) and for four hours as a System at maximum capacity after reaching stable operating conditions.

   f. All equipment, interconnecting piping and accessories are to be checked for leakage and specified rate performance

capability. Instrumentation and controls shall be tested as part of the equipment.

E. Contractor Responsibilities

1. For preliminary field tests of equipment and Systems, the Contractor shall furnish all labor, lubricants, fuel, power, water, materials, plant and instrument air, instruments and equipment required for the tests.

2. For final field tests of equipment and Systems, the Contractor shall furnish all labor, lubricants, materials, fuel, power, instruments and equipment required for the tests. The City will furnish all water necessary.

3. All testing shall be performed by the Contractor and witnessed by the Engineer, DEP Operations personnel and, when applicable, representatives of the Electrical Division, Department of Buildings. Preliminary field testing of equipment and systems and final field testing of equipment and systems shall be performed within the time periods designated in the preliminary construction schedule (CPM) during regular weekday daytime working hours.

F. Coordination

1. The Structures and Equipment Contractor shall coordinate the field testing activities with the HVAC, Plumbing and Electrical Contractors in order to ensure the availability of their equipment for field tests required by the Structures and Equipment Contractor. A Contractor furnishing equipment under one Contract that is required for testing in a system furnished by another Contractor shall coordinate with the Other Contractor to ensure that its equipment is available for testing with the system. All such requirements for coordination shall be indicated in the preliminary and final field activity schedules specified herein

2. The Contractor for the equipment to be tested (Structures and Equipment, HVAC or Plumbing) shall be responsible for coordinating with the Electrical Contractor for furnishing power required to perform its field tests.

3. Each Contractor shall study the requirements of these Contracts insofar as they affect its work, or insofar as its work may affect that of the related Contractors. Coordination with the Other Contractors will be required in order to perform the field tests. Any Contractor having equipment installed under its Contract and tested as part of a System furnished by another Contractor shall assist in the testing procedure.

1.06 QUALITY ASSURANCE

A. Nothing stated herein shall affect the requirements contained in Detailed Specification 01432 - Contractors Work Quality; or the specific pressure testing requirements for piping systems specified in the General and Detailed Specifications. Such tests shall be performed at the scheduled time, prior to backfilling, encasement or enclosure, if applicable. However, checking the systems for leakage at the pressures developed, particularly for leakage of the visible type, shall be performed as part of the tests included herein.

1.07 SUBMITTALS

A. The Contractor shall submit a preliminary and final field test schedule to the Engineer within 120 days after the date for commencing work in the Notice to Proceed. The test schedule shall be updated every 2 months or sooner if necessary, until completion of the required testing. The field test schedule shall itemize all key tasks in chronological order, based on the Construction CPM Schedule specified in Detailed Specification 01321 – Progress Schedule, to meet all the requirements of this Section. All preliminary and final field testing to be conducted shall be organized and scheduled in accordance with the approved test procedure.

B. The field test schedule shall include proposed test dates, preliminary or final field test, equipment or System being tested, specification references, equipment identification numbers, and indication of whether the test procedure has been submitted for approval and approval status.

C. The Contractor shall notify the Engineer in writing 30 days prior to any testing. The Contractor shall not proceed with any testing until the test procedure has been approved by the Engineer.

D. Before each test commences, the Contractor shall submit a detailed test procedure and manpower schedule to the Engineer for approval. In addition, Other Contractors for equipment required to be field tested as part of a System shall furnish detailed test procedures for their equipment and assist in the testing of the system

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PRELIMINARY FIELD TESTS OF EQUIPMENT

A. Each item of equipment shall be field tested with either water or air as suitable for the system, and shall operate trouble free in accordance with the procedures prescribed in the General and Detailed Specifications, Preliminary tests shall demonstrate that equipment and appliances were

properly installed, meet their specified operating cycles and characteristics, and are free from defects such as overheating, overloading and undue vibration.

B. A successful test shall consist of at least one continuous hour of trouble free operation unless a longer period is so specified in the General or Detailed Specifications.

3.02 PRELIMINARY FIELD TESTS OF SYSTEMS

A. All Systems shall be field tested with either water or air as suitable for the system and shall operate trouble free for four continuous hours, or longer if so specified in the General or Detailed Specifications.

B. The Systems shall be tested by operating the systems equipment together as a unit with all related piping, valves, electrical controls and mechanical operations.

C. The tests shall prove that all equipment and appurtenances of each system are properly installed, free from defects, meet their specified operating cycles and characteristics when operating as part of the system.

D. Systems with automatic control systems shall be operated continuously by the automatic control system for four continuous hours, or longer if so specified in the General or Detailed Specifications.

E. To satisfy the requirements for preliminary testing of equipment and Systems, the Contractor shall submit data per the approved test procedure and receive approval from the Engineer.

3.03 FINAL FIELD TESTS OF EQUIPMENT AND SYSTEMS

A. The following requirements shall be met prior to the final field testing of equipment and systems:

1. All required operating instructions, maintenance manuals, bulletins, and shop drawings shall be approved and distributed unless otherwise specifically allowed by the Engineer.

2. All spare parts shall be delivered unless otherwise specifically allowed by the Engineer

3. The equipment and systems shall be inspected, operated, successfully tested, and adjusted by the manufacturer's representative in the presence of the Engineer and representatives of the City. All instruction sessions for operating personnel shall also be completed unless otherwise specifically allowed by the Engineer. All instrumentation shall be field calibrated and previously tested.

4. After completion of Item 3 above and when leakage tests of pipelines are completed, the equipment or system shall then be given a final field test.

B. Equipment and systems shall be subject to final field tests in accordance with the procedures prescribed in the Detailed and General Specifications and approved test procedure for each test and as supplemented herein.

C. Equipment shall be given a running test, at its rated capacity, of normal (start-and-stop) operation and during such test shall demonstrate its ability to operate without vibration or overheating, and shall prove without question its fitness for services in accordance with the approved Test Procedure. Unless otherwise specified, final field tests of equipment which will be operating continually shall be given a minimum running test of three continuous 8-hour tests for each unit. Other equipment shall be given a running test for a minimum period of four continuous hours, or as otherwise approved by the Engineer. For final field tests of equipment and Systems to be deemed successful, they shall be run continuously and trouble – free in accordance with the approved test procedure for each test, and data shall be submitted and approved by the Engineer.

D. The Contractor shall provide all labor and materials needed to supply all water or other media needed for final field testing.

E. After completion of final System and equipment tests, the equipment and systems shall be operated by DEP for a two-week period under normal operating conditions. The Contractor shall schedule and have delivered sufficient training and instruction to City personnel to ensure that during the two week test the equipment and Systems will be operated properly and safely. Should the equipment and Systems function normally during this period the equipment and Systems shall have successfully passed the final field tests and will be accepted for additional testing and/or operation by the City. The Contractor shall warrant and guarantee that all equipment shall function satisfactorily for a period of one year from Substantial Completion.

3.04 SYSTEMS

A. The following equipment groupings shall be tested together as Systems, in accordance with the General and Detailed Specifications:

1. Telephone System
2. Security System
3. Heating and ventilation System

END OF SECTION

SECTION 01821
Equipment Start-up and Training

PART 1 PART 1 GENERAL

1.01 SECTION INCLUDES

A. Representatives of Equipment Manufacturers

B. Start-up Services

C. Training of plant personnel

D. Lesson plans

E. Training aids

F. Qualifications of training specialists

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01811 – Preliminary and Final Field Tests

1.04 REPRESENTATIVES OF EQUIPMENT MANUFACTURERS

A. The Contractor shall provide the services of qualified factory trained representatives of the equipment manufacturers, who shall provide the following services:

1. Supervise and assist in the installation of the equipment to ensure a proper installation of the equipment.

2. Check the installation of the equipment and make all necessary adjustments prior to placing the equipment in service.

3. Supervise the preliminary and final equipment and system field test work specified in Section 01811 - Preliminary and Final Field Tests.

   a. Additional acceptance testing supervision resulting from the failure to meet the specified performance requirements shall be at the Contractor's expense.

4. Conduct training of DEP personnel as specified herein. One day of training by a manufacturer’s representative shall be defined as a minimum of eight (8) hours on-Site.

B. The manufacturers' representatives shall devote, at a minimum, the amount of full time specified under the Detailed Specifications.

C. The Contractor shall coordinate all equipment start-up services and training with the City, the Engineer and the manufacturers.

1.05 START-UP SERVICES

A. The equipment start-up and initial operating period shall begin after satisfactory completion and acceptance of the preliminary and final equipment field tests and preliminary system field tests. The start-up and initial operating period shall demonstrate that the equipment functions as specified and shown under actual operating conditions by operating continuously for at least twenty-eight (28) days with no more than twenty-four (24) hours of total down time and no more than four (4) unscheduled shutdowns. Equipment start up and initial operating period shall be complete after a minimum of twenty-eight (28) days of continuous operation and when the manufacturer and the Engineer have mutually agreed that the equipment is in suitable condition for continuous operation.

B. During the equipment start up and initial operating period, the Contractor shall furnish the services of factory trained specialists of the equipment manufacturers for the equipment to assist in the start-up and operation of the equipment.

1.06 TRAINING

A. As part of these services, the City will provide the necessary personnel for training in the operation and maintenance of the equipment. Training shall occur after the initial operational period is complete.

B. The training shall consist of both classroom and field instruction. The purpose of field instruction shall be to reinforce topics covered in the classroom and to identify the location of any valves, pushbuttons, control panels switches, and other equipment required for operation; and to identify the location of any maintenance equipment such as grease fittings, oilers, isolation valves, safety lockout switches, and other equipment.

C. All training shall take place at the Work Site at a place specified by the City and shall be conducted by qualified training specialists.

D. Separate training sessions shall be conducted for City mechanical operations and maintenance personnel and for City electronic and electrical maintenance personnel.

E. The Contractor shall coordinate the manufacturers training services with the City and the Engineer, providing a minimum of fourteen (14) days prior notice of training, subject to the approval of the Engineer and the City.

F. In order to provide training for an adequate number of City operation and maintenance personnel, a minimum of two 8-hour training days shall be provided for each item of equipment, unless otherwise specified in the detailed specifications.

G. Training shall be limited to no more than three days per week. No training shall be conducted on Mondays and Fridays.

H. The Contractor shall deliver all training material to the Engineer and the City a minimum of 14 days prior to the scheduled training.

1.07 LESSON PLANS

A. The Contractor shall submit the equipment manufacturer's lesson plans, which shall include specific information about each item of equipment or equipment system, including controls. Lesson plans shall include but not be limited to the following information and meet the following requirements:

1. The Contractor shall submit the equipment manufacturer's lesson plans for approval by the Engineer no less than sixty (60) days prior to the date that the training is to take place.

2. Lesson plans shall indicate the estimated duration of each segment of the training and the training audience that the instruction is to address. The training audience refers to City mechanical operation and maintenance personnel and City electronic/electrical maintenance personnel, as appropriate.

3. The lesson plan shall indicate when training aids are used or referred to during the course of instruction.

4. An outline of required lesson plan contents is included below:

B. Equipment Description:

1. Purpose and function of equipment and auxiliary equipment and systems.

2. Physical arrangement of equipment components and electrical supply.

3. General function of controls, including automatic and manual operation, interlocks, and shutdowns.

C. Equipment Operation:

1. Operating requirement for equipment to perform satisfactorily.

2. Typical operating characteristics.

3. Start-up and shutdown procedures.

4. Use of controls.

D. Equipment Monitoring:

1. Recommended routine instrument readings and operational checking.

2. Early warning signs of developing operational or equipment problems.

3. Procedures for handling non-routine problems such as alarms, power failures, component failures, etc.

E. Equipment operational trouble-shooting procedures.

F. Safety and Housekeeping:

1. Safety features of the equipment.

2. Safe practices.

3. Housekeeping practices.

G. Description of the use of the equipment manufacturer's O&M Manual as regards operation.

H. Preventive Maintenance Requirements:

1. Maintenance needs for equipment.

2. Identification of procedure to satisfy maintenance need (relate to equipment manufacturer's O&M Manual, which should have detailed descriptions of maintenance procedures).

3. Outline or summarize procedures.

4. Recommended schedule for performing preventive maintenance.

5. Provide preventive maintenance record forms (if available).

I. Maintenance Inspection Program:

1. Parts, components and areas of equipment to inspect for routine preventive maintenance.

2. Recommended frequency of inspection.

3. Inspection procedures.

4. Problem identification.

J. Maintenance Trouble-shooting:

1. Sections in O&M Manual detailing trouble-shooting procedures.

2. Summarize trouble-shooting procedures.

3. Testing equipment used in trouble-shooting.

a. Demonstration of use of specialized testing equipment if supplied with equipment.

b. Other testing equipment.

4. Tests used to verify trouble-shootings findings.

K. Disassembly and Assembly:

1. Summarize disassembly and assembly procedures.

2. O&M Manual coverage of subject.

3. Testing to verify success of corrective maintenance.

L. Equipment Calibration:

1. Calibration needs and tolerances.

2. Calibration equipment.

3. O&M Manual listing of calibration ranges, tolerances and settings.

M. Name, address and telephone number of nearest parts supply house and nearest repair service center.

N. Warranty information and service contract description, if applicable.

1.08 TRAINING AIDS

A. Training aids shall be used as an integral part of the training program. Training aids shall include text and/or pictorial handouts specific to the equipment supplied. Handouts shall be legible and printed on good quality stock. Handouts shall be submitted when lesson plans are submitted.

B. Additional training aids shall be used for maximum training effectiveness and shall include the following as appropriate:

1. Audio-visual aids, for example, films, videotapes, slides, overhead transparencies, posters, blueprints, diagrams, and catalogue cuts.

2. Models and samples, for example, cutaways, spare parts, tools, miniature models, equipment assemblies, and damaged parts.

C. The use of additional training aids shall be identified in the lesson plan, and a description of the additional training aids shall be given.

1.09 QUALIFICATIONS OF TRAINING SPECIALISTS

A. The Contractor shall submit the equipment manufacturer's documentation of the qualifications of their proposed training specialists for approval by the Engineer sixty (60) days prior to the date of proposed training. The documentation shall include the experience of the training specialists in

operation and maintenance of the equipment and a summary of training experience.

B. Only those training specialists whose qualifications have been approved by the Engineer shall conduct training.

PART 2 PART 2 PRODUCTS (NOT USED)

PART 3 PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01831
Operation and Maintenance Manuals

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General requirements

B. Operation and maintenance Manual requirements

C. Binding and format requirements

D. Submittals

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Section.

1.03 RELATED SECTIONS

A. Detailed Specification 01332 – Final Record Documents

1.04 GENERAL REQUIREMENTS

A. As a prerequisite to obtaining payments in excess of 50 percent of the equipment cost for equipment furnished under this Contract, the Contractor shall prepare, submit and obtain the Engineer's approval, as designated by "Approved," of an operation and maintenance Manual ("Manual") for each item of equipment supplied under the Contract. Approval is a prerequisite for continuing payments for equipment furnished by the Contractor, providing instructional services and equipment start-up.

B. Each Manual shall be prepared especially for each installation and shall include all pertinent and legible instructions, preventative maintenance instructions, technical bulletins and other printed matter required to provide accurate and comprehensive information for the safe and proper operation, maintenance and repair of the equipment.

1.05 OPERATION AND MAINTENANCE MANUAL REQUIREMENTS

A. The Manuals shall include, but not be limited to, the following:

1. Complete, detailed written operating instructions for each product or piece of equipment including: equipment function; operating characteristics; limiting conditions; operating instructions for startup, normal and emergency conditions; regulation and control; and shutdown.

2. Complete, detailed written preventive maintenance instructions, including all information and instructions required to keep a product or piece of equipment properly lubricated, adjusted and maintained so that the item functions economically throughout its full design life. Preventive maintenance instructions include, but are not limited to, the following:

    a. A written explanation with illustrations for each preventive maintenance task.

    b. Recommended schedule for execution of preventive maintenance tasks.

    c. Lubrication charts.

    d. Table of alternative lubricants.

    e. Troubleshooting instructions.

    f. List of required maintenance tools and equipment.

3. Nameplate data of each component, year of installation, Contract number and Specification number.

4. Name, address and telephone number of the manufacturer and the manufacturer's local representative(s).

5. Installation instructions.

6. Emergency operating instructions and capabilities.

7. Troubleshooting and corrective maintenance (repair) procedures.

8. Drawings suitable for assembly and disassembly of entire system or unit, and each component, and approved wiring and control diagrams, all as required for operation, maintenance and repair of the equipment supplied. Drawings shall be black on white, clearly legible and no larger than 11" x 17".

9. Parts list with current prices and ordering information.

10. List of recommended spare parts and the recommended number of each.

11. Name, address and telephone number of nearest parts supply house and nearest repair service center.

12. Warranties, guarantees, bonds and service contracts.

13. Long-term and short-term manufacturer’s recommended equipment storage procedures.

14. Written explanations of all safety considerations relating to operation and maintenance procedures.

15. Name, address and telephone number of manufacturer, manufacturer's local service representative, and subcontractor or installer.

16. Copy of all approved shop drawings.

17. Catalogs, diagrams, schematics, drawings, instruction bulletins and manuals marked by underlining, checking, the use of arrows or the obliteration or removal of extraneous data, so as to pertain only to the specific equipment item for which the manual is supplied.

18. Complete electrical schematics and wiring diagrams. Complete wiring between terminal points must be shown. Computerized diagrams are not acceptable.

B. Reference to features and elements of equipment, such as operational limits of time, speed, pressure, temperature, etc. shall be clear, complete and compatible with authoritative published engineering reference documents. All functional components, electrical systems, equipment, etc. shall be shown on diagrams and discussed in the text so as to identify their proper system relationship. Operation, service, trouble-shooting, checkout and in-line and bench repair procedures, identifying specific system characteristics of the equipment shall be provided. The information shall include recommended procedures and frequencies for preventive maintenance such as inspection, adjustment, lubrication, calibration and cleaning.

C. Equipment parts shall be identified by manufacturer's part number and located with relation to other components of the equipment utilizing “exploded” type drawings for clarity, if required. Complete parts lists shall be included, which indicate the part number, the part description, applicable serial and model numbers, current unit prices and the name, address and telephone number of the nearest equipment manufacturer's representative and nearest service and spare parts warehouse. Complete instructions for the ordering of all replaceable parts shall be noted in this section of a Manual. Recommendations as to spare parts and spare inventory levels shall be made. Where pertinent, lead-time and shelf life values and preservation, packaging and labeling methods shall be also recommended.

D. All copyrighted material used in the Manual or in any operation required in the performance of the Contract will be preceded by the Contractor obtaining the copyright holder's written permission on behalf of DEP to use such material in perpetuity.

1.06 BINDING AND FORMAT REQUIREMENTS

A. Each Manual shall be bound in a durable, permanent, hard cover binder of one (more if required) volume with a complete index of the Manual's

contents arranged by subject matter and in order of presentation in each volume. Applicable equipment item numbers, as shown in the Contract Documents shall be prominently included at their appropriate location in the index. The title of the Manual shall be securely affixed to the binder in two places: the front cover and the binder back edge. The title shall identify the Project by number and name, location of the site, state the volume is an O&M Manual, generally classify the equipment and state the manufacturer's name and equipment model number.

B. Intermediate submittals of the Manual for approval by the Engineer need not be hard bound.

C. Use 8½-inch by 11-inch paper of high rag content and quality. Larger drawings or illustrations (no larger than 11" x 17") are acceptable if neatly folded to the specified size in a manner which will permit easy unfolding without removal from the binder. Provide reinforced punched binder tab. Or provide flyleaf for each product.

D. All text must be legible typewritten or machine printed originals or high quality copies of same.

E. Each page shall have a binding margin of approximately 1½ inches and be punched for placement in a three-ring loose-leaf or triple post binder. Provide binders. Identify each binder with the following:

1. Title “OPERATING AND MAINTENANCE MANUAL”
2. Project title and number.
3. Contract title and number.
4. Identity of building or structure as applicable.
5. Identity of general subject matter covered.

F. Use dividers and indexed tabs between major categories of information such as operating instructions, preventive maintenance instructions, or other. When necessary, place each major category in a separate binder.

G. Provide a Table of Contents for each binder. Identify products by their functional names in the Table of Contents and at least once in each chapter or section. Thereafter, abbreviations and acronyms may be used if their meaning is explained in a table in the back of each binder. Use of model or catalog numbers or letters for identification is not acceptable.

1.07 SUBMITTALS

A. The Contractor's submittal to the Engineer for approval shall consist of three (3) complete sets of each Manual and three (3) copies of an itemized listing providing cross-references between the Specification, the approved Shop Drawings, and the Manual submittal.

B. A transmittal will be returned to the Contractor indicating the status of the Manual and will include a tabulation of any pages being returned with review comments and noting any extra pages required clarifying or amplifying the comments. Copies of only the pages containing comments and any additional pages needed to clarify or amplify the comments will be attached to the transmittal. The status of the Manual will be noted on the front page of the Manual, which will also be attached to the transmittal, and will be stamped either, "Furnished as Submitted" or "Furnish as Corrected", when the Manual submittal substantially conforms to the requirements of this Section and requires minor corrections; or "Revise and Resubmit" when the Manual submittal is considered inadequate, inaccurate or lacking essential information.

C. The submitting Contractor shall rectify all submittals annotated "Furnish as Corrected," or "Revise and Resubmit" within 15 days of receipt of such notice by replacing pages or adding additional data, as required. The Manual's Index of Contents and the itemized, cross-referenced listing shall be revised to reflect all revisions or additions made. Then, three (3) copies of the revised material shall be resubmitted to the Engineer for approval.

D. When the status of the Manual is stamped "Rejected," a transmittal to the submitting Contractor will return the copies of the Manual intact with the reason for the rejection stated. The Manual will be stamped "Rejected" when the submittal is considered illegible, or does not contain a complete index of contents and/or an itemized list of cross references, or is so incomplete and lacking in required documentation as to preclude a meaningful review by the Engineer. Within 15 days of receipt of such notice the submitting Contractor shall revise the Manual and resubmit to the Engineer for approval.

E. Final Approved Copies of the Manuals:

1. After a Manual submittal receives final approval status, signified by the annotation "Furnish as Submitted", the Contractor shall furnish the final Manual to the Engineer in the quantities and formats specified in Detailed Specification 01332 – Final Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

DETAILED SPECIFICATION 02105G – SOIL SAMPLING AND ANALYSIS

CONTRACT CRO-624 G

SECTION 02105G

Soil Sampling and Analysis

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 02105 – Soil Sampling and Analysis, except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Delete Paragraph 1.01.A and 1.01B, and replace with the following:

A. The Contractor shall provide all labor, materials, tools, and equipment to perform all operations necessary to determine the requirements for handling and onsite reuse of all materials to be excavated.

B. When sampling is deemed necessary, stockpiling of excavated material on-site or ex-situ sampling will be allowed only with written approval from the Engineer.

Add the following new paragraph after Paragraph 1.01B, and renumber existing Paragraph 1.01C accordingly:

C. Soils from miscellaneous excavations shall be reused in the same excavation or elsewhere onsite without sampling. Sampling of excess soils is anticipated if unanticipated conditions (e.g., hot spots) are encountered; or excess soils are generated that cannot be reused onsite.

1.02 PAYMENT

Delete Paragraph 1.02A, and replace with the following:

A. No separate payment will be made for performing any Work required under this Specification.

B. Payment for additional sampling required by unanticipated conditions will be made from the allowance, as described in Section 01355 – Hazardous Materials Control.

1.06 SAMPLING REQUIREMENTS

Delete Paragraphs 1.06A.1 & 2, and replace with the following:

A. Fill material:

1. If it is determined by the Contractor's EP that unanticipated conditions are encountered; sampling of excess soils shall be performed.

2. When sampling is necessary, excess soils shall be sampled for RCRA characteristics, including ignitability, corrosivity, reactivity, and Toxicity Characteristics Leaching Procedure (TCLP) for metals, SVOCs, VOCs, and pesticides and herbicides, asbestos (NYS only), and volume of physical contaminants (if present) (NYS only), in addition to any other parameters required by the reuse/disposal facility. Frequency of sampling shall be as required by the reuse/disposal facility.

Delete Paragraphs 1.06A.3 & 4 and replace with the following, renumber Paragraph 1.06A.5 accordingly, and delete Paragraphs 1.06A.6 & 7 in their entirety:

3. When reusing in New York State, fill material samples, at a minimum, shall be analyzed for metals, PCBs/pesticides, SVOCs, VOCs listed in 6 NYCRR Part 375, Subdivision 375-6.8(b), asbestos, and volume of physical contaminants (if present) based on visual observation. Sampling is performed within the planned excavation boundaries at frequencies as defined in 6 NYCRR Part 360, Section 360.13(e)(1), Table 1: Minimum Analysis Frequency for Fill Material.

1.07 SUBMITTALS

Delete Paragraph 1.07A.2.b and replace with the following:

b. For in-situ soil sampling, each composite sample will be comprised of multiple (3-5) discrete samples that are representative of the horizontal and vertical extent of the excavation footprint. For ex-situ soil sampling, each composite sample will be comprised of multiple representative discrete samples throughout the soil stockpile. Surface soil shall not be used as sampling material. Multiple samples shall be classified based on biased worst case to be considered fully representative of the soils being sampled for reuse in New York State (NYS).

1) VOC analysis will require two (2) discrete (biased worst case) VOC samples to be collected for every one (1) composite sample.

2) When soils are visibly heterogenous, composite and discrete (for VOCs), samples will be obtained to represent each visually different stratum or section of the excavation site, regardless of the overall excavation volume.

1.11 PROJECT CONDITIONS

Delete Paragraph 1.11A. and replace with the following:

A. Stockpiling: No stockpiling of excavated material on-site or ex-situ sampling will be allowed without written approval from the Engineer. Soils stockpiled for onsite reuse do not require sampling.

PART 3 EXECUTION

3.01 EXAMINATION/PREPARATION

Delete Paragraph 3.01A. and replace with the following:

A. Testing shall be in accordance with the sampling requirements of Article 1.06.A.

1. Parameters analyzed for excess soils to be reused or disposed off-site shall be the RCRA characteristics, including ignitability, corrosivity, reactivity, and Toxicity Characteristic Leaching Procedure (TCLP) for metals, SVOCs, VOCs, and pesticides and herbicides, asbestos (NYS only), and volume of physical contaminants (if present) (NYS only), in addition to any other parameters required by the beneficial use facility or TSDF.

2. If any soil sample results are greater than 5 ppm lead by TCLP the Contractor shall immediately notify the Engineer. (See Section 01355 – Hazardous Materials Control for implementation of a Community Air Monitoring Program (CAMP) in the event that hazardous levels of lead are detected in soil.)

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02116
Above Ground Storage Tank Removal and Disposal

Note: Detailed Specification 02116 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 02116.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall remove and dispose of an existing 200-gallon concrete chemical waste-containing Above Ground Storage Tank (AST), located in the basement crawlspace, which is considered to be a non-permit required confined space, and all associated piping and appurtenances, as identified in Table 26 attached to Section 01355 - Hazardous Materials Control, and shown in the Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC., in accordance with all applicable Federal, State, and local regulations and codes. The Contractor shall provide a Closure Report that includes a map of the exact location of the AST and associated piping prior to removal.

B. The tank is assumed to contain mercury and corrosive hazardous waste. The Contractor shall sample and inventory the AST prior to removal to determine the exact contents (type and volume of liquid/solid residuals) of the tank. The Contractor shall supply an inventory of tank contents to the Engineer.

C. The Contractor shall provide all labor, materials, equipment, and incidentals required to purge, decontaminate, remove, and dispose of the AST, associated piping and appurtenances without the release of any product or derivatives.

D. The Contractor shall fully comply with all City, State, and Federal codes and regulations governing removal and disposal of the AST and its contents.

1.02 REFERENCES

A. Water Environment Federation Manual of Practice No. 1, Safety in Wastewater Works.

B. National Fire Protection Association (NFPA) Bulletin No. 30, "A Guide to Flammable Liquids."

C. NFPA No. 326, Standard for the Safeguarding of Tanks and Containers for

Entry, Cleaning, or Repair.

D. American Welding Society F4.1, Safe Practices for the Preparation of Containers and Piping for Welding, Cutting, and Allied Processes, dated January 1, 2017.

E. The Occupational Safety and Health Act of 1970, OSHA and the Code of Federal Regulations (CFR) Title 29, Parts 1910 and 1926, OSHA.

F. 6NYCRR Part 371, Section 371.3, Toxicity Characteristic Leachate Procedure (TCLP) for VOCs, semi-VOCS, metals, pesticides, herbicides and CFR Section 261, Identification and Listing of Hazardous Wastes.

G. American Petroleum Institute (API) Standard 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks

H. API Standard 2217A Guidelines for Safe Work in Inert Confined Spaces in the Petroleum and Petrochemical Industries

I. API Recommended Practice (RP) 1604, Closure of Underground Petroleum Storage Tanks

J. NYS DEC Regulations:

1. 6 NYCRR Part 597 - Hazardous Substance Identification, Release Prohibition and Release Reporting

2. 6 NYCRR Part 598 – Handling and Storage of Hazardous Substances

K. NYSDEC Spill Guidance Manual, Spill Reporting and Initial Notification

L. New York City Fire Department (FDNY) - Fire Code (FC) Chapter 34, Flammable and Combustible Liquids

M. New York City Department of Environmental Protection (NYCDEP):

1. Environmental Health and Safety Policies and Procedures – Vol. IV Chemical Bulk Storage Tank and Container Management

2. Environmental Health and Safety Policies and Procedures – Vol. IV. Petroleum Bulk Storage Tank and Container Management

3. Environmental Health and Safety Policies and Procedures - Vol. IV Spill Prevention, Environmental Release Reporting and Investigation

1.03 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

B. For bidding purposes, the Contractor shall assume that the AST has not been emptied; therefore, the AST will need to be emptied, the hazardous waste contents properly disposed of, and will require cleaning to remove any remaining residuals.

1.04 SUBMITTALS

A. The Contractor shall provide all submittals, including the following, as specified in Detailed Specification 01330 – Submittal Procedures.

1. AST Removal and Disposal Plan: The Contractor shall submit to the Engineer for approval at least 30 calendar days prior to beginning removal work a removal and disposal plan for the AST, their contents, wastes, piping materials, and cleaning solutions. The Contractor shall disconnect, remove, and cap designated lines within demolition areas.

a. Provide evidence that the subcontractor for tank removal is licensed by the applicable local government authority.

b. Describe means and methods for tank content removal, tank and pipe cleaning, waste handling, tank closure and disposal of all generated wastes at appropriately permitted facilities. Permits of all disposal facilities shall be provided in the Plan.

c. Where temporary waste storage is anticipated, provide details of storage area construction with secondary containment, demarcations, and posting of inventory and weekly inspection reports.

d. Describe labeling requirements for waste containers and storage areas.

e. Provide a task-specific health and safety protocol for all tank closure activities.

f. Identify and estimate volumes for each anticipated waste stream, including but not limited to tank contents, cleaning solutions, and personal protective equipment.

g. Provide a waste analysis plan detailing waste characterization methods for each anticipated waste stream. At a minimum, it

is expected that representative samples of each waste stream shall be collected by a qualified Environmental Professional and analyzed for total PCBs and full RCRA characterization (reactivity, ignitability, corrosivity and full toxicity [TCLP]), and any additional parameters required by the disposal facilities. Waste analysis shall be performed by a NYSDOH ELAP-certified laboratory, as documented by current ELAP certificates included in the Plan. The samples shall be characterized in accordance with 6 NYCRR Part 371, and Section 371.3 – Characteristics of Hazardous Waste.

h. Provide waste characterization documents/waste profiles for each waste stream.

i. Identify waste transporters for each anticipated waste stream, and provide current NYSDEC Part 364 Waste Transporter Permit(s) required to transport the wastes to the recycling facility or TSD (Treatment, Storage & Disposal) facility. The Plan shall include the name, address, 24-hr phone number and qualifications for each vendor or facility that will be transporting, storing, testing or disposing of the wastes.

j. Provisions for advance copies of waste profiles, waste manifests, Land Disposal Restrictions (LDR) Notification and Certification Form (if hazardous waste) for the Engineer's review and approval and DEP signature as generator. Advance copies shall be provided no less than 2 weeks prior to removal of the waste.

2. Manifest Requirements: Manifests shall include measurements of the volume of all waste materials from the site prior to transporting to an approved recycling or disposal facility. The Contractor shall also prepare all vehicles and manifests necessary for transporting all material. Nonhazardous waste shall be manifested in a fashion similar to that for hazardous waste. The Contractor shall comply with all Federal, State and local regulations regarding the transport of hazardous and nonhazardous waste.

a. Applicable Regulations: All project work that concerns the transport of non-hazardous waste shall comply with the appropriate EPA and DEC regulations and DOT hazardous material transportation regulations.

b. EPA Hazardous Waste Manifest: If waste stream analysis identifies any hazardous wastes, the Contractor shall obtain an appropriate number of hazardous waste manifest forms (EPA Form 8700-22 (Rev. 12-17) or latest version), sequentially numbered for this project based on the quantity of hazardous waste to be removed from site. The name of the generator, transporter and disposal facility, and their appropriate EPA identification number, shall be typed on each form. All other pertinent information shall be included on the manifest. A copy of the partially completed manifest including the above information shall be submitted for approval at least 2 weeks prior to removal of the waste.

c. Non-hazardous Waste Manifest: Material classified as non-hazardous shall be transported and measured in a similar manner to that specified for hazardous material. Manifests shall be provided for each truckload of material removed from the site. The form of the manifest shall be approved by the Engineer. Nonhazardous waste shall be transported in accordance with all applicable Local, State and Federal DOT regulations by properly licensed and permitted waste haulers.

d. Routing: The Contractor shall provide a map and written description of the route which will be taken to the approved recycling or TSD facilities by the waste transporter(s).

e. The Contractor shall submit written evidence that selected recycling or TSD facilities have accepted or will accept the wastes generated by tank removal activities. The Contractor shall also submit copies of the completed manifest, signed and dated by the initial transporter, in accordance with Federal and State requirements and with associated documentation (e.g., Waste Profile and Hazardous Waste Land Disposal Restrictions (LDR) Notification and Certification Form). Copies of completed and signed waste manifests from recycling or TSD facilities shall be provided to the Engineer within seven (7) days of waste shipment offsite.

3. Site Information: The Contractor shall confirm the following information and submit required documents before AST removal:

a. Review record construction drawings, if available;

b. Locate the AST, product piping, and associated vent lines to be removed;

c. Provide Map of AST location;

d. Locate and map piping and ancillary equipment to be removed or capped. Identify lines and indicate capping locations on Project Record Documents.

4. Spill and Discharge Control Plan: The Contractor shall develop, implement and maintain a comprehensive spill and discharge control plan. The plan shall provide contingency measures for potential spills and discharges from handling and transportation of contaminated residuals and water. The Contractor shall submit the plan, for approval by the Engineer, no later than 30 calendar days prior to the start of tank removal.

5. The Contractor shall notify the Engineer 45 days in advance of the AST removal date to facilitate submittal of the NYSDEC Pre-Work Notification for Bulk Storage (CBS) Tank Installation or Closure Form.

6. Tank Closure Reports: The Contractor shall submit to the Engineer a closure report for the tanks and associated piping removed from the site, which includes the following information:

a. Map showing the exact tank location and layout of associated piping;

b. Description of work performed, including starting and end dates of reporting period;

c. Tank, tank contents, and tank cleaning waste disposal locations;

d. Affidavit of Compliance. When applicable, the Contractor shall file with FDNY an affidavit certifying that a permanently out-of-service storage system was removed and disposed, in compliance with the requirements of FDNY Fire Code (FC) Chapter 34 - Flammable and Combustible Liquids. Such Affidavit shall be executed by a person with the requisite qualifications to supervise the closure of such tanks.

e. All final Closure documentation, including all reports, records, permits, notifications, tank inventory and inspection reports, tank disposal and waste disposal records, and all waste sampling records, including analytical test results.

1.05 QUALITY ASSURANCE

A. Permits and Regulations: The Contractor shall obtain all necessary building

permits, inspection permits, licenses, and all other permits required for above ground storage tank removal.

B. The Contractor shall handle all material in compliance with applicable requirements of NYSDEC, NYC Fire Department, and OSHA and other governing authorities having jurisdiction.

1. Codes and Standards: Federal, State and City laws and code requirements shall govern the hauling and disposal of all materials off site.

1.06 STORAGE, HANDLING AND REMOVAL

A. The AST, piping, and related items removed offsite by the Contractor shall be disposed in accordance with federal, state, and local regulations.

B. Salvageable Items: The Contractor shall carefully remove items to be salvaged, if any, and store them on site in an approved location. Items shall remain the property of the City.

C. Reused Materials: The Contractor shall remove and store materials to be reused or retained in a manner which prevents damage to the material.

D. Marking Closed Tanks: Prior to permanent disposal, the Contractor shall clearly mark the tanks by painting the outside with the following wording:

TANK HAS CONTAINED (Applicable Name)
NOT SUITABLE FOR FOOD OR DRINKING WATER

E. Removal and Disposal of Tank Contents: Tank contents, cleaning solutions, rinse water, and contaminated clothing and equipment shall require a waste analysis in accordance with the Removal and Disposal Plan and shall be disposed of at appropriately permitted facilities. The tanks and all the other contents shall be removed from the site for disposal in accordance with the requirements of the federal, state and local codes and regulations.

1.07 PROJECT CONDITIONS

A. Health and Safety: When working within hazardous areas, the Contractor shall take suitable precautions to ensure safe working conditions. Before entering any hazardous area, the Contractor shall ensure that a safe working atmosphere exists. The basement crawlspace is considered to be a non-permit required confined space. The Contractor shall adhere to all other health and safety requirements in accordance with the Environmental Health and Safety Plan (EHASP).

1.08 SPECIAL REQUIREMENTS

A. Protection of Surrounding Areas: The Contractor shall protect surrounding areas from exposure to material removed during tank closure/removal.

B. Workmanship: AST removal shall be performed by a licensed Contractor employing competent and experienced workers with due regard for safety of other workers, inspectors and the public. The Contractor shall have all appropriate licenses to carry out this work. Based on advance regulatory notification requirements, the Contractor shall notify the Engineer at least 45 days prior to the start of tank removal. Removal shall be performed with as little nuisance as possible.

C. Existing Structures: The Contractor shall protect existing appurtenances and structures and all other areas which are not to be demolished, shall cease operations and notify the Engineer immediately if adjacent structures appear to be endangered, and shall not resume operations until corrective measures have been taken and approval to resume has been received from the Engineer.

D. Air Monitoring: The Contractor shall conduct continuous air monitoring to confirm that unprotected persons (e.g., without the benefit of Personal Protective Equipment) outside the work area are not adversely impacted, and shall be prepared to implement engineering controls to reduce air emissions (e.g., ventilation). At a minimum, the Contractor shall monitor for VOCs and Lower Explosive Limit (LEL) within and at the perimeter of the work area in accordance with the Environmental Health and Safety Plan. However, the Contractor's Safety Professional shall be responsible for identifying other air monitoring appropriate to protect workers based on their knowledge, following sampling, of the tank contents.

E. The Contractor shall schedule permanent closure of the AST in accordance with 6 NYCRR Part 598.10 (c) and 6 NYCRR Part 613-4.5, as applicable.

F. The Contractor shall furnish all the necessary labor, materials, and equipment for:

1. Permanent closure, per 6 NYCRR Part 598.10(c) and 6 NYCRR Part 613-4.5, as applicable, and removal of above ground chemical storage tank and all associated above ground piping systems, fill stations and vent systems.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Tank Purging: The Contractor shall pump out all remaining liquid in the tank. Following removal of the liquids, the tank shall be purged and tested to assure that no explosive gases are present. Any liquid present in piping shall be properly drained and piping purged prior to removal. The tank atmosphere shall be tested to determine if the tank is safe. The tank interior shall be tested for percent oxygen per volume and for percent of lower explosive limit (%LEL). The tank atmosphere shall be greater than 19% oxygen and less than 25% LEL before the tank is considered safe. If the tank is not safe, then inerting and purging must be continued until the tank passes all testing.

B. Pipe Cleaning: After the tank is emptied, the tank and all connecting piping to the tank shall be cleaned and triple rinsed in accordance with all applicable local and state regulations, whichever is more stringent. The Contractor shall dispose of all removed liquids in a method conforming to all applicable Federal, State, and local regulations.

C. Disconnecting Piping: The Contractor shall disconnect piping from all tank openings, and cap or plug all tank openings. All piping indicated on the Contract Drawings shall be removed and disposed of as specified.

D. Excess Liquid: Residual liquid remaining in the tank shall be absorbed by sawdust or fine sand introduced into the tank or other approved method. The Contractor shall dispose of absorbing material in accordance with all applicable State and local regulations. The tank shall not be moved if liquid is still present in the tank. Preventive measures shall be taken to avoid liquid leaking from the tank or associated piping.

E. Initial Tank Cleaning: Initial tank cleaning, prior to tank removal, shall be conducted as follows:

1. Introduce water into the high end of the tank. Pump water, along with any remaining product or sediment, out of the lower end of the tank.

2. During the initial cleaning operations, the following items shall be observed:

    a. The pumps or vacuum lift used in the operation shall be properly grounded and bonded.

    b. Vapors from the vacuum vent system shall be emitted a minimum height of 12 feet above grade and 3 feet above any adjacent structure in accordance with API standards.

    c. Explosive vapors may develop during cleaning procedures. The area in and around the tank site shall be monitored

continuously with direct reading on-line meters for flammable or combustible vapor and total volatile vapor concentrations until the tank is removed from the site.

3. If the vapor concentration exceeds 25% LEL, all work shall be stopped until vapors disperse.

4. Response to any vapor concentration (VOCs and %LEL) condition shall be in accordance with the Contractor's Environmental Health and Safety Plan.

5. All smoking and other ignition sources are prohibited from the tank area at all times.

6. Maintain operable fire extinguishers on site at all times in accordance with the Environmental Health and Safety Plan.

F. Secondary Cleaning: Secondary cleaning procedure involves actual entry into the tank for manual cleaning.

1. Create a large opening into the tank.

2. During secondary cleaning operations, the following items shall be observed:

a. All confined space entry safety precautions and requirements shall be met. Confined space entry shall be in accordance with the provisions of the Environmental Health and Plan.

b. Enter tank only when AST is deemed safe based on monitoring information.

c. Remove all remaining sludge, tar, scaling, etc., using a squeegee. All remaining residue shall be pumped from the bottom of the tank, or absorbed with suitable absorbent material.

d. All residual material shall be recovered, characterized, drummed, labeled and disposed of in accordance with the Removal and Disposal Plan.

e. Inspect the interior wall of the tank for holes or breaks.

G. Gas Freeing: The AST and piping shall be rendered vapor free before removal is initiated. The tanks and piping must be certified gas and vapor free prior to requesting Hot Work Permits. The AST shall be inerted below the specified State and local approved acceptable LEL in accordance with all

applicable Federal, State and local codes and regulations and API recommended procedures. The Contractor shall dispose of any water used in the gas-freeing operation in accordance with applicable regulations and the Removal and Disposal Plan. The AST and piping shall be adequately grounded so that buildup of any static charge is prevented. The Contractor shall remove the tank from the property immediately upon completion of the gas-freeing operation.

H. Gas-free the tank using one of the procedures described in API RP 1604, Closure of Underground Petroleum Storage Tanks.

3.02 REMOVAL

A. Tank Removal: All accessible holes shall be plugged or capped. The tank shall be rendered unusable for further use in accordance with API RP 1604. Immediately remove demolished material from site. In no case shall a removed tank remain on-site for a period of time exceeding 24 hours. Demolition of the AST shall be in compliance with 6 NYCRR 613 and API Standard 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks, as applicable.

B. Encountered Contamination: Contractor shall notify the Engineer, verbally, within one hour of any contamination encountered, and shall provide a follow-up notification to the Engineer, in writing, within one (1) day. Any spills or drips shall be contained to the maximum extent possible to minimize the spread of encountered contamination. Failure to notify the Engineer will subject the Contractor to additional liability if the encountered contamination spreads in any way.

3.03 DEREGISTRATION

NOT USED.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02222G
DEMOLITION AND REMOVALS

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 02222 – Demolition and Removals, except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Delete Paragraph 1.01.C, and replace with the following:

C. The Contractor shall provide for the removal and proper recycling or disposal of universal and other miscellaneous regulated wastes as identified in the Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC. Removals shall be in accordance with Section 01355 – Hazardous Materials Control, Section 01733A – Construction Waste Management, Section 13281 – Asbestos Management, Section 13282 – Mercury Management, Section 13283 – Lead Management, and Section 13284 – PCB Management, as applicable.

1.02 PAYMENT

Delete Paragraph 1.02A, and replace with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

Add the following references to Paragraph 1.03:

D. Section 01355 – Hazardous Materials Control

E. Section 13281 – Asbestos Management

F. Section 13282 – Mercury Management

G. Section 13283 – Lead Management

H. Section 13284 – PCB Management

1.04 REFERENCES

Add the following references to Paragraph 1.04:

E. Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC.

1.06 JOB CONDITIONS

Delete Paragraph 1.06A.6.

END OF SECTION

SECTION 02230G
Site Clearing

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02230 – Site Clearing except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification.

3.02 REMOVAL OF TREES AND SHRUBS

A. Tree Removal within Property Limits:

4. Payment for removal of trees greater than 6 inches shall be paid under the following individual unit price items:

a. 02230-0612 for calipers Over 6” to 12”

b. 02230-1218 for calipers Over 12” to 18”

c. 02230-1824 for calipers Over 18” to 24”

d. 02230-0024 for calipers Over 24”

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02316G
Excavation

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 02316 – Excavation, except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Add the following new paragraph after Paragraph 1.01B, and renumber existing Paragraph 1.01C accordingly:

C. The Contractor's Environmental Professional (EP) shall oversee the excavation of fill material to ensure that hot spots of suspect soils are segregated and stockpiled for additional testing, as necessary.

1.05 DEFINITIONS

Delete Paragraph 1.05.G, and replace with the following:

G. Unsuitable Materials: Any material containing vegetable or organic matter such as muck, peat, organic silt, topsoil or sod, which is not satisfactory for the use as fill material.

1.08 REGULATORY REQUIREMENTS

Delete Paragraph 1.08C and replace with the following:

A. In the period of 2 to 10 days prior to starting excavation, notify all utilities of intended work locations and have utility locations marked. Upstate locations are served by Dig Safely NY (800 962-7962 or 811).

PART 3 EXECUTION

3.05 SEGREGATION, STORAGE AND DISPOSAL OF MATERIALS

Insert Paragraph 3.05A.2:

2. Soil sample results greater than 5 ppm lead by TCLP shall be reported to the Engineer immediately. (See Section 01355 – Hazardous Materials Control for

implementation of a Community Air Monitoring Program (CAMP) in the event that hazardous levels of lead are detected in soil.)

END OF SECTION

SECTION 02317G
BACKFILLING

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 02317 – Backfilling, except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Add the following new paragraph after Paragraph 1.01A, and renumber existing Paragraph 1.01B accordingly:

B. Backfilling – The Contractor shall maximize reuse of soil on-site for backfilling rather than import soil from other sources. Fill from an off-site source shall be uncontaminated (General Fill) and shall meet the requirements of this Section.

1.01 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.05 DEFINITIONS

Delete Paragraph 1.05.E, and replace with the following:

E. Unsuitable Materials: Any material containing vegetable or organic matter such as muck, peat, organic silt, topsoil or sod, which is not satisfactory for the use as fill material.

PART 2 PRODUCTS

2.01 BACKFILL MATERIAL - GENERAL

Delete Paragraph 2.01A.1. and replace with the following:

1. Backfill shall be composed of suitable materials as defined in this Section.

   a. On-site Materials: Material to be excavated and proposed for reuse as fill under Pre-Determined Beneficial Use must meet the requirements of 6 NYCRR Part 360, Section 360.13 (a), Applicability, Section 360.13 (b), Waste Cessation, or Section

360.13 (c), Exemption for On-site Reuse of Fill Material. The Contractor shall maximize reuse of soil on-site for backfilling rather than import soil from other sources.

END OF SECTION

SECTION 02371G
Dust, Soil Erosion and Sedimentation Control

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02371 – Dust, Soil Erosion and Sedimentation Control as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.08 ENVIRONMENTAL REQUIREMENTS

Replace 1.08A. with the following:

A. Soil Stabilization: The stabilization practices to be implemented shall include one or a combination of the following: temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control mats, protection of trees and shrubs, preservation of mature vegetation. Protection of trees shall be in accordance with General Specification 02230 – Site Clearing. Stabilization practices shall be implemented as approved by the Engineer. The Contractor shall record the dates when the major grading activities occur (i.e. clearing and grubbing, excavation, embankment and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs 1.08A.1 and 1.08A.2 below, stabilization practices shall be initiated as soon as practicable, but no more than seven (7) days after construction activities have temporarily or permanently ceased.

1. Unsuitable Conditions: Where the initiation of stabilization measures by the seventh day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather. Stabilization practices shall be initiated as soon as practicable after conditions become suitable.

2. Temporary Inactivity Less than 7 Days: Where construction activity will resume on a portion of the site within 7 days after it temporarily ceases, no stabilization practices will be required.

PART 3

3.04 CLEANING

Add 3.04B as follows:

B. Concrete truck washes/decontamination stations shall be required to be installed to minimize the migration of sediment off-site as specified herein:

1. Work

a. Under this item, the Contractor shall reduce or prevent the discharge of pollutants to stormwater from concrete waste by conducting washout offsite, or performing onsite washout in a designated area to prevent pollutants from entering the soil, storm drains, surface waters or groundwater.

2. Intent

a. Concrete washout area best management practices shall be implemented on construction projects where concrete is used as a construction material. It is not possible to dispose of all concrete wastewater and washout offsite (ready mix plant, etc.); and concrete trucks, pumpers, or other concrete coated equipment are washed onsite.

3. Education

a. Discuss the concrete management techniques described in this Specification with the ready-mix concrete supplier before any deliveries are made.

b. Educate employees and subcontractors on the concrete waste management techniques.

c. Arrange for contractor's superintendent or New York State stormwater pollution prevention certified Qualified Inspector to oversee and enforce concrete waste management procedures.

d. A sign shall be installed adjacent to each temporary concrete washout facility to clearly identify the designated concrete washout area so as to inform concrete equipment operators/concrete suppliers to utilize the proper facilities.

4. Contracts

a. Concrete waste management requirements as specified herein shall be incorporated into concrete supplier and subcontractor agreements.

5. Materials

a. Unless otherwise specified, the materials shall meet the requirements of Section B, "Materials and Methods of Construction".

b. Minimum 20-mil thick high-density polyethylene (HDPE) liner for self-installed concrete washout areas.

6. Installation

a. The following steps shall be taken to reduce stormwater pollution from concrete wastes:

b. Perform washout of concrete trucks offsite or in designated concrete washout areas only.

c. Provide and use potable water for concrete washout.

d. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams.

e. Do not allow excess concrete to be dumped onsite, except in designated concrete washout areas.

f. Concrete washout areas may be portable prefabricated water-tight concrete washout containers, or self-installed structures (above-grade or below-grade).

g. Prefabricated containers are typically most resistant to damage and protect against spills and leaks if properly constructed and maintained. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste from such containers.

h. If self-installed concrete washout areas are used, below-grade structures are preferred over above-grade structures because they are less prone to spills and leaks.

i. Self-installed above-grade watertight structures should only be used if excavation is not practical.

j. Washout areas shall be watertight and constructed and operated such that no waste is released from the designated washout area.

7. Location and Placement

a. Washout area(s) shall be located a minimum of 50 feet from sensitive areas such as storm drain inlets, open ditches and drainage facilities, watercourses and water bodies, including wetlands.

b. Convenient access for concrete trucks shall be provided, preferably near the site exit.

c. The number of facilities to be installed shall correspond with the expected demand for storage capacity.

d. On large sites with extensive concrete work, washouts shall be placed in multiple locations for ease of use by concrete truck drivers.

8. Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

a. Concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

1) Approximately 7 gallons of wash water are used to wash one truck chute.

2) Approximately 50 gallons are used to wash out the hopper of a concrete pump truck.

3) Washout of concrete trucks shall be performed in designated areas only.

b. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of offsite.

c. Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per applicable solid waste regulations. Disposal of hardened concrete shall be performed on a regular basis.

9. Temporary Above-Grade Concrete Washout Facility

a. Temporary concrete washout facility (type above grade) shall be constructed as shown on the Details, with a recommended minimum length and minimum width of 10 ft., but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.

b. Straw bales and staking materials shall conform to the Standard Details.

c. Plastic lining material shall be a minimum of 20-mil HDPE liner and be free of holes, tears, or other defects that compromise the impermeability of the material.

d. The HDPE liner shall be of sufficient width to have no seams when installed.

10. Temporary Below-Grade Concrete Washout Facility

a. Temporary concrete washout facilities (type below grade) shall be constructed as shown on the Erosion Control Details drawing, with a recommended minimum length and minimum width of 12 feet. The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations.

b. Plastic lining material shall be a minimum of 20-mil HDPE liner and be free of holes, tears, or other defects that compromise the impermeability of the material.

c. The installed HDPE liner shall be of sufficient width to have no seams when installed.

d. Soil base shall be prepared to be free of rocks or other debris that may cause tears or holes in the plastic lining material.

e. Detail is provided on the Erosion Control Details drawing.

11. Inspection and Maintenance

a. Inspect and verify that concrete washout area(s) are in place prior to the commencement of concrete work.

b. During periods of concrete work, inspect daily to verify continued performance.

1) Check overall condition and performance.

2) Verify washout area is visibly retaining wash water such that it is watertight.

3) Check remaining capacity (% full).

4) If using self-installed washout facilities, verify plastic liners are intact, watertight, and sidewalls and bottom are not damaged.

5) If using prefabricated containers, check for good physical condition and no leaks.

c. Washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 12 inches.

d. Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

e. If the washout is nearing capacity, vacuum and dispose of the waste material off-site in an approved manner.

1) Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.

2) Do not discharge liquid or slurry into separate sanitary or combined sewer without local approval and any required pretreatment.

3) Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete shall be hauled away for off-site disposal or recycling.

f. Place a secure, non-collapsing, non-water collecting cover over the concrete washout area prior to predicted wet weather to prevent accumulation and overflow of precipitation.

g. When removing materials from the self-installed concrete washout, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Any liner damage shall be sufficient repaired in accordance with manufacturer's instructions or fully replaced such that the area remains watertight as determined necessary and complete by the Resident Engineer.

12. Removal

a. When temporary concrete washout facilities are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of off site. Materials used to construct temporary concrete washout facilities shall be removed from the work site and disposed of or recycled. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled, compacted, repaired, and stabilized to prevent erosion.

END OF SECTION

SECTION 02374
STORM WATER TREAMENT DEVICE – CDS UNIT

NOTE: Detailed Specification 02374 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 02374.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The furnishing and installation of the stormwater quality in-line treatment devise; selected CDS® by Contech Engineered Solutions LLC, or approved equal, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

B. The Contractor shall furnish all labor, equipment and materials necessary to install the storm water treatment device(s) (SWTD) and appurtenances specified in the Drawings and these specifications.

C. The manufacturer of the SWTD shall be one that is regularly engaged in the engineering design and production of systems deployed for the treatment of storm water runoff for at least five (5) years and which have a history of successful production, acceptable to the Engineer. In accordance with the Drawings, the SWTD(s) shall be a CDS® device manufactured by:

Contech Engineered Solutions LLC
9025 Centre Pointe Drive
West Chester, OH, 45069
Tel: 1 800 338 1122

(or approved equal)

D. RELATED WORK SPECIFIED ELSEWHERE

1. Section 02240: Dewatering
2. Section 02316: Excavation
3. Section 02317: Backfilling

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.01 DESCRIPTION

A. All components shall be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.

B. The manufacturer shall guarantee the SWTD components against all manufacturer originated defects in materials or workmanship for a period of twelve (12) months from the date the components are delivered to DEP for installation. The manufacturer shall repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period. The use of SWTD components shall be limited to the application for which it was specifically designed.

C. The SWTD manufacturer shall submit to the Engineer of Record a "Manufacturer's Performance Certification" certifying that each SWTD is capable of achieving the specified removal efficiencies listed in these specifications. The certification shall be supported by independent third-party research

D. No product substitutions shall be accepted unless previously approved by the Engineer of Record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

2.02 MATERIALS

A. Housing unit of stormwater treatment device shall be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:

1. Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);

2. The precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;

3. Cement shall be Type III Portland Cement conforming to ASTM C 150;

4. Aggregates shall conform to ASTM C 33;

5. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.

6. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.

7. Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.

B. Internal Components and appurtenances shall conform to the following:

1. Screen and support structure shall be manufactured of Type 316 and 316L stainless steel conforming to ASTM F 1267-01;

2. Hardware shall be manufactured of Type 316 stainless steel conforming to ASTM A 320;

3. Fiberglass components shall conform to the ASTM D-4097.

C. Access system(s) conform to the following:

1. Manhole castings shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.

2.03 PERFORMANCE

A. The SWTD shall be sized to either achieve an 80 percent average annual reduction in the total suspended solid load or treat a flow rate designated by the jurisdiction in which the project is located. Both methods should be sized using a particle size distribution having a mean particle size (d50) of 125 microns unless otherwise stated.

B. The SWTD shall be capable of capturing and retaining 100 percent of pollutants greater than or equal to 2.4 millimeters (mm) regardless of the pollutant's specific gravity (i.e.: floatable and neutrally buoyant materials) for flows up to the device's rated-treatment capacity. The SWTD shall be designed to retain all previously captured pollutants addressed by this subsection under all flow conditions. The SWTD shall be capable of capturing and retaining total petroleum hydrocarbons. The SWTD shall be capable of achieving a removal efficiency of 92 and 78 percent when the device is operating at 25 and 50 percent of its rated-treatment capacity. These removal efficiencies shall be based on independent third-party research for influent oil concentrations representative of storm water runoff (20 ± 5 mg/L). The SWTD shall be greater than 99 percent effective in controlling dry-weather accidental oil spills.

C. The SWTD shall be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The minimum storage capacity provided by the sump chamber shall be in accordance with the volume listed in Table 1. The boundaries of the sump chamber shall be limited to that which do not degrade the SWTD's treatment efficiency as captured pollutants accumulate. The sump chamber shall be separate from the treatment processing portion(s) of the SWTD to minimize the probability of fine particle re-suspension. In order to not restrict DEP's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber shall be 16 inches in diameter.

D. The SWTD shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills and have a capacity listed in Table 1 of the required unit.

E. The SWTD shall convey the flow from the peak storm event of the drainage network, in accordance with required hydraulic upstream conditions as defined by the Engineer. If a substitute SWTD is proposed, supporting documentation shall be submitted that demonstrates equal or better upstream hydraulic conditions compared to that specified herein. This documentation shall be signed and sealed by a Professional Engineer registered in the State of the work. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

F. The SWTD shall have completed field tested following TARP Tier II protocol requirements

TABLE 1
Storm Water Treatment Device
Storage Capacities

CDS Model	**Minimum Sump Storage Capacity (yd^3)/(m^3)**	**Minimum Oil Storage Capacity (gal)/(L)**
CDS4030-8	5.6(4.3)	426(1,612)
CDS4040-8	5.6 (4.3)	520(1,970)
CDS4045-8	5.6 (4.3)	568(2,149)
CDS5640-10	8.7(6.7)	758(2,869)
CDS5653-10	8.7(6.7)	965(3,652)
CDS5668-10	8.7(6.7)	1,172(4,435)

PART 3 EXECUTION

3.01 INSTALLATION

A. The contractor shall exercise care in the storage and handling of the SWTD components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.

B. The SWTD shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer shall provide the contractor installation instructions and offer on-site guidance during the important stages of the installation as identified by the manufacturer at no additional expense. A minimum of 72

hours notice shall be provided to the manufacturer prior to their performance of the services included under this subsection.

C. The contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.

D. The contractor shall removal all loose material and pooling water from the SWTD prior to the transfer of operational responsibility to DEP.

END OF SECTION

NO TEXT ON THIS PAGE

NOTE: Detailed Specification 02411 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 02411.

1.01 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.

1.02 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to DEP ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.03 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to DEP that may be uncovered during demolition remain the property of DEP.
   1. Carefully salvage in a manner to prevent damage and promptly return to DEP.

1.04 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.

3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection , for dust control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:
1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure DEP's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of stairs.
5. Coordination of DEP's continuing occupancy of portions of existing building and of DEP's partial occupancy of completed Work.

D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.06 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.07 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.08 FIELD CONDITIONS

A. DEP will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so DEP's operations will not be disrupted.

B. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
   1. Hazardous material remediation is specified elsewhere in the Contract Documents.
   2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
   3. DEP will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
   4. If additional suspected hazardous materials are encountered, do not disturb; immediately contact Engineer and DEP for instructions on how to proceed.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

1.09 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition or construction, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
   1. Sika Sarnafil roofing

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with DEP's operations.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by DEP. DEP does not guarantee that existing conditions are same as those indicated in Project Record Documents.

B. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
   2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.02 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. DEP will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to DEP.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.04 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01521 – Temporary Field Office Trailers, and Section 02371G – Dust, Soil Erosion and Sedimentation Control.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.05 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

10. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.06 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

B. Do not allow demolished materials to accumulate on-site.

C. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

D. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

E. Burning: Do not burn demolished materials.

3.08 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 02910G
Planting

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02910 – Planting except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Replace 1.01A.2. with the following:

2. Furnishing and installing new hydroseeded lawns.

Replace 1.01A.7. with the following:

7. Guarantee of all new plant materials for a period of 24 months.

Replace 1.01A.8. with the following:

8. Maintenance of plantings during the 24-month guarantee period.

Delete 1.01A.4. in its entirety.

1.02 RELATED SPECIFICATIONS

Add the following to 1.02.

E. Detailed Specification 01270 – Measurement and Payment.

1.02 PAYMENT

Replace 1.02 with the following:

No separate payment will be made for performing any Work required under this Specification.

1.07 SUBMITTALS

Add the following after 1.07.C.1.

2. Erosion Control Mat: 10” x 10” sample of material 30 (thirty) days prior to installation for approval by City and Engineer.

Replace 1.07.D with the following:

D. Growers/Nurseries: Contractor shall submit a list of proposed growers/nurseries prior to the commencement of any landscaping work, with sufficient advance notice of at least 90 (ninety) days.

Replace 1.07.F with the following:

F. Materials/Certificates: Contractor shall submit a list of all materials and certificates in this Section prior to the commencement of any landscaping work, with sufficient advance notice of at least 90 (ninety) days.

Replace 1.07.I with the following

I. Documentation: The Contractor shall submit written documentation at least 60 (sixty) days prior to scheduled start of planting that all plant material has been ordered.

Replace 1.07.H.1 with the following:

1. Manufacturers' product information for erosion control mat, showing conformance with the specified requirements

1.11 WARRANTY (GUARANTEE PERIOD)

Replace 1.11.A with the following:

A. All new plant material shall be guaranteed for a period of 24 months after the date of Substantial Completion.

Replace 1.11.C.6 with the following:

C.6 Guarantee all replaced material for a period of 24 months after the date of replacement, or until Final Acceptance.

2.02 MATERIALS

Delete 2.02.C DRAINAGE GRAVEL in its entirety.

Delete 2.02.E SOD GRASS in its entirety.

Add the following to Grass Seed for Lawn Areas after 2.02.F.4:

5. Seed shall be stored in original unopened packages, kept dry and not opened until needed for use. Damaged or faulty packages shall not be used and will be rejected. Seed shall have been harvested from the previous growing season.
6. Seed shall be no less than 75% Pure Live Seed (PLS). Quantities shall be calculated by quantity of PLS. Legume seed shall be inoculated with Rhizobia bacteria.
7. Seed shall be delivered to site in separate packages and shall be machine mixed of hand broadcast in smaller areas where appropriate, on site as approved by the Engineer or Engineer's Designated Representative.
8. Apply seed with drop or cyclone spreaders to uniformly cover seedbed at the rate required.
9. Carrier Medium for Seed Applied by Conventional Seeding Methods:
    a. Seed Mix shall be missed with clean moistened sand. Sand shall consist of clean, hard, durable, uncoated stone particles, free from lumps of clay and all deleterious substances. Sand shall be so graded that when dry, one-hundred percent (100%) shall pass through a one-quarter inch (1/4") square opening sieve; not more than thirty-five percent (35%) by shall pass a No. 50 sieve and not more than ten percent (10%) by weight shall pass a No. 100 sieve. Sand may be rejected for this class if it contains more than ten percent (10%) by weight of loam and/or silt. Sand shall be mixed at a rate of 10 parts sand to 1 part seed.

Delete 2.02.F.2 in its entirety.

Delete 2.02.G GRASS SEED FOR HYDROSEEDED AREAS in its entirety

Delete 2.02.H Native Grass and Wildflower Seed Mix in its entirety

Replace 2.02.I FILTER FABRIC with the following:

I. Erosion Control Mat
    1. Erosion control mat shall meet the following requirements:

Netting	One Side Only, Organic Leno Weave Jute, 100% Biodegradable 0.5" x 1.0" opening
Matrix	100% Agriculture Straw 0.55 lbs/yd^2 298.4 g/m^2
Thread	1.5" stitch space,

100% Biodegradable

Index Value Properties

Property	Test Method	Typical
Mass/Unit Area	ASTM D6475	10.00 oz/yd^2
Thickness	ASTM D6525	.40 in
Tensile Strength-MD	ASTM D6818	106 lb/ft
Elongation-MD	ASTM D6818	16.7%
Tensile Strength-TD	ASTM D6818	118 lb/ft
Elongation-TD	ASTM D6818	26.8%
Light Penetration	ASTM D6567	6%
Water Absorption	ASTM D1117	322%
Unvegetated Shear Stress	ASTM D6460	1.55 lbs/ft^2
Slope		3:1 or flatter

2. The Erosion Control Mat must be ECS-1B, by East Coast Erosion Blankets, Bernville, PA; BioNet S75BN by North American Green, Evansville, IN; US-1SNN by L and M Supply Co., Pearson, GA; or approved equal.

3. Wire Staples must consist of 12-inch lengths of No. 11 gauge wire bent to form a "U" or other wire staples as approved.

3.02 PREPARATION FOR PLANTING

Replace 3.02.A. with the following:

A. Install erosion control mat over permanently seeded areas immediately following seeding and in areas as shown on Drawings.
   1. Erosion control mat must be placed on topsoil perpendicular to slope contours where directed by the Engineer. Erosion control mat must be laid without stretching so that it lies loosely on the soil and in contact with the soil at all points and must be pressed firmly into the soil surface by rolling or tamping. If seeding is required, it must be done prior to the installation of the erosion control mat.

1. The upper end of each roll of erosion control mat must be turned and buried to a depth of six (6) inches, with the soil firmly tamped against it. Erosion control matting must have a minimum lap of six (6) inches on all sides. Ends of rolls must also have a minimum lap of six (6) inches with the upgrade section on top.

2. Check slots must be constructed at intervals of 50 feet, unless otherwise directed by placing a fold of erosion control mat six (6) inches vertically into the ground with replaced soil tamped firmly against it.

3. Erosion control mat must be held tightly to the soil by staples driven firmly into the ground. Staples must be spaced not more than three (3) feet apart, along the sides and center of the erosion control mat and not more than one (1) foot apart at roll ends, check slots and at other critical areas as determined by the Engineer.

3.03 PLANT INSTALLATION

Planting shall occur on the dates indicated in the Specification with exceptions as follows:

Replace 3.03.A.1 B&B DECIDUOUS TREES AND SHRUBS with the following:

1. Spring: March 1st to May 15th

2. Fall: October 15th to December 15th

Replace 3.03.A.3 B&B EVERGREEN TREES AND SHRUBS with the following:

a. Spring: March 15th to May 15th

b. Fall: September 1st to October 15th

Replace 3.03.A.4 CONTAINER-GROWN PERRENIALS, VINES AND GROUNDCOVER PLANTS:

a. Spring: April 15th to June 15th

b. Fall: August 15th to September 15th

3.05 SODDING & SEEDING OPERATIONS

Delete 3.05.A SODDING OPERATIONS in its entirety.

Add the following after 3.05.B.9:

10. Permanent seeded areas must be covered with erosion control mat and as indicated by Contract Drawings or as directed by the Engineer, immediately following seeding.

Replace 3.05.F.1 MOWING with the following:

1. Mowing of all seeded areas shall begin when lawn is firmly rooted and secure, and has reached a

height of 3 inches, and shall continue until Substantial Completion.

3.06 PLANT PROTECTION & MAINTENANCE

Add the following after 3.06.B.10:

Erosion Control Mat: The Contractor shall maintain the areas of the erosion control mat installation until Final Acceptance. Maintenance shall consist of providing protection for erosion control mat and repair of areas damaged by equipment, erosion, fire, or other causes, as well as re-establishment of the grade and conditions of the area as specified.

Add the following after 3.06.B.18.d:

e. The guarantee of all replacement plants shall extend for an additional period of 24 months from the date of their acceptance after replacement.

-END OF SECTION-

DETAILED SPECIFICATION 03210G – REINFORCING STEEL

CONTRACT CRO-624G

SECTION 03210G

REINFORCING STEEL

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 03210 – Reinforcing Steel, except as modified herein.

PART 1 GENERAL

PART 2 1.02 PAYMENT

Replace 1.02A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 3 PRODUCTS

3.06 MANUFACTURERS

Replace 2.06C with the following:

A. The adhesive system shall be:

a. HIT HY-200 Adhesive Anchoring System as manufactured by Hilti, Inc

b. Epcon C6+ Adhesive Anchoring System as manufactured by ITW Redhead

c. Pure 110+ Epoxy Adhesive Anchor System" by DeWalt

d. Or approved equal.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 03290G

JOINTS IN CONCRETE

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 03290 – Reinforcing Steel, except as modified herein.

PART 1 GENERAL

PART 2 PRODUCTS

Replace 2.03.A.1 with the following:

1. Sikaflex-2C NS/SL as manufactured by Sika Corporation, Lyndhurst, NJ.

Replace 2.03.B.2 with the following:

2. Sikaflex 1A, Sika Corporation, Lyndhurst, NJ.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 03300G
Cast-in-Place Concrete

NOTE: This Detailed Specification 03300G - Cast-in-Place Concrete replaces General Specification 03300 - Cast-in-Place Concrete in its entirety. Whenever a reference appears in the Contract Documents to General Specification 03300, it shall now be deemed to refer to Detailed Specification 03300G.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Work specified in this Section consists of providing all labor, materials, equipment, supervising, testing, and incidentals necessary to furnish and install cast-in-place concrete as indicated on the Contract Drawings and as specified herein.

B. Work includes producing concrete consisting of Portland cement fine and coarse aggregate, water and approved admixtures; proportioned, mixed, transported, placed, finished, and cured as specified. Work shall also include:

1. Providing openings in concrete as required to accommodate Work under this and other Sections and Contracts.

2. Building into the concrete all items such as sleeves, frames, anchor bolts and inserts required to accommodate Work under this and other Sections and Contract Drawings.

C. This Section covers cast-in-place structural concrete for use in buildings and structures and miscellaneous cast-in-place concrete.

D. An index of the Articles in this Section is presented hereinafter for the convenience of the Contractor.

1.02 RELATED SPECIFICATIONS

A. General Specification 03100 - Concrete Formwork

B. General Specification 03210 - Reinforcing Steel

C. General Specification 03290 - Joints in Concrete

D. General Specification 03350 - Concrete Finishes

E. General Specification 03600 - Grout

1.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

B. No payment will be made for concrete or grout that does not conform to the approved concrete mix design until a disposition is made by the Supervising Engineer for Concrete Construction. Payment shall be subject to the conditions of Section 3.07.C.8 through 3.07.C.9 of General Specification 03300 – Cast-in-Place Concrete.

1.04 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M 182 Burlap Cloth Made from Jute or Kenaf

2. AASHTO T 318 Proposed Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying

B. American Concrete Institute (ACI):

1. ACI 116R Cement and Concrete Terminology
2. ACI 117 Standard Tolerances for Concrete Construction and Materials
3. ACI 207.1R Mass Concrete
4. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
5. ACI 214 Recommended Practice for Evaluation of Strength Test Results of Concrete
6. ACI 301 Specification for Structural Concrete
7. ACI 302R Guide for Concrete Floor & Slab Construction
8. ACI 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete
9. AC 305R Hot Weather Concreting
10. ACI 306R Cold Weather Concreting
11. ACI 308.1 Specification for Curing Concrete
12. ACI 309R Guide for Consolidation of Concrete
13. ACI 311 Recommended Practice for Concrete Inspection
14. ACI 318 Building Code Requirements for Structural Concrete
15. ACI 347R Guide to Formwork for Concrete
16. ACI 506 Guide to Shotcrete
17. ACI 506.2 Specification for Shotcrete
18. ACI SP-2 ACI Manual of Concrete Inspection
19. ACI SP-15 Field Reference Manual Standard Specifications for Structural Concrete ACI 301 with selected ACI references.

C. American National Standards Institute/National Science Foundation (ANSI/NSF) Standard 61 - “Drinking Water System Components - Health Effect”

D. American Society for Testing and Materials (ASTM)

1. ASTM C 31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C 33 Standard Specification for Concrete Aggregates
3. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C 42 Standard Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
5. ASTM C 88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
6. ASTM C 94 Standard Specification for Ready-Mixed Concrete
7. ASTM C 109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
8. ASTM C 138 Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
9. ASTM C 143 Standard Test Method for Slump of Hydraulic Cement Concrete
10. ASTM C 150 Standard Specification for Portland Cement
11. ASTM C 157 Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete
12. ASTM C 171 Standard Specification for Sheet Materials for Curing Concrete
13. ASTM C 172 Standard Practice for Sampling Freshly Mixed Concrete
14. ASTM C 173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
15. ASTM C 227 Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations
16. ASTM C 231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
17. ASTM C 260 Standard Specification for Air-Entraining Admixtures for Concrete
18. ASTM C 309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
19. ASTM C 311 Test Method for Sampling & Testing Fly Ash or Natural Pozzolans for Use in Concrete

20. ASTM C 387 Standard Specification for Packaged, Dry Combined Materials for Mortar and Concrete
21. ASTM C 470 Standard Specification for Molds for Forming Concrete Test Cylinders Vertically
22. ASTM C 494 Standard Specification for Chemical Admixtures for Concrete
23. ASTM C 595 Standard Specification for Blended Hydraulic Cements
24. ASTM C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
25. ASTM C845 Standard Specification for Expansive Hydraulic Cement
26. ASTM C 881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
27. ASTM C 882 Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
28. ASTM C 979 Standard Specification for Pigments for Integrally Colored Concrete
29. ASTM C 989 Standard Specification for Slag Cement for Use in Concrete and Mortars
30. ASTM C 1064 Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
31. ASTM C 1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
32. ASTM C 1141 Specification for Admixtures for Shotcrete
33. ASTM C 1157 Standard Performance Specification for Hydraulic Cement
34. ASTM C 1240 Standard Specification for Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout
35. ASTM C 1398 Test Method for Laboratory Determination of Time of Setting of Hydraulic-Cement Mortars Containing Additives for Shotcrete by the Use of Gillmore Needles
36. ASTM C 1480 Packaged, Pre-Blended, Dry Combined Materials for Use in Wet or Dry Shotcrete Application

37. ASTM E 329 Standard Specification for Agencies Engaged in Construction Inspection, Testing or Special Inspection

E. The Building Code of the State of New York (NYSBC or BC)

F. Concrete Plant Manufacturer's Bureau (CPMB) - "Concrete Plant Standards"

G. Concrete Reinforcing Steel Institute (CRSI):

1. CRSI – "Manual of Standard Practice"

2. CRSI – "Placing Reinforcing Bars"

1.05 DEFINITIONS

A. The following items are defined for general use in these specifications:

1. Inspection Requirements – Special Inspections requirements of the New York State Building Code as defined in BC 1704.4 shall apply to all applicable materials and construction.

2. Normal Weight Concrete – Concrete for which density is not a controlling attribute, made with aggregates of types covered by ASTM C 33, and usually having unit weights in the range of 135 to 160 lbs. per cubic foot.

3. Supervising Engineer for Concrete Construction –Professional Engineer designated by the Commissioner, who will be responsible for coordination of Special Inspections and Buildings Form TR1 – Technical Report Statement of Responsibility. The Supervising Engineer for Concrete Construction may or may not be the Resident Engineer. The Supervising Engineer for Concrete Construction shall undertake all responsibilities outlined in Article 28 and BC1704.4 Special Inspections of the New York Building Code.

B. Other technical words and terms used in this Section are defined in ACI 116R.

1.06 GENERAL REQUIREMENTS

A. Classes of Concrete:

1. Class 25 – use for lean concrete.

2. Class B-32 – use NYSDOT specification sidewalks, headers and curb.

3. Class 45 – use for all concrete unless indicated otherwise.

B. Work in Connection with Other Disciplines:

1. All sleeves, inserts, anchors, and embedded items required for adjoining Work or for its support shall be placed prior to concreting. No concrete shall be deposited until the Resident Engineer or his authorized representative has inspected the placement of the embedded items and the reinforcing bars and has given his permission to place the concrete.

2. All Work is related to the concrete or must be supported by it, shall be coordinated with the work of this Section, including but not limited to the introduction or furnishing of embedded items prior to concrete placement.

3. Electrical conduits, junction boxes or pipes shall be placed prior to concreting. The Contractor shall coordinate the placement of such items of Work in order that they are installed in accordance with all requirements of the New York State Building Code. The Contractor shall protect such installations to the extent that they are not displaced or damaged during concrete placement.

4. Openings in slabs shall be provided for pipes, conduits, and the like required for the Work of others where indicated on the Contract Drawings or for which directions are given prior to placing concrete. When Work of others is completed, the excess part of the respective openings shall be completely closed up to the pipe sleeve and/or inserts to match the adjoining Work in a manner approved by the Supervising Engineer for Concrete Construction.

5. Sleeves for miscellaneous metal work, castings, pipes, and anchors furnished shall be set true and to proper alignment in the concrete as indicated on the Contract Drawings or required by the manufacturer's templates.

6. Voids in embedments shall be filled temporarily with readily removable material to prevent entry of concrete into the void.

1.07 QUALITY ASSURANCE

A. General:

1. Work performed under this Section shall comply with the applicable provisions and recommendations in the references of this Section.

2. The Contractor shall employ, at its own expense, a testing laboratory experienced in the design and testing of concrete materials and mixes. This laboratory shall be responsible for all concrete mix design and trial batch testing.

   a. Unless otherwise approved, all mix designs shall be run in the presence of DEP-designated personnel.

3. Testing agencies that perform testing services on concrete shall meet the requirements of ASTM E 329 and be licensed by the New York State Department of Buildings.

4. Testing laboratory shall have been inspected within the last two (2) years by the Cement and Concrete Reference Laboratory (CCRL) of the National Institute of Standards and Technology for testing concrete

aggregates and for the preparation and testing of concrete trial batches with or without admixtures. The laboratory shall provide documentation indicating how any deficiencies in the latest CCRL inspection report have been corrected.

5. Testing and inspection shall be conducted in accordance with the requirements of ASTM C 1077 and other applicable standards.

6. Prior to performing any Work, the qualifications of the proposed testing agency shall be submitted for review and acceptance by the DEP.

7. Tests of concrete required by this Section shall be made by an ACI Concrete Field Testing Technician Grade 1 or equivalent. Equivalent certification programs shall include requirements for written and performance examinations as stipulated in ACI publication CP1.

8. Prior to approval, all testing of proposed materials and mix designs including trial batch and shrinkage testing shall be at the Contractor's expense.

9. Concrete materials and operations will be tested and inspected by the Supervising Engineer for Concrete Construction or his authorized representative as the Work progresses. Failure to detect defective Work or material shall not in any way prevent later rejection when a defect is discovered nor shall it obligate the Engineer for final acceptance.

10. Materials and installed Work may require testing and retesting, as directed by Engineer, at any time during the progress of the Work. Contractor shall allow free access to material stockpiles and facilities at all times. Tests not specifically indicated to be done at DEP's expense, including the retesting of rejected materials and installed Work, shall be done at Contractor's expense.

B. Laboratory Trial Batch:

1. Each concrete mix specified shall be verified by a laboratory trial batch, unless indicated otherwise. Each trial batch shall also be witnessed by a DEP representative.

2. Each trial batch shall be reported on DEP's Mix Design Submittal (MDS) forms and shall include the following testing:

a. Aggregate gradation for fine and coarse aggregates.

b. Combined aggregate gradation including total percentage of each aggregate size retained on each sieve.

c. Fly ash or ground granulated blast furnace slag testing to verify meeting specified properties, unless certification by an independent testing laboratory is provided by the fly ash or ground granulated blast furnace slag supplier.

d. Slump.

e. Air content.

f. Compressive strength based on 3 cylinders tested at 7 days and 3 cylinders tested at 28 days (6 cylinders minimum.)

g. Shrinkage tests, as specified herein, for all Class 45 concrete.

3. Each trial batch shall provide the following information:

a. Project identification name and number.

1) Specified strength f'c.

2) Name of the concrete producer supplying materials.

3) Name of the Design Trial Lab.

b. Date of trial.

c. Complete identification of aggregate source of supply.

d. Tests of aggregates for compliance with specified requirements.

e. Scale weight of each aggregate.

f. Absorbed water in each aggregate.

g. Brand, type, and composition of cement.

h. Brand, type, and amount of each admixture.

i. Amounts of water used in trial mixes.

j. Proportions of each material per cubic yard.

k. Gross weight and yield per cubic yard of trial mixtures.

l. Measured slump.

m. Measured air content.

n. Shrinkage test results where required and as specified herein.

o. A minimum of three (3) trial runs with different water/cement ratios shall be performed for each mix design proposed.

p. Compressive strength developed at 7 days and 28 days, and if required, 56 days or longer. A minimum of three (3) test cylinders shall be cast for each seven 7-day, 28-day and/or 56-day test for each trial run.

q. For concrete mixes with admixtures which can affect concrete strength properties, (corrosion inhibitors, accelerators, etc) trial batch batches shall be performed both with and without these admixtures.

4. The requirement for a trial batch may be waived if the required test information has been provided in a previous laboratory trial batch run on the identical mix design within the previous twelve (12) months and the history of the concrete mix field results are acceptable to the Supervising Engineer for Construction. The same brand, type, source, and supplier of all materials must have been used.

5. On the day of the trial test, the laboratory shall provide to the DEP witness a 1- 2 lb. neat cement sample for delivery to the DEP Laboratory for chemical composition analysis, for fly ash and slag and cement.

C. Shrinkage Test:

1. Drying shrinkage tests, as specified herein, shall be performed with every trial batch test.

2. Drying shrinkage specimens shall be 4-inch by 4-inch by 11-inch prisms with an effective gage length of 10 inches, fabricated, cured, dried, and measured in accordance with ASTM C 157 modified as follows: Specimens shall be removed from molds at an age of 23 ± 1 hours after trial batching, shall be placed immediately in water at 70 degrees F ± 3 degrees F for at least 30 minutes, and shall be measured within 30 minutes thereafter to determine original length and then submerged in saturated lime water at 73 degrees F ± 3 degrees F. Measurement to determine expansion expressed as a percentage of original length shall be made at age 7 days. This length at age 7 days shall be the base length for drying shrinkage calculations ("0" days drying age). Specimens then shall be stored immediately in a humidity control room maintained at 73 degrees F ± 3 degrees F and 50 percent ± 4 percent relative humidity for the remainder of the test. Measurements to determine shrinkage expressed as percentage of base length shall be made and reported separately for 7, 14, 21, and 28 days of drying after initial 7 days of moist curing.

3. The drying shrinkage deformation of each specimen shall be computed as the difference between the base length (at "0" days drying age) and the length after drying at each test age. The average drying shrinkage deformation of the specimens shall be computed to the nearest 0.0001 inch at each test age. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004 inch, the results obtained from that specimen shall be disregarded. Results of the shrinkage test shall be reported to the nearest 0.001% of shrinkage. Compression test specimens shall be taken in each case from the same concrete used for preparing drying shrinkage specimens. These tests shall be considered a part of the normal compression tests for the Project. Allowable shrinkage limitations shall be as specified in Part 2, herein.

1.08 SUBMITTALS

A. General:

1. The Contractor shall submit to the Engineer, in accordance with Section 01330 – Submittal Procedure for all concrete and grout mix designs.

2. A new mix design shall be submitted to the Engineer for approval prior to changing the brand, type, size, or source of cementitious materials, aggregates, water, ice, or admixtures, new historical field strength test data, data from new trial mixtures, or evidence which indicates that the change will not adversely affect the relevant properties of the concrete.

3. Materials, equipment, and aggregates approved by the Materials Bureau of the New York State Department of Transportation (NYSDOT), in the

most recent NYSDOT-approved lists mentioned below, are acceptable for use without a detailed submission. Submittal is required stating the particular material, equipment or aggregate source to be used with approval identification number, and/or page number.

a. Materials and Equipment NYSDOT Approved Materials List

b. Approved List Sources of Fine and Coarse Aggregates

B. Certifications:

1. All materials used in the manufacture of concrete shall be accompanied by a certificate from the manufacturer or fabricator or supplier indicating test results of current production stockpiles or shipments.

2. Submit notarized certification of conformance to referenced standards when requested by Engineer.

C. Delivery Tickets:

1. The Contractor shall submit to the Engineer a copy of the delivery ticket for each load of concrete delivered to the Site. Delivery tickets shall contain all information specified in ASTM C94 Section 14.1.

2. Provide batch tickets for each batch of job Site mixed concrete as specified.

D. Submit samples of materials as specified and as otherwise may be required by the Engineer, including names, sources, and descriptions.

E. Shop Drawings:

1. Manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.

2. All information pertinent to a concrete plant to be erected at the site as required by the CPMB Publication "Concrete Plant Standards of the Concrete Plant Manufacturers Bureau."

3. Detailed description of conveying equipment.

4. Detailed description of concrete placement methods.

5. Proposed procedures for bonding new concrete work to existing, including manufacturer's information on proposed bonding agents.

6. Proposed normal procedures for protection and curing of concrete including manufacturer's literature for proposed curing compounds.

7. Proposed special procedures for protection of concrete under wet weather placement conditions.

8. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.

9. Proposed method for underwater placement.

10. Proposed method of measuring concrete surface temperature changes and for Class 45M concrete, method of measuring concrete internal temperatures.

11. Detailed procedures and materials for repair of defective concrete.

12. Detailed procedures for removing stains, rust, efflorescence, and surface deposits.

13. Materials and procedures to be used to plug tie holes, other than for Portland cement mortar.

14. Proposed methods to measure concrete compressive strength by means other than field cured cylinders for termination of curing, such as maturity, penetration resistance, pulse velocity, rebound hammer, or pullout strength.

15. The following information, if ready-mixed concrete is used.

    a. Identification of Ready-Mixed Concrete Supplier including the plant location and all pertinent information required by the CPMB Publication "Concrete Plant Standards of the Plant Manufacturers Bureau."

    b. Locations of sources of materials for cement, fine and coarse aggregates, and water, and the brands and types of admixtures to be used.

    c. Physical capacity of mixing plant.

    d. Trucking facilities available.

    e. Estimated average amount which can be produced and delivered to the site during a normal 8-hour day, excluding the output to other customers.

16. Requests and Notifications:

a. Request to use the volumetric batching method.

b. Request for acceptance of preplacement activities: This request is to ensure that the pre-placement activities are complete and have been properly inspected. The Contractor shall sign-off on a Concrete Placement Card indicating that the Work is complete and is ready for placement. A sample of the required Concrete Placement Card is shown as Attachment 03300 B at the end of this Section. The Supervising Engineer for Concrete Construction will sign-off on the items to be inspected but this does not relieve the Contractor from coordinating the concrete placement properly and meeting all requirements of the Contract. The Contractor shall submit the completed Concrete Placement Card to the Supervising Engineer for Concrete Construction in accordance with Article 3.03 Preparation for Concrete of this General Specification, and with sufficient time to obtain receipt of authorization from DEP to place concrete in conformance with the latest DEP concrete placing guidelines.

c. Advance notification of forthcoming placement including arrangements to coordinate tests and inspection.

d. Requests to exceed the ASTM C 94 required time of discharge.

F. Test and Inspection Reports:

1. Information on types, classes, procedures, names and plant locations for cementitious materials; types, pit or quarry locations, producers' names, gradations and properties required by ASTM C 33 for aggregates; types, brand names, producers' names for admixtures; and source of supply for water and ice.

2. Except for admixtures and water, test results not more than 90 days old confirming the conformance of all concrete materials with applicable specifications.

3. Testing agencies shall submit the results of all tests and inspections performed during the course of the Work to the Supervising Engineer for Concrete Construction. Reports from the Testing Agency shall be on forms acceptable to the Supervising Engineer for Concrete Inspection.

4. Submit copies of laboratory test reports for concrete cylinders, materials and mix design tests. Engineer's review will be for information only. Production of concrete to comply with the specified requirements is the responsibility of the Contractor.

5. A complete record of the date and details of each concrete placement including the exact location thereof and the date of removal of forms.

This record shall be coordinated with and in addition to that maintained by the Supervising Engineer for concrete inspection.

6. Mixture Proportions:

   a. Mixture proportions conforming to the requirements of the New York State Administrative Building Code and this Specification for water/cement ratio, cement content, slump, maximum size of coarse aggregate, air content, admixtures, and chloride concentration, as well as compressive strength.

   b. Method and test data used to establish proportions.

7. No payment will be made for concrete or grout that does not conform to the approved concrete mix design until a disposition is made by the Supervising Engineer for Concrete Construction as defined in 1.05.4.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Cement shall be stored in weather tight buildings, bins, or silos which will provide protection from dampness and contamination and will minimize warehouse set.

B. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation or contamination with other materials or with any other sizes of like aggregates. To insure that this condition is met, any test for determining conformance to requirements for cleanliness and grading shall be performed on samples secured from the aggregates at the point of batching. Frozen or partially frozen particles shall not be used.

C. Stockpiles of natural sand shall be allowed to drain freely to minimize variations in moisture content throughout the stockpile.

D. Admixtures shall be stored in such a manner as to avoid contamination, evaporation or damage. For those used in the form of suspensions or non-stable solutions, suitable agitating equipment shall be provided to assure uniform distribution of the ingredients. Liquid admixtures shall be protected from freezing and other temperature changes which would adversely affect their characteristics. All admixture containers shall be clearly marked with paint as to their content and dosage.

PART 2 PRODUCTS

2.01 GENERAL

A. All materials used in concrete or the curing and repair of concrete, which can contact potable water, shall be certified as meeting the requirements of ANSI/NSF 61 for contact with potable water when in the finished concrete.

B. Materials listed in this Section apply to all concrete unless specified otherwise in the Detailed Specifications or for specific applications in other General or Detailed Specifications.

2.02 CEMENTITIOUS MATERIALS

A. General:

1. Cement shall be produced by an acceptable, recognized manufacturer. The cement used shall be produced by one plant only per mix design. Cement per mix design shall be of one type only.

2. Cement type used shall be appropriate for site exposures in accordance with NYS BC 1904 and ACI 350 06 Table 4.2.2.

3. Alternate cement sources may be used provided that a mix design has been accepted and a trial batch verifying performance has been made.

4. Cement which has deteriorated, become caked or partially hydrated because of improper storage or handling shall be rejected.

B. Portland Cement

1. Portland cement shall be a Type II conforming to ASTM C 150 or as otherwise specified in the Detailed Specifications. Total alkalies in the cement, calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O) shall not exceed 0.85 percent unless aggregates are shown to be non-reactive in accordance with ASTM C 1778 and ASTM C295.

C. Blended Cement:

1. Blended hydraulic cement shall be a Type IP (Portland Fly Ash Cement) or Type IS (Portland Blast Furnace Slag Cement) binary blend conforming to ASTM C 595 or as otherwise specified in the Detailed Specifications.

2. Type IP cement shall be an interground blend of Type II Portland cement and fly ash where the fly ash constituent is between 15% and 25% of the total blend weight.

3. Type IS cement shall be an interground blend of Type II Portland cement and ground granulated blast furnace slag where the slag constituent is between 35 and 50 percent of the total blend weight.

4. Fly ash and ground granulated blast furnace slag used in the production of blended cement shall meet the requirements of this Section.

D. Fly Ash and Natural Pozzolans:

1. Fly ash mineral admixture, when used, shall meet the requirements of ASTM C 618 Class F, except as follows:

a. The loss on ignition shall be a maximum of 4 percent.

b. The maximum percent of sulfur trioxide (SO_3) shall be 4.0.

2. Natural pozzolan mineral admixture, when used, shall meet ASTM C 618 Class N.

3. Fly ash used in the production of Type IP cement shall have a pozzolan activity index greater than 75 percent as specified in ASTM C595.

4. Fly ash and natural pozzolans used in concrete that contacts potable water shall be certified as meeting the requirements of ANSI/NSF 61.

E. Ground Granulated Blast Furnace Slag:

1. Ground granulated blast furnace slag (GGBF) mineral admixture, when used, shall meet the requirements of ASTM C 989, Grade 100 or better.

a. Slag used in the manufacture of an IS or I (SM) blended cement ASTM C 595 or ASTM C 1157.

2. GGBF slag will be permitted as a substitute for fly ash or natural pozzolans, at no additional cost to the DEP, in the event that Class F Fly Ash or Class N natural pozzolans are not available. The slag substitution shall be as indicated in Table 1. A higher percentage of GGBF slag of the total cementitious material in concrete shall be permitted as approved by the Engineer to suit the Project needs.

3. Laboratory trial batches will be tested to determine compliance with strength requirements, times of setting, slump, slump loss, and shrinkage characteristics.

4. GGBF slag used in concrete that contacts potable water shall be certified as meeting the requirements of ANSI/NSF 61.

F. Silica Fume:

1. Silica fume mineral admixture shall be the dry compacted or slurry form and shall meet the requirements of ASTM C 1240. Silica Fume shall be considered to be a cementitious material. Application rate shall be 7 percent by weight of cement, unless indicated otherwise.

2. Product and manufacturer, provide one of the following:

a. Masterlife SF 100 (formerly Rheomac SF100), as manufactured by BASF Construction Chemicals, LLC.

b. Force 10,000 D, as manufactured by GCP Applied Technologies (formerly W.R. Grace & Company).

c. Sikacrete 950 DP, as manufactured by Sika Corporation.

d. Eucon MSA, as manufactured by the Euclid Chemical Company.

e. Or approved equal.

2.03 AGGREGATE

A. Coarse and fine aggregates shall meet the requirements of ASTM C 33 with the requirements of Table 3, Class 4S. Soundness shall be tested using magnesium sulfate. Abrasion resistance shall be tested using the Los Angeles Abrasion Test. For testing requirements, concrete shall be assumed to be subject to abrasion.

B. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces. Marine dredged aggregates shall not be used.

C. The loading, storing, unloading, and batching of aggregates shall be done in such a manner as to prevent segregation, intermingling, or the inclusion of foreign materials. All aggregates shall remain in free drainage storage until a stable moisture content is attained prior to placement in the batching plant bins. Each size of coarse aggregate and the fine aggregate shall be kept in separate hoppers or bins. All aggregates shall be delivered to the batching plant bins by a belt conveyor or other approved means; and the operation thereof shall be controlled so as to prevent the mixing of the sizes and kinds of aggregates with each other. Any mixture of fine and coarse aggregates or of the two sizes of coarse aggregate in the batching plant bins or prior thereto shall be cause for rejection of such materials, and the affected bin or bins shall be emptied and inspected prior to refilling with the correctly graded aggregate.

D. Fine Aggregates:

1. Fine aggregate shall be composed of clean, sharp, hard, strong, durable, insoluble, uncoated, natural sand free from loam, clay lumps or other deleterious substances.

2. Dune sand, bank run sand, and manufactured sand are not acceptable.

3. Sand having FM less than 2.40 or greater than 3.00 shall not be allowed.

4. Fine aggregate shall meet the requirements of ASTM C 33 except that loss when tested for soundness using magnesium sulfate shall not exceed 12 percent.

E. Coarse Aggregates:

1. Coarse aggregate shall be crushed stone processed from natural rock or stone and shall consist of clean, hard, strong, durable, insoluble, unweathered, and uncoated pieces of uniform quality throughout; and shall be free from such alkali, decomposed minerals, organic material, clay, mica, schist, or other foreign matter that will render it unsuitable.

2. Use of slag and pit or bank run gravel is not permitted.

3. Coarse aggregate gradation shall be as specified in Table 1 Concrete Mix Requirements and shall meet the requirements of ASTM C33. All aggregate gradations listed for each class shall be used.

4. Coarse aggregate shall meet the requirements of ASTM C 33, Table 3, Class 4S, with the following additional requirements.

   a. Clay lumps shall not exceed 1.0 percent by weight of coarse aggregate.

   b. Shale and other soft particles shall not exceed 3.0 percent by weight of coarse aggregate.

   c. Thin, elongated, or laminated particles shall not exceed 3.0 percent by weight of coarse aggregate.

   d. Loss when tested for soundness using magnesium sulfate shall not exceed 12 percent.

5. Nominal maximum size of coarse aggregate shall be not larger than:

   a. 1/5 the narrowest dimension between sides of forms, nor

   b. 1/3 the depth of slabs, nor

   c. 3/4 the maximum clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, bundled tendons, or ducts.

6. The requirements of Article 2.03, Paragraph E.6, shall not apply if, in the judgment of the licensed design professional, workability and methods of construction are such that concrete can be placed without honeycombs or voids.

F. Combined Aggregate:

1. Aggregate gradations shall be determined during trial batch testing and shall be based upon the combined gradation and particle distribution in the mixture of coarse and fine aggregates.

2. Fine aggregate and coarse aggregate sizes specified shall be combined to produce a workable and cohesive concrete mix that is appropriate for its specific application. Coarse aggregate contents shall be based on

Table 6.3.3 of ACI 211.1. Adjust the content required for pumping applications as specified in ACI 211.1.

3. The total quantity of fine aggregate shall be not more than 45 percent nor less than 32.5 percent by weight of the total aggregate for normal weight concrete. Using a total quantity of fine aggregate which does not meet this specified range shall only be acceptable when approved by the Engineer. The total quantity of fine aggregate shall be not more than 45 percent nor less than 32.5 percent by weight of the total aggregate for normal weight concrete. Using a total quantity of fine aggregate which does not meet this specified range shall only be acceptable when approved by the Engineer

4. Gradations of combined aggregate shall be plotted and submitted on:

   a. A combined grading chart (percent passing versus sieve size).

   b. An aggregate Particle Distribution Chart (percent retained versus sieve size).

2.04 CONCRETE ADMIXTURES

A. Provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instructions. All admixtures shall be compatible and by a single manufacturer capable of providing qualified field service representation. Do not use admixtures which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by ENGINEER.

B. Air entraining admixtures shall conform to the NYS DOT Materials Bureau approved list and ASTM C 260.

C. Normal range or midrange water reducing admixture shall be in conformance with ASTM C 494 Type A, and comply with the NYS DOT Materials Bureau approved list.

D. High-Range Water Reducing Admixture:

1. High range water reducer shall conform to ASTM C 494, Type F or G and comply with the NYS DOT Materials Bureau approved list.

2. The high range water reducing admixture shall be accurately measured and added at the batch plant facility. The Contractor may redose the concrete no more than 2 times with the high range water reducer at the site, provided that a calibrated dispenser system and containers of high range water reducer sealed and labeled by the manufacturer are used.

E. Set Controlling Admixture:

1. Set controlling admixture shall be either with or without water-reducing properties.

2. Where the air temperature at the time of placement is expected to be consistently over 90 degrees Fahrenheit, a water-reducing set controlled admixture conforming to ASTM C 494, Type D and the NYS DOT Materials Bureau approved list.

3. Where the air temperature at the time of placement is expected to be consistently under 40 degrees Fahrenheit, except for mass concrete placement, a non-corrosive, non-chloride accelerator conforming to ASTM C 494, Type C and the NYS DOT Materials Bureau approved list shall be used.

F. Shrinkage Reducing Admixture:

1. A shrinkage reducing admixture is permitted to be used in the mix design where necessary to meet specified shrinkage limitations provided that specified strength requirements are met and there is no reduction in sulfate resistance and no increase in permeability.

2. Shrinkage reducing admixtures shall be one of the following:

a. Eclipse, manufactured by GCP Applied Technologies (formerly Grace Construction Products).

b. MasterLife SRA 20 (formerly Tetraguard AS20), as manufactured by BASF Construction Chemicals, LLC.

c. Sika Control-220, manufactured by Sika Corporation.

d. Eucon SRA-XT, manufactured by Euclid Chemical Co.

e. Or approved equal.

G. Corrosion Inhibiting Admixture:

1. Corrosion inhibiting admixture shall be a calcium nitrite solution containing a minimum of 30 percent calcium nitrite. Shall meet the requirements of ASTM C 1582 and ASTM C 494 as a Type C admixture.

2. The quantity of mix water shall be adjusted to account for the water portion of the calcium nitrite solution.

3. As the calcium nitrite solution accelerates setting time, retarding admixtures shall be provided as needed, unless the admixture has been formulated to not accelerate setting.

4. Corrosion inhibiting admixture shall be one of the following:

a. DCI or DCI-S, manufactured by GCP Applied Technologies (formerly Grace Construction Products).

b. Rheocrete CNI, manufactured by BASF Construction Chemicals, LLC.

c. Sika CNI, manufactured by Sika Corporation.

d. Eucon CIA, manufactured by Euclid Chemical Company.

e. Or approved equal.

H. Calcium chloride, admixtures containing thiocyanate, or admixtures containing more than 0.05 percent chloride ions shall not be used.

I. Crystalline waterproofing admixture and crystalline permeability reducing admixture shall be one of the following as required for specific contract work:

1. Eucon Vandex AM-10, manufactured by Euclid Chemical.

2. Sika WT-215P, manufactured by Sika Corporation Crystalline.

3. XYPEX Admix C-500 or C-1000, manufactured by XYPEX Chemical Company.

4. Krystol Internal Membrane (KIM), manufactured by Kryton.

5. Or approved equal.

2.05 WATER

A. Water for concrete, mortar, and grout shall be clean and free from objectionable mineral salts and from injurious amounts of oils, acids, alkalis, organic materials, or other substances that may be deleterious to concrete or steel. Water shall meet the requirements of ASTM C 94.

2.06 PROPORTIONING AND MIX DESIGN

A. Prepare concrete design mixes subject to the limitations listed in Table 1 – Concrete Mix Design Requirements as specified herein so as to create a homogeneous mix and a concrete which meets the specified strength requirements and, of equal importance, provides a concrete which is water tight and durable against deterioration and abrasion. The mix design shall produce a concrete of a consistency which can be placed so as to meet the required finished appearance. The minimum cement necessary to produce the required strength shall be used. This Section applies to concrete mixes using 3/8-inch and larger nominal maximum aggregate. For mixes using smaller aggregate sizes, see Detailed Specification 03600 - Grout. The mix design shall be submitted using the Mix Design Submittal Form at the end of this Section.

B. Air Content:

1. All concrete shall be air entrained unless indicated otherwise.

2. Air content for normal weight concrete shall be as follows:

NOMINAL MAXIMUM AGGREGATE SIZE (IN.)	Total Air Content, percent by Volume (+/- 1.5%)
3/8	7
3/4	6
1	6
1-1/2	5.5

3. Air content for concrete designated to receive floor hardeners shall be in accordance with manufacturer requirements.

C. Slump:

1. Slump for all concrete shall be 3 +/- 1 inches, unless indicated otherwise.

2. Where high range water reducing admixture is used, the specified water-cementitious material ratio shall be reduced by 0.02 and concrete shall be proportioned for no higher than 3-inch slump. The slump after addition of the high range water reducing admixture shall not exceed 8 inches when measured at the point of placement.

3. A tolerance of up to 2 inches above the maximum indicated slump shall be allowed for one batch in any five consecutive batches tested provided that it can be demonstrated that the specified water-cementitious material ratio is not exceeded.

D. Shrinkage Limitation:

1. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21-day drying age or at 28-day drying age shall 0.039 percent or 0.045 percent, respectively. The Contractor shall only use a mix design for construction that has first met the trial batch shrinkage requirements. Shrinkage limitations shall not apply to Class 25 concrete, unless indicated otherwise.

2. If the trial batch results fail to meet the shrinkage limitation, the mix shall be redesigned to reduce shrinkage. Alternately, the Contractor may use a higher shrinkage mix when acceptable to the Engineer provided that the amount of shrinkage reinforcement in the structures is increased as determined by the Engineer to resist the higher levels of shrinkage stresses. The additional reinforcing shall be provided at the Contractor's expense.

E. The percentage of mortar in the concrete mix shall not exceed 60 percent for Class 45 concrete. Exceeding this specified mortar percentage shall only be acceptable when approved by the Engineer.

F. Proportioning: Concrete proportions shall be determined in accordance with the provisions of the NYSBC as well as these specifications.

1. Proportions of materials for concrete shall be established to provide

   a. The proportioning of ingredients shall produce a mixture that will provide workability and consistency to permit concrete to be worked readily into the corners and angles of the forms and around reinforcement by the methods of placing and consolidation employed on the Work, but without permitting the materials to segregate or excessive bleeding. Yield of all mixes as designed shall not exceed 27.2 cu.ft./cu.yd.

   b. Resistance to special exposures are required by NYSBC Section 1904.

   c. Conformance with the strength test requirements of Section 1905.

2. Concrete is to meet the durability requirements of Section 1904 of NYSBC.

3. The determination of the concrete mix proportion to attain the required strength shall be in accordance with the procedure, as set forth herein. All mixes shall be approved by the registered design professional or record, prior to construction.

4. Where different materials are to be used for different portions of proposed Work, each combination shall be evaluated.

5. Concrete proportions shall be established in accordance with NYSBC Section 1905, and shall comply with the applicable requirements of Section 1904.

a. Proportioning on the basis of field experience/or trial mixtures. Concrete proportioning determined on the basis of field experience or trial mixtures shall be done in accordance with ACI 350, Section 5.3. If the required f'_c is obtained for trial batch mixed prior to the date specified, the trial mix design may be approved. All mixes shall be approved by the registered design professional of record, prior to construction.

b. Proportioning without field experience. Concrete proportioning determined without field experience or trial mixtures shall be done in accordance with ACI 350, Section 5.4. This method of proportioning shall not be permitted for load-carrying structural concrete or concrete mix proportions that are required to conform to NYSBC Section 1904.

6. Proportioning on the basis of field experience and/or trial mixtures using a mix design employing the same ingredients proposed for use, and used successfully on a previous Project, or Projects, may be used provided the following are submitted by a licensed concrete testing laboratory and approved by the Design Engineer of record in conformance with BC 1905.3 and ACI 350 Section 5.3.

a. The name and location of the plant from which the concrete will be batched.

b. The concrete mix design including detailed data and analysis of the ingredients proposed for use as specified herein. Concrete mix designs, including material source locations, both for the previous concrete proposed for consideration as similar for proportioning purposes and for the concrete proposed for this Project shall be submitted for Engineer consideration. Final determination of whether the proposed concrete mix is similar to a previous concrete mix is up to the licensed design professional of record.

c. Reports for at least 30 consecutive tests of 7-day and 28-day concrete strength tests of the proposed mix made during the previous twelve months of concrete batched and delivered from the same plant that is to furnish this job. These data shall include an evaluation in accordance with ACI 214 to determine the average strengths, moving averages and the coefficients of variation. In addition, the results of a minimum of 3 shrinkage tests for this mix made during the previous twelve months and using the same materials to be used on this Project.

d. Reports of compliance tests of fine and coarse aggregates made during the above tests.

7. Average strength reduction. As data becomes available during construction, it is permissible to reduce the amount by which the average compressive strength (f'_c) is required to exceed the specified value of f'_c in accordance with ACI 350, Section 5.5, if allowed by the licensed design professional of record.

8. Evaluation and acceptance of concrete. The criteria for evaluation and acceptance of concrete shall be as specified in the NYSBC and these specifications.

9. Qualified technicians. Concrete sampling frequency and testing shall be tested in accordance with the requirements of NYSBC. The testing agency shall perform tests on fresh concrete at the job site, prepare specimens required for curing under field conditions, prepare specimens required for testing in the laboratory and record the temperature of the fresh concrete when preparing specimens for strength tests. All field sampling and testing, including the testing of aggregates, concrete mixes, and strength testing of specimens, shall be subject to special inspection by an approved agency. All testing laboratories shall be approved testing agencies and shall employ qualified special inspectors to perform all required laboratory tests. Test results shall be promptly

distributed by the testing laboratory to the registered design professional of record, concrete producer, DEP, and Contractor.

2.07 BONDING AGENT

A. Provide a two component epoxy-resin bonding agent conforming to ASTM C 881.

B. Product and manufacturer, provide one of the following:

1. Sikadur 32, Hi-Mod LPL, as manufactured by Sika Corporation.
2. Eucopoxy LPL MV, as manufactured by the Euclid Chemical Company
3. MasterEmaco ADH 327 (formerly Concressive Paste LPL), as manufactured by BASF Construction Chemicals..
4. Or approved equal.

C. Provide three component epoxy modified cementitious bonding agent where two component bonding agent does not provide sufficient open time.

D. Product and manufacturer, provide one of the following:

1. Sika Armatec 110 EpoCem, as manufactured by Sika Corporation.
2. MasterEmaco P 124 (formerly Emaco P24), as manufactured by BASF Construction Chemicals
3. Ardex Baca Bonding & Anti-Corrosion Agent, by Ardex Americas
4. Or approved equal

E. All bonding agent shall be two component epoxy-resin type unless specifically noted otherwise in the Contract Documents.

2.08 FINISHING AIDS

A. Evaporation Retardant:

1. Evaporation retardant shall be a material which seals the surface of plastic concrete to prevent moisture loss. The material shall be able to be worked into the concrete surface by subsequent finishing operations with no adverse effect on finishing effort and no discoloration of the finished concrete.
2. Evaporation retardant shall be one of the following:

a. Confilm, as manufactured by BASF Construction Chemicals, LLC.

b. Eucobar, as manufactured by Euclid Chemical Company.

c. SikaFilm, as manufactured by Sika Corporation.

d. Or approved equal.

2.09 CURING AND PROTECTION MATERIALS

A. Absorptive covers shall consist of burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M 182, Class 3.

B. Curing mats shall be heavy carpets or cotton mats, quilted at 4 inches on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.

C. Moisture retaining covers shall conform to ASTM C 171 and consist of one of the following materials.

1. Waterproof paper.

2. Polyethylene film.

3. White burlap- polyethylene sheet.

D. Curing compounds shall conform to the requirements of ASTM C 309 Type 1-D (water retention requirements):

1. Provide one of the following:

a. Super Aqua Cure VOX, as manufactured by The Euclid Chemical Company.

b. Sealtight 1100, as manufactured by W.R. Meadows, Inc.

c. MasterKure, as manufactured by BASF Construction Chemicals, LLC.

d. Or approved equal.

2. Provide fugitive dye unless waived by the Engineer.

E. Insulation Blankets:

1. Closed cell flexible foam sheet material such as polystyrene or urethane. Foam sheet material which is capable of being bent 90 degrees without breaking or tearing shall be provided at corners. The foam insulation blankets shall be 1/2-inch thick.

2. Quilted, flexible insulation blankets that retain their insulating value when wet and which retard the evaporation of water.

F. Temperature Monitoring Equipment:

1. Thermocouples or thermistors shall be as manufactured by James Instruments Inc., or approved equal. They shall be suitable for embedment in concrete and capable of registering temperatures within the accuracy 0.5 degrees Fahrenheit over a minimum temperature range of 20 to 200 degrees Fahrenheit.

2. Temperature monitoring and recording equipment shall consist of rechargeable battery-powered recording thermometers with microprocessors such as the IQT-Meter or the IQM-Meter as manufactured by James Instruments Inc., or approved equal.

3. The equipment shall be capable of taking and recording temperature readings at each temperature sensor at preset time intervals. The thermometer units shall be compatible with the temperature sensors used, shall have a non-volatile memory capacity of at least 120 readings per sensor, and shall be designed to be connected to a battery-powered compatible printer unit. Time periods shall be able to be set over a minimum range of 10 to 60 minutes. The thermometer unit shall be designed and constructed for construction conditions. Sufficient thermometer units shall be provided to take readings from all temperature sensors plus one additional backup unit for every ten units in service. One printer unit shall be provided for every 20 thermometer units with sufficient paper supply to record all readings taken.

2.10 CRACK INJECTION MATERIALS

A. Epoxy:

1. Epoxy for injection shall be a low viscosity, high modulus moisture insensitive type.

2. Epoxies for injection shall be:

   a. Sikadur 35, Hi-Mod L.V., Sikadur 31, Hi-Mod Gel, and Sikadur 52 as manufactured by Sika Corporation.

   b. Eucopoxy Injection Resin, as manufactured by Euclid Chemical Company

   c. MasterInject 1500, as manufacturered by BASF Construction Chemicals.

   d. Or approved equal.

3. Viscosity of epoxy shall be as determined by the manufacturer and Engineer as appropriate for the crack size.

B. Hydrophilic Resin:

1. Hydrophilic resin shall be an acrylic-ester based resin with a maximum viscosity of 50 cps. It shall cure into a flexible rubber-like material

which has the potential for unrestrained increase in volume in excess of 100 percent in the presence of water.

2. Hydrophilic resins shall be:

   a. Duroseal Inject 215, as manufactured by Sika (formerly by BBZ USA, Inc.)

   b. Gelacryl Superflex, and DeNeef Sealfoam PURe, as manufactured by GCP Applied Technologies (formerly Grace Construction Products).

   c. AV-333 Injectaflex, as manufactured by Avanti International.

   d. Or approved equal.

3. Viscosity of resin shall be as determined by the manufacturer and Engineer as appropriate for the crack size.

2.11 CONCRETE REPAIR MATERIALS

A. Concrete repair mortar shall be a prepackaged polymer-modified cementitious repair mortar with the following minimum properties:

1. Compressive strength at one day: 2,000 psi (ASTM C 109).

2. Compressive strength at 28 days: 6,000 psi (ASTM C 109).

3. Bond strength at 28 days: 1,800 psi (ASTM C 882 modified).

B. Concrete repair mortar shall be:

1. Five Star Structural Concrete, manufactured by Five Star Products, Inc. The formulation recommended by the manufacturer for the specific application conditions shall be used.

2. SikaTop 122 Plus, SikaTop 123 Plus, SikaTop 111 Plus, or Sikacem 133, manufactured by the Sika Corporation. The formulation, among those listed, recommended by the manufacturer for the specific application conditions shall be used.

3. Emaco S88-CI or S66-CI, manufactured by BASF Construction Chemicals, LLC. The formulation, among those listed, recommended by the manufacturer for the specific application conditions shall be used.

4. Verticoat or Verticoat Supreme, manufactured by the Euclid Chemical Company. The formulation, among those listed, recommended by the manufacturer for the specific application conditions shall be used.

5. Or approved equal.

C. Cement mortar shall consist of a mix of 1 part cement to 1 1/2 parts sand with sufficient water to form a trowelable consistency. Minimum compressive strength at 28 days shall be 4,000 psi. Where required to match the color of

adjacent concrete surfaces, white Portland cement shall be blended with standard Portland cement so that, when dry, the patching mortar shall match the color of the surrounding concrete.

PART 3 EXECUTION

3.01 INSPECTION

A. The Contractor and its installer shall examine the substrate and the conditions under which Work is to be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.02 MIXING AND TRANSPORTING CONCRETE

A. General:

1. The Contractor shall provide the production of concrete which includes batching, mixing, delivering, and discharging of concrete according to the following requirements.

B. Ready-Mixed Concrete:

1. Ready-Mixed concrete shall be batched, mixed, and transported in accordance with the appropriate sections of "Specifications for Ready-Mixed Concrete" (ASTM C 94 or ASTM C685). Follow the detailed recommendations given in Guide for Measuring, Mixing, Transporting, and Placing Concrete (ACI 304R), where applicable.

2. Each truck mixer or agitator shall have attached thereto in a prominent place a metal plate issued by the Truck Mixer's Manufacturer's Bureau by the manufacturer complying with Section 11.1.2 of ASTM C 94 for that truck mixer and the limitations thereon shall be strictly adhered to.

3. Ready-mixed concrete shall only be batched in plants which meet the following requirements:

a. Concrete plants shall be certified by the National Ready Mixed Concrete Association (NRMCA) and shall comply with the rules of the department.

b. Upon written application by the producer, accompanied by a detailed report on how the facilities compare with the standards of the NRMCA, the above requirements may be waived, in writing by the Engineer.

c. If the detailed report mentioned above is issued by the testing agency which will perform the inspection of the batching and mixing of the concrete and indicates that satisfactory quality concrete can be produced by the plant in question, based on prior job performance records, then the above requirement will be waived, in writing, by the Supervising Engineer for Concrete Construction.

4. Approval of plants as outlined above is subject to the continuous checking and acceptance by the Commissioner or his duly authorized representative.

5. Only plants meeting the requirements for certification of the NRMCA for automatic batching and automatic recording will be permitted.

a. If at any time automatic proportioning or recording instruments become inoperative, the plant may be allowed to batch concrete manually or operate with manual recording for a period of not more than 48 working hours from the time of breakdown.

b. If at the end of 48 working hours, the plant is still not in operating order, the following shall be complied with:

1) DEP shall be contacted and an independent inspector, other than the regular plant inspector shall be assigned to each batching operation at the plant, at no additional cost to the DEP.

2) Additional inspectors shall observe and record the weight of each component of the batch.

3) The manually recorded batch weights shall appear on a ticket presented to inspection personnel at the project site.

6. Concrete producers shall have their plants inspected quarterly by NYSDOT.

7. Concrete producers shall have their scales and trucks certified quarterly by NYSDOT.

C. Batch Mixing at Site:

1. The concrete shall be produced in a plant conforming to the requirements of the Concrete Plant Standards and Concrete Plant Mixer Standards of the Concrete Plant Manufacturer's Bureau and ACI 350, Section 5.8. Prior to erection of such plant at the Site, the Contractor shall submit to the Supervising Engineer for Concrete Construction, for approval, all pertinent data relative to the plant.

2. All components of the plant must bear the proper rating plates issued by the Concrete Plant Manufacturers Bureau and the limitations thereon shall be strictly adhered to.

3. On job site plants for jobs requiring less than 1,000 cubic yards of structural concrete or a job site plant that would operate for less than 30 working days duration, the requirements of Paragraph B.5 above for automatic batching and automatic recording will be waived. If at any time automatic proportioning devices or recording instruments become inoperative, follow the provisions of Paragraphs B.5.a and B.5.b.

4. The batch shall be so charged into mixer that some water will enter in advance of the cement and aggregates. Water shall continue to flow for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to insure that the batch cannot be discharged until the required mixing time has elapsed. When concrete of normal weight is specified, controls shall be provided to insure that no additional water may be added during mixing. The entire batch shall be discharged before the mixer is recharged.

5. Each batch of 2 cu/yd or less shall be mixed for not less than 1 1/2 minutes. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof. Shorter mixing time may be permitted provided performance tests made in accordance with ASTM C 94 indicate that the time is sufficient to produce uniform concrete. At least three quarters of the required mixing time shall take place after the last of the mixing water has been added. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Replace mixer blades when they have lost 10 percent of their original weight.

6. When small quantities of concrete are produced on the site, measure solid materials by weight, and liquid or paste materials by weight or by volume. Mix all materials in a mechanical mixer. If packaged dry combined materials are used, they shall conform to the requirements of ASTM C 387, and shall be capable of satisfying the requirements of this Standard Specification.

D. Control of Admixtures:

1. Air entraining and chemical admixtures shall be charged into the mixture as a solution and shall be dispensed by an automatic dispenser

or similar measuring device. The accuracy of measurement of any admixture shall be within ± 3 percent. Admixtures shall be charged into the mixer in such manner as not to come into direct contact with the cement.

2. Two or more admixtures may be used in the same concrete provided such admixtures are added separately during the batching sequence and provided further that evidence is submitted to show that the admixtures used in that combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.

3. All admixtures shall be added prior to mixing.

E. Tempering and Control of Mixing Water:

1. Concrete shall be mixed only at the mix plants or at the job site. Concrete shall be mixed in quantities not to exceed immediate job placement requirements.

2. The addition of any water to the mix while the truck is en route from plant to job site is strictly prohibited. Mixing in transit is strictly prohibited. Agitating in transit is permitted, but shall be kept to a minimum.

3. When concrete arrives at the point of delivery with a slump below that which will result in the specified slump at the point of placement and is unsuitable for placing at that slump, the slump may be adjusted to the specified value by adding water if all the water required in the accepted mixture proportions has not been added at the start of mixing and if permitted by the Engineer. Addition of water shall be in accordance with ASTM C 94. Neither the specified water-cement ratio nor slump shall be exceeded. Do not make slump adjustments after 15 percent of the batch has been unloaded. Do not add water to concrete containing a plasticizing or a high range water reducing admixture. Do not add water to concrete in delivery equipment not acceptable for mixing. Measure air content of air-entrained concrete, after slump adjustment, to verify compliance to specified requirements.

4. Each increment of water added at the job site must be incorporated by additional mixing by turning the drum not less than 30 revolutions. The addition of the increments of water and the start of the mixing procedures shall not be commenced earlier than one-half hour prior to the beginning of discharge. From the time the batch or load has been mixed to the specified slump, no further water shall be added to the concrete.

5. Discharge of the concrete shall be completed within the limits set out in the following table. Time and drum revolution limits shall be measured

from the introduction of any mixing water to the cement and aggregates or the introduction of the cement to the aggregates (ribbon loading).

CONCRETE DISCHARGE REQUIREMENTS	
CONCRETE TEMPERATURE	**Limit**
Over 90°F	Concrete shall be removed from Site and discarded
85° to 90°F	1 hour or 300 revolutions, whichever comes first
80° to 85°F	1 hour 15 minutes or 300 revolutions, whichever comes first
70° to 80°F	1 hour 30 minutes or 300 revolutions, whichever comes first
Below 70°F	2 hours or 300 revolutions, whichever comes first

F. Weather Conditions:

1. Cold Weather:

   a. To maintain the temperature of the concrete above the minimum placing temperature required by Article 3.04, Paragraph D.3 the as-mixed temperature shall not be less than 55°F when the mean temperature falls below 40°F. Follow the detailed recommendations given in "Cold Weather Concreting" (ACI 306R), where applicable.

   b. If water or aggregate has been heated above 100°F, the water shall be combined with the aggregate in the mixer before cement is added. Cement shall not be added to mixtures of water and aggregate when the temperature of the mixture is greater than 90°F.

2. Hot Weather:

   a. The ingredients shall be cooled before mixing if necessary to maintain the temperature of the concrete below the maximum placing temperature required by Article 3.04, Paragraph D.3. The temperature of the concrete at initial discharge shall not exceed 85°F. Follow the detailed recommendations given in "Hot Weather Concreting" (ACI 305R), where applicable.

3. Under special circumstances, and with written approval of the Supervising Engineer for Concrete Construction, the above provisions as to the initial discharge temperature of the concrete may be modified.

4. Accelerators or retarders may be used with the approval of the Supervising Engineer for Concrete Construction. When permitted, they shall be used in accordance with "Hot Weather Concreting" (ACI 305R).

G. Mixing Small Quantities of Concrete:

1. Only when permitted by the Supervising Engineer for Concrete Construction, small quantities of concrete may be mixed either by a small manually controlled portable mixer or by hand. In such cases, volumetric measurement of aggregates will be permitted.

2. Concrete shall be hand mixed on a watertight platform. Cement and aggregates shall first be mixed dry until a uniform color is obtained. Water shall then be added and the entire mass turned over at least six times, or until the mixture is uniform and of the required consistency. Not more than one-half cubic yard of concrete shall be hand mixed in any batch.

3.03 PREPARATION FOR CONCRETE

A. All reinforcement, installation of waterstop, positioning of embedded items, and condition of formwork shall be inspected and approved by the Supervising Engineer for Concrete Construction prior to concrete placement. Contractor shall provide written notice of intention to place concrete a minimum of one (1) working day prior to placement.

B. The Contractor shall provide the following preparation before placing of concrete.

1. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.

2. Formwork shall have been completed in conformance with General Specification 03100 - Concrete Formwork; ice and standing water shall have been removed; reinforcement shall have been secured in place in conformance with General Specification 03210 - Reinforcing Steel; expansion joint material, anchors, and other embedded items shall have been positioned. Concrete shall not be placed on frozen ground.

3. Subgrade shall be watered sufficiently to achieve surface saturated density of subgrade materials.

4. Soft spots in subgrade shall be removed and replaced with approved backfill materials.

5. No concrete shall be placed until the entire preparation has been approved by the Supervising Engineer for Concrete Construction or his authorized representative.

6. When high ambient temperatures necessitate protection of concrete immediately after placing or finishing, make provisions in advance of concrete placement for windbreaks, shading, fogging, sprinkling, ponding, or wet covering with a light colored material.

7. During cold weather make provisions in advance of concrete placement to maintain the temperature of the concrete above 55ºF. Use heating, covering, or other means adequate to maintain the required temperature without injury to concrete due to concentration of heat. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases containing carbon dioxide.

3.04 CONCRETE PLACEMENT

A. General:

1. The Contractor shall provide concrete placement including preparation before placing, conveying, depositing, consolidation, weather protection, bonding, underwater concreting, and placing of grout and mortar according to the following requirements.

B. Conveying:

1. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients and in a manner which will assure that the required quality of the concrete is obtained. Follow the detailed recommendations given in "Guide for Measuring, Mixing, Transporting, and Placing Concrete" (ACI 304), where applicable.

2. Conveying equipment shall be of size and design to insure a continuous flow of concrete at the delivery end and shall be approved. Conveying equipment and operations shall conform to the following requirements:

a. Conveying equipment shall contain no aluminum components.

b. Truck mixers, agitators, and non-agitating units and their manner of operation shall conform to the applicable requirements of Article 3.02.

c. Belt conveyors shall be horizontal or at a slope which will not cause segregation or loss. Protect concrete to minimize drying and effects of temperature rise. Use an acceptable discharge hopper at the discharge end to prevent segregation. Do not allow mortar to adhere to the return length of the belt.

d. Chutes shall be metal or metal-lined having rounded bottoms and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

e. Pump equipment shall be of suitable kind and adequate pumping capacity and shall be subject to approval by the Supervising Engineer for Concrete Construction. Placement shall be controlled so that segregation does not occur in the discharged concrete. Test cylinders for strength and tests for slump, temperature, and air content shall be made on samples of concrete taken at point of discharge from the pump line.

f. The provisions of Paragraph B.2.d shall apply to placement methods delivering concrete through lines using pneumatic air pressure.

g. The provisions of Paragraphs B.2.d and B.2.e are not applicable to gunned mortar applications.

C. Depositing:

1. Concrete shall be deposited continuously, or in lifts not to exceed 18 inches in thickness such that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located at points as provided for in the Contract Drawings or as approved. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. They may remain embedded in the concrete only if made of metal or

concrete and if prior approval has been obtained. Detailed recommendations are given in "Guide for Measuring, Mixing, Transporting, and Placing Concrete" (ACI 304R), where applicable.

2. Placing of concrete in supported elements shall not be started until the concrete previously placed in columns and walls is no longer plastic and has been in place at least two hours.

3. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any procedure which will cause segregation.

4. Place concrete for beams, girders, brackets, column capitals, haunches, and drop panels at the same time as concrete for slabs.

5. When underwater placement is required or permitted, place concrete by a method acceptable to the Engineer. Deposit the fresh concrete so the concrete enters the mass of the previously placed concrete from within, displacing water with a minimum disturbance to the surface of the concrete.

6. Where a surface mortar is to be the basis of the finish, the coarse aggregate shall be worked back from the forms with a suitable tool so as to bring a full surface of mortar against the form, without the formation of excessive surface voids. All concrete shall be consolidated by internal vibration, spading, rodding, or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting or planes of weakness. Use internal vibrators of the largest size and power that can properly be used in the Work. Over vibrating and use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at many points, approximately eighteen (18) in. apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 sec. duration. A spare vibrator shall be kept on the job site during all concrete placing operations. Follow the detailed recommendations given in of ACI 309R, where applicable. Workers shall be experienced in use of the vibrators.

a. External vibration shall only be used when explicitly permitted by the Supervising Engineer for Concrete Construction. Vibrating operations shall be continuous throughout the entire section where concrete is being deposited. Vibrators shall be clamped to the studs or wales or in pairs so that while one is vibrating the other can be shifted to insure constant vibration. External vibration shall conform to the requirements of ACI 309R.

D. Protection, Weather, Placing and Preparation of Forms:

1. Concrete placed during rain, sleet, or snow, or when the mean daily temperature falls below 40°F or is expected to be below 40°F during placing or within 24 hours thereafter or rises above 90°F shall be adequately protected as provided in Article 3.05 and approval for placement shall be obtained from the Supervising Engineer for Concrete Construction.

2. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.

3. Placing temperature:

a. When the mean daily temperature falls below 40°F, the minimum temperature of concrete as placed shall be 50°F. Follow the detailed recommendations given in "Cold Weather Concreting" (ACI 306R), and in accordance with NYSBC, where applicable.

b. Concrete deposited in hot weather shall have a placing temperature which will not cause difficulty from loss of slump, flash set, or cold joints. The temperature of the concrete preferably should be less than 80°F and shall not exceed 90°F unless permitted by the Supervising Engineer for Concrete Construction. Loss of slump, flash set, or cold joints due to the temperature of the concrete as placed will not be acceptable. When the temperature of the steel is greater than 120°F, fog the steel forms and the reinforcement with water just prior to placing the concrete. Follow the detailed recommendations given in "Hot Weather Concreting" (ACI 305R) and in accordance with NYSBC, where applicable.

4. Placing:

a. Adequate skilled personnel and equipment shall be available to handle and place the concrete immediately upon delivery.

b. Dry surfaces shall be wet down before commencing placement of concrete.

c. Temperature of surfaces to receive concrete (earth, forms, reinforcing steel, etc.), should approximate the temperature of the concrete being placed.

d. Evaporation rate of water from freshly placed concrete should be held to a minimum by:

1) Shading of operations.

2) Reducing air circulation in area of operations.

3) Maintaining fog spray during operations.

e. Cold Joints shall be avoided. This can be accomplished by:

1) Providing adequate skilled personnel to handle and place the concrete immediately after its delivery to the forms at an acceptable temperature.

2) Placing in layers thin enough and areas small enough so that vibration or working of the concrete will insure complete union of adjacent layers.

3) Lengthening of setting time by use of approved water reducing retarders.

4) Placing a bulkhead at a suitable point where placement is stopped temporarily.

f. Loss of slump shall be kept at a minimum. This can be accomplished by:

1) Minimum lapse of time between mixing and placing.

2) Avoiding delays in batch mixing and truck dispatching.

3) Job conditions and equipment (chutes, access runs, etc.) being organized to prevent additional mixing.

4) Use of approved water reducing retarders.

5. Preparation of forms:

a. All forms or surfaces (subgrades, reinforcing steel) to receive concrete, in addition to the normal requirements of tightness, soundness, being free of debris, etc., shall be:

1) Protected against excessive air currents.

2) Sprinkled systematically with cool water.

b. Note: Wetting down around the Work will cool the surrounding air and increase the humidity, thus reducing temperatures and evaporation from the concrete.

E. Bonding:

1. When specified, the surface of joints shall be prepared in accordance with General Specification 03290 - Joints in Concrete.

2. The hardened concrete of joints between footings and walls or columns, between walls or columns and beams or floors they support, joints in unexposed walls and all other not mentioned below shall be dampened (but not saturated) immediately prior to placing of fresh concrete.

3. The hardened concrete of horizontal construction joints in exposed Work; horizontal construction joints in the middle of beams, girders or joints, and slabs; and horizontal construction joints in Work designed to contain liquids shall be dampened (but not saturated) then thoroughly covered with a coat of neat cement mortar of similar proportions on vertical surfaces and at least 1/2 in. thick on horizontal surfaces. The fresh concrete shall be placed before the mortar has attained its initial set.

4. Joints receiving an adhesive shall have been prepared and adhesive applied in accordance with the manufacturer's recommendations prior to placing of fresh concrete.

5. Surfaces of joints which have been obtained by the use of a chemical retarder shall have been prepared in accordance with the manufacturer's recommendations prior to placing of fresh concrete.

F. Concreting Under Water:

1. Placing concrete in water will be permitted only when approved by the Supervising Engineer for Concrete Construction. Concrete deposited under water shall be carefully placed in a compacted mass in final position by means of a tremie, a closed bottom dump bucket or other approved means, and shall not be disturbed after being deposited. Special care must be exercised to maintain still water at the point of deposit. Concrete shall not be placed in running water. Underwater formwork shall be reasonably watertight. The consistency of the concrete shall be carefully regulated and special care shall be exercised to prevent segregation of materials. The method of depositing concrete shall be regulated to produce approximately horizontal surfaces.

2. When a tremie is used, it shall consist of a tube having a diameter of not less than 10 in. and constructed in sections having flanged couplings fitted with gaskets. The tremie shall be supported to permit free movement of the discharge end over the entire top surface of the Work

and shall permit rapid lowering when necessary to choke off or retard the flow. The discharge end shall be entirely sealed at all times and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper, the tremie shall be slightly raised, but not out of the concrete at the bottom, until the batch discharges to the bottom of the hopper. The flow shall then be stopped by lowering the tremie. The flow shall be continuous until the pour has been completed.

3. When a bucket is used to place concrete in water, it shall have a capacity of not less than 1/2 cubic yard.

G. Protection and Cleaning of Exposed Structural Steel:

1. The Contractor shall take all necessary precautions to prevent mortar and concrete splashes on the steel. The Contractor shall exercise care to prevent abrasion or scuffing of the paint on the structural steel while concrete is being formed, placed or stripped.

2. The Contractor shall thoroughly clean the structural steel of all concrete drippings or other foreign matter that may have been deposited on the steel or on any other part of the structure as a result of his operations. All the Work involved in thoroughly cleaning the steel shall proceed before concrete drippings have hardened. Immediately after the concrete has been placed, the Contractor shall clean the steel with water and/or such other additional means subject to the approval of the Supervising Engineer for Concrete Construction as may be necessary to remove all mortar, concrete, and other foreign matter that has been dropped, dripped, splashed, or otherwise deposited on the steel as a result of his operations. It will be the Contractor's obligation and responsibility to remove all foreign matter to the satisfaction of the Supervising Engineer for Concrete Construction.

3. After formwork has been removed, any concrete or other foreign material that may have been previously missed and that still remains on the steel shall be removed.

H. Concrete finishes shall conform to the requirements of General Specification 03350 - Concrete Finishes.

3.05 CONCRETE CURING AND PROTECTION

A. General:

1. Protect all freshly deposited concrete from premature drying, weather elements, defacement, flowing water, and mechanical injury. The concrete shall be maintained with minimal moisture loss at a relatively constant temperature for a period of time necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements specified herein.

2. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for maintaining the concrete in a moist condition for at least a 7-day period thereafter except for high early strength concrete, for which the period shall be at least the first 3 days after placement. Horizontal surfaces shall be kept covered, and intermittent, localized drying will not be permitted.

3. Concrete curing: As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for maintaining the concrete in a moist condition for at least a 7-day period thereafter except for high early strength concrete, for which the period shall be at least the first three days after placement. Horizontal surfaces shall be kept covered, and intermittent, localized drying will not be permitted

B. Curing Methods:

1. The Contractor shall use one of the following methods to insure that the concrete remains in a moist condition for the minimum period stated above.

a. Ponding or continuous fogging or sprinkling.

b. Application of mats or fabric kept continuously wet.

c. Continuous application of steam (under 150°F).

d. Application of sheet materials conforming to ASTM C 171.

e. If approved by the Engineer, application of a curing compound in accordance with Paragraph G.

f. High Early Strength concrete shall be maintained above 50°F and in a moist condition for at least the first 3 days. Accelerated curing of concrete shall comply with ACI 318, Section 5.11.3.

C. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in paragraph B.

D. Any of the curing procedures used in Paragraph B may be replaced by one of the other curing procedures listed in Paragraph B after the concrete is one-day old. However, the concrete surface shall not be permitted to become dry at any time.

E. Curing Concrete under Cold Weather Conditions:

1. Curing under cold weather conditions shall conform to the requirements of ACI 306.

2. Stripping time for forms and supports shall be increased as necessary to allow for retardation in concrete strength caused by colder temperatures.

This retardation is magnified when using concrete made with blended cements or containing fly ash or ground granulated blast furnace slag. Therefore, curing times and stripping times shall be further increased as necessary when using these types of concrete.

3. The methods of protecting the concrete shall be approved by the Engineer and shall prevent local drying. Equipment and materials approved for this purpose shall be on the site in sufficient quantity before the Work begins. The Contractor shall assist the Engineer by providing holes in the forms and the concrete in which thermometers can be placed to determine the adequacy of heating and protection. All such thermometers shall be furnished by the Contractor in quantity and type which the Engineer directs.

F. Curing Concrete under Hot Weather Conditions:

1. When air temperatures exceed 85ºF, the Contractor shall take extra care in placing and finishing techniques to avoid formation of cold joints and plastic shrinkage cracking. If ordered by the Engineer, temporary sun shades and/or windbreakers shall be erected to guard against such developments, in addition to generous use of wet burlap coverings and fog sprays to prevent drying out of the exposed concrete surfaces.

2. Curing and protection of the concrete shall begin immediately after completion of the finishing operation. Continuous moist-curing consisting of method 1a or 1b, listed in paragraph B is mandatory for at least the first 24 hours. Method 1b may be used only if the finished surface is not marred or blemished during contact with the coverings.

3. At the end of the initial 24-hour period, curing and protection of the concrete shall continue for at least four (4) additional days using one of the methods listed in paragraph B.

4. Curing procedures during hot weather conditions shall conform to the requirements of ACI 305.

G. Use of Curing Compound:

1. Curing compound shall not be used on surfaces to receive subsequent coatings. Curing compound shall not be used on surfaces exposed to water in potable water storage tanks and treatment plants unless curing compound is certified in accordance with ANSI/NSF Standard 61.

2. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time period, and the subsequent appearance of the concrete surface shall not be affected.

3. The compound shall be applied in accordance with the manufacturer’s recommendations after water sheen has disappeared from the concrete surface and after finishing operations. The rate of application shall not

exceed 300 square feet per gallon. For rough surfaces, apply in two directions at right angles to each other.

H. Early Termination of Curing:

1. Moisture retention measures may be terminated earlier than the specified times only when at least one of the following conditions is met:

   a. The strength of the concrete reaches 85 percent of the specified 28-day compressive strength in laboratory-cured cylinders representative of the concrete in place, and the temperature of the in-place concrete has been constantly maintained at 50 degrees Fahrenheit or higher.

   b. The strength of concrete reaches the specified 28-day compressive strength as determined by accepted nondestructive methods or laboratory-cured cylinder test results.

   c. Tests are made of cylinders kept adjacent to the structure and cured by the same methods and reach 70 percent of the specified compressive strength f'c as determined in accordance with ASTM C 39.

I. Protection:

1. Floors which have received their final finish shall be closed to all traffic for at least 48 hours following the completion of trowelling. Thereafter, before the floor is subjected to any traffic, it shall be covered with paper covering meeting the requirements of ASTM C 171. This protection shall be maintained as long as necessary to avoid damage to the floor.

2. During the curing period, and thereafter as conditions may require, the concrete shall be protected from damaging mechanical disturbances, particularly excessive load stresses, heavy shock, and excess vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

3. Following removal of protective paper, the surface shall be protected from painting and other Work. All stains shall be removed.

3.06 MASS CONCRETE

A. Concrete sections 4 feet or more in the least dimension are termed mass concrete and shall conform to the special provisions of this article in addition to all applicable provisions of other articles in this Section. Mass concrete proportioning, placement, consolidation and curing shall be in accordance with ACI 304R, 309R, 211.1, and 207.1R.

B. Additional requirements for heating, cooling, curing, and protecting concrete sections more than 6 feet in the least dimension shall be as specified in the Detailed Specifications. Consideration shall be given to temperature rise caused by the hydration of the cement. Large differences in temperature within the concrete shall be avoided.

C. Proportioning and Mix Design:

1. Materials and mix proportioning for mass concrete shall be in accordance with ACI 207.1 - Mass Concrete, latest edition. Type III Portland cement and accelerating type admixtures shall not be used.

2. Selection of concrete aggregates for mass concrete is of paramount importance to the quality of the concrete and to the economy and durability of the structure. Aggregates shall conform to the requirements of ASTM C 88 and C 227. Aggregate size shall be in accordance with ASTM 467.

3. The selection of the mix design should recognize that serious volume change stresses can be avoided by controlling the temperature drop of the concrete from the maximum to ambient. Avoidance of thermal shock is important in preventing surface cracks due to temperature gradients. The maximum internal temperature will depend upon the initial concrete temperature and the type and quantity of cementitious materials used.

4. Mixes shall be designed using types and amounts of cement which will reflect lower internal temperatures. Optimum cement is only obtainable by aggregate proportioning that reduces the volume of the void spaces and depends upon aggregate gradation. Minimum cement factors with maximum size aggregate, air entrainment and low water cement ratios should be used, to produce workable concrete and the specified strength.

D. Placement:

1. Concrete with lower than usual slump may be used, provided it can be properly placed and consolidated.

2. Placing Temperatures - Unless otherwise permitted or specified, the temperature of the concrete when deposited at the point of placement shall not exceed 70°F, nor be less than 35°F. When the temperature of the surrounding air is expected to be below 40º F during placing, or within 24 hours thereafter, the temperature of the concrete when deposited at the point of placement shall be in accordance with ACI 306R.1.

3. Concrete shall not be placed until the installation of the temperature monitoring system has been inspected and approved by the Engineer

and adequate materials for the curing and thermal protection of the concrete are on the Site.

E. Curing and Protection: The curing requirements for this Section shall apply as modified in this article.

1. The curing period shall be a minimum of fourteen (14) days.

2. Temperature Monitoring:

a. For mass concrete sections identified as requiring monitoring, install temperature devices that are capable of measuring the temperature of the concrete continuously and record temperature data in increments that do not exceed 30 minutes for a minimum period of 7 days per ACI 301, Section 8.3 or as otherwise directed by the Engineer.

b. Thermocouples or thermistors shall be installed in mass concrete placements in sets of two located on a grid at a maximum spacing of 25 feet on center in each direction and no closer than 6 feet from any edge or 4 feet from any opening. One thermocouple shall be placed at mid-depth of the concrete placement and the second thermocouple shall be located directly above the first and 2 inches below the surface. Additional thermocouples shall be placed at exposed edges of concrete placements at 50 feet on center, at mid-depth, and 2 inches beneath the surface. Where cooling pipes are installed, thermocouples shall be located mid-way horizontally between the pipes.

c. Each wire lead shall extend a minimum of 6 feet out of the concrete and shall be securely labeled with the location of the corresponding sensor and a tracking number.

d. Placement plans showing all temperature sensors and manufacturer's installation instructions and operating manuals for all related equipment shall be submitted to the Engineer for approval prior to concrete placement.

e. Temperature monitoring shall continue during the curing period and until the internal temperature is within 25 degrees F of the ambient air temperature following the end of the curing period.

3. Thermal Control:

a. At mass concrete placements, the curing water added shall not be colder than 30 degrees F below the interior temperature of the concrete. If necessary, curing water shall be heated.

b. The maximum in-place concrete internal temperature shall not exceed 158 degrees F.

c. For mass concrete, large differentials of temperature between the interior of the concrete and the exterior of the concrete shall be avoided. The maximum allowable temperature differential between the interior of the concrete (core) and the exterior of the concrete (surface) shall not be more than 35 degrees Fahrenheit. When the difference in temperature between the core and the surface (horizontal or vertical) exceeds 30 degrees Fahrenheit, insulation blankets shall be added in 1/2-inch layers as needed to prevent the difference from increasing. Joints in insulation blankets shall be staggered a minimum of 12 inches at adjacent layers. Insulation blankets shall be placed over curing mats and moisture retaining cover. If the addition of layers of insulation are not sufficient to limit the temperature gradient to 35 degrees Fahrenheit, the concrete placement shall be tented and heat shall be applied as needed to control the temperature gradient.

d. Thermal controls and protection shall be maintained until the interior concrete temperature is less than 35 degrees Fahrenheit greater than the average daily ambient air temperature.

e. The rate of cooling within the interior of the concrete shall be regulated to control the temperature drop to not more than 1 degree Fahrenheit in any one hour and 10 degrees Fahrenheit in any 24- hour period.

f. Where insulation blankets are provided over mass concrete, at the end of the curing period they shall be removed one layer at a time at such a rate that the temperature differential between the core and the surface never exceeds 35 degrees Fahrenheit and the cooling rate specified above is not exceeded, but not more than one layer in an 8-hour period.

3.07 FIELD QUALITY CONTROL

A. Field Quality Control Testing:

1. General:

a. Unless required otherwise by the Detailed Specifications, all field quality control testing of materials and the resulting concrete for compliance with the technical requirements of the specifications shall be performed by the Division of Design Services of the Bureau of Engineering Design and Construction and/or it's QA/QC Consultant.

b. The use of these, or any, testing services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the Contract Documents. The Contractor is required under this contract to provide concrete of the quality specified and it is hereby emphasized that the responsibility for so doing is solely and completely his. It shall be the Contractor's responsibility to Work with the Supervising Engineer for Concrete Construction and the DEP designated Testing Laboratory and to keep himself fully informed of the Evaluation of the Compression Test results as described in Paragraph 3.07 B.

2. Testing Provided by DEP – at DEP's discretion, the following testing and inspection shall be provided.

a. Secure production samples of materials at plants or stockpiles during the course of the Work and test for compliance with the specifications unless otherwise noted in the Schedule of Mixes Proportioning and Testing of the Detailed Specifications.

b. Provide the services of a qualified concrete technician at each location on the job site where concrete is being mixed and discharged from the mixer for the duration of the concrete placement.

c. Strength Tests: The Concrete Testing Laboratory provided by DEP shall conduct all strength tests (in accordance with ASTM C39). Strength tests of the concrete shall be conducted in accordance with the following procedures.

1) Secure composite samples in accordance with ASTM C 172.

2) Each strength test shall be obtained from a different batch of concrete on a representative, truly random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.

3) Additional concrete test cylinders shall be made from concrete taken out of the bucket, hopper, or forms as directed by the Supervising Engineer for Concrete

Construction. These test cylinders shall be separate and distinct from those made from the mixer and shall be made from the same batch as the sample taken from the mixer. Where concrete is placed directly from the mixer into forms, without any intermediate conveyance, these additional cylinders will not be required.

4) When pumping or pneumatic equipment is used, samples shall be taken at the discharge end.

5) Compressive strength tests shall be conducted on a set of five specimens molded from each sample in accordance with ASTM C 31, and cured under standard moisture and temperature conditions in accordance with ASTM C 31.

6) A strength test shall be the average of the strength of two 6-inch by 12-inch or three 4-inch by 8-inch cylinders made from the same sample of concrete in accordance with BC 1905.6.2.4 and ASTM C31.

7) Test two specimens at 7 days in accordance with ASTM C 39. Test two specimens at 3 days instead of 7 days when high early strength is required.

8) Test three specimens at 28 days in accordance with ASTM C 39. The 28-day test result shall be the average of the strengths of the three specimens, except that if one specimen in a test manifests evidence of improper sampling, molding, or testing, it shall be discarded and the remaining two strengths averaged. Should more than one specimen in a test show any of the above defects, the entire test shall be discarded. When high early strength is required, the specimens shall be tested at 7 days instead of 28 days.

9) When the 7-day test results (3-day for high early strength) are below 65% of the specified strength and/or whenever the 28-day test results (7-day for high early strength) are below the specified strength, the specimens shall be kept intact and stored for a minimum of 30 days or until inspected by both the Supervising Engineer for Concrete Construction or his authorized representative and the Contractor.

10) Written results of the compression test results shall be posted on the DEP's concrete database 24 hours following the test date on the following business day. The test results are available to the Supervising

Engineer for Concrete Construction, the Engineer, Contractor, and concrete supplier. A hard copy of the final result will be sent to the Resident Engineer.

11) Unless otherwise directed, all cylinders shall only be handled by DEP designated personnel.

d. Other Required Tests:

1) Check the slump, air content, concrete temperature, unit weight, yield, and water content of each sample of concrete to be used in molding strength test specimens.

2) Perform all other field testing of concrete as required by the New York State Building Code.

3) Slump testing shall be conducted in accordance with ASTM C 143.

4) Air content testing shall be conducted in accordance with either ASTM C 231 (Pressure Method) or ASTM C 173 (Volumetric Method) on concrete samples from which the compressive strength test specimens are made. Note that the chase indicator is not the approved ASTM volumetric test method.

5) Additional tests of air content shall be performed on a regular and frequent basis for control as directed by the Supervising Engineer for Concrete Construction. A Chase indicator, calibrated at least once daily against the readings for air content obtained by methods outlined in Item 4) of this Paragraph may be used for additional testing. Use of the Chase Indicator alone will not be considered as having met the requirements of Item 1) of this Paragraph for checking air content.

6) Measurements of concrete temperature shall be performed in accordance with ASTM C 1064.

7) Unit Weight tests shall be made with a calibrated one-half (1/2) cubic foot bucket in accordance with ASTM C 138. On obtaining the unit weight, the yield shall be immediately computed as the ratio; weight of all the ingredients batched including the water added per cubic yard (from the batching ticket) divided by the unit weight determined times 27. Over-yielding or under-yielding by more than 2 percent are cause for concern and should be immediately investigated.

8) Water content testing shall be conducted in accordance with AASHTO T 318.

9) Properly note and record the time of day when all tests were made and the corresponding results. Also, record from what truckloads the samples were taken, the class of concrete which the samples represent and exactly where the concrete represented by the sample was deposited in the structure.

e. Frequency of Testing:

1) For buildings, make one strength test for each 50 cu/yd of concrete, or fraction thereof. For each mix design placed in any one day except that a minimum of two tests will be made for each day's placement.

2) The minimum number of tests shown in the following table will be made for concrete used for all structures other than buildings.

Total Cubic Yards of Concrete Placed During Day	**Minimum Number of Strength Tests**
Up to 100	One for each 50 Cu. Yds.*
OVER 100 CU. YDS.	One for each 100 Cu.Yds.*
* or fraction thereof.	

3) The Supervising Engineer for Concrete Construction may require that additional tests be made.

f. Additional Services: The DEP provided testing agency shall provide additional services to the extent deemed necessary by DEP and shall also perform the following services.

1) Inspect concrete batching, mixing, and delivery operations in accordance with inspection requirements of the administrative building code of the City of New York.

2) Check batching and mixing operations.

3) Review the manufacturer's report of each shipment of cement, aggregates, and reinforcing steel and/or conduct laboratory spot checks of these materials as received.

4) Inspect the location and dimension of the forms, the placing of the reinforcing steel, and the placing, conveying, and depositing of the concrete.

5) Sample concrete at point of placement and other locations directed by the Supervising Engineer for Concrete Construction and perform required tests.

6) Additional testing and inspection required because of changes in materials or mixture proportions requested by the Contractor. When required, such testing shall be performed at the Contractor's expense.

7) Additional testing of materials or concrete occasioned by failure to meet specification requirements. When required, such testing shall be performed at the Contractor's expense.

3. Authority and Duties of the DEP provided Special Inspection Testing Agency:

a. Special Inspections of concrete shall be in accordance with NYSBC Table 1705.3.

b. Technicians representing the testing agency shall inspect the materials and the manufacture of concrete and shall report their findings to the Supervising Engineer for Concrete Construction or his authorized representative and the Contractor.

c. When it appears that the material furnished or Work performed by the Contractor fails to fulfill specification requirements, the technician shall immediately notify the Supervising Engineer for Concrete Construction or his authorized representative, and the Contractor of such failure.

d. The technician shall not act as foreman or perform other duties for the Contractor.

e. Technicians are not authorized to revoke, alter, relax, enlarge, or release any requirement of the specifications, nor to approve or accept any portion of the Work.

4. Responsibilities and Duties of the Contractor:

a. Submit data and test documentation on materials and design mixtures including trial batch and shrinkage test results to the Engineer at least 60 days prior to the start of field operations.

b. Submit to the Supervising Engineer for Concrete Construction proposed procedures, methods, concrete mix designs, and the name and location of the particular proposed concrete.

c. Submit the quality assurance programs of the concrete suppliers and provide copies of all test reports to the Engineer.

d. Provide all materials, labor, and equipment necessary to assist the representatives of the DEP's testing agency in obtaining, preparing, and handling test samples at the project site or at other sources of material. When directed by the Engineer, the Contractor shall be responsible for transferring strength test specimens from point of casting to curing boxes and/or to testing agency vehicles.

e. Advise the Resident Engineer and the Supervising Engineer for Concrete Construction and the DEP provided Testing Agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.

f. Provide and maintain for the sole use of the testing agency adequate facilities for safe storage and proper curing of concrete test cylinders on the Project Site for the first 24 hours, as required by ASTM C 31. The Contractor shall provide an insulated box of substantial construction for use in storing cylinders on the site until such time as they are transported to the testing laboratory. The box shall be large enough to accommodate the maximum number of test cylinders which may be required for any day's concrete placement, and shall have an insulated hinged cover. Heating facilities shall be installed in the box such that the temperature within the box may be maintained at the limits specified by ASTM C 31. The box shall be of such dimensions as to permit placing the cylinders in the box one (1) high only. No stacking of cylinders will be permitted. A high-low thermometer shall be placed in the storage box and the maximum and minimum temperatures noted shall be recorded on an appropriate identification card for each test. To minimize the hazard of disturbance during curing, the storage box shall be located in an area free from vibration such as pile driving and traffic of all kinds. No concrete shall be delivered on the site until such storage curing box has been provided and any identified problems with the box addressed to the satisfaction of the Engineer. Cylinders shall remain in the curing box until ready for delivery to the testing laboratory but not less than 24 hours. Sufficient box storage capacity shall be provided by the Contractor to allow for up to 72 hours of cylinder storage.

g. The DEP provided Testing Agency shall deliver concrete test cylinders to the DEP-designated testing laboratory, or such other location as designated in the Detailed Specifications. Delivery methods shall be in accordance with the requirements of ASTM C 31. Deliveries shall be made such that cylinders remain at the job site (in the boxes provided for their storage) no less than 24 hours and no more than 72 hours after casting.

h. The Contractor shall furnish copies of mill test reports of all shipments of cement, aggregates and reinforcing steel being used to Supervising Engineer for Concrete Construction and the testing agency.

i. The Contractor shall be responsible for:

   1) All testing associated with the evaluation proposed mix designs including required trial batch and shrinkage testing.

2) Establishing and controlling the mix proportions during the entire progress of the Work in accordance with Paragraph 2.04.

3) Testing required because of changes in materials or proportions of the mix requested by the Contractor, as well as, any extra testing of concrete or materials occasioned by failure to meet specification requirements.

B. Evaluation of Concrete Quality:

1. General:

a. Concrete quality shall include but not be limited to satisfactory strength, durability, density (air entrainment), wearing quality, shrinkage cracks, color, physical appearance etc.

b. Wherever there is evidence that any of the concrete in place does not appear to produce the results required by the specifications, such concrete shall be considered questionable and evaluations shall be made as detailed below.

2. Evaluation of Compressive Test Results:

a. Test results shall be evaluated separately, for each type and each specified strength of concrete. Evaluation shall be in accordance with the ACI 214.

b. The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:

1) Every arithmetic average of any three consecutive compressive strength tests equals or exceeds the specified compressive strength f'c.

2) No individual strength test (average of two 6- inch by 12-inch or three 4-inch by 8-inch cylinders) falls below the specified compressive strength f'c by more than 500 psi when f’c is 5,000 psi or less, or by more than 0.10 f’c when f’c is more than 5,000 psi. The strength level of the concrete will be considered satisfactory as long as the averages of all sets of three consecutive compressive strength test results equal or exceed the specified compressive strength f’c and no individual strength test result falls below the specified compressive strength f’c by more than 500 psi.

c. For evaluation of the control of the quality and uniformity, each type and specified strength of the concrete shall be represented by at least five (5) tests.

d. If results of a number of consecutive seven (7) day tests at any stage of the Work indicate abnormalities or results of a number of twenty-eight (28) day tests are below the specified strengths, the production and testing of the concrete shall be immediately investigated and reported upon by the Committee noted in Item 5 of Paragraph 3.07 B. It is emphasized that the report of the Committee is advisory. The responsibility for the production of the concrete and the decision as to how to proceed with the Work remain with the Contractor. However, the decision as to how to proceed is subject to review and approval by the Commissioner.

3. Evaluation of Questionable In-Place Concrete Construction by Non-destructive Methods:

a. Visual inspection, impact hammers, sonoscopes, microscopic examination, chemical analysis of the hardened concrete, probes or other nondestructive testing devices may be used as an indicator of the relative quality and uniformity of various areas of the structure, as an aide in evaluating concrete in place, or in determining locations of areas to be cored. Any program of nondestructive testing shall be performed as directed by and under the supervision of the Committee noted in Item 5 of Paragraph 3.07 B. Test results of any program of nondestructive testing and recommendations based thereon shall be reported by the Committee to the Commissioner prior to the commencement of any other program of further testing, if recommended or required. All viewpoints if there is no complete agreement, shall be noted in the report.

b. Nondestructive Tests:

1) Test results shall be evaluated and shall be valid only if tests have been conducted by properly calibrated equipment in accordance with recognized standard procedures.

2) Nondestructive tests shall not be used as the sole basis for accepting or rejecting concrete.

4. Evaluation of Questionable In-Place Concrete Construction from Core Tests:

a. Core tests shall be conducted only as recommended and directed by the Committee noted in Item 5 of Paragraph 3.07 B and only after a program of nondestructive testing as noted in Item 3 of Paragraph 3.07 B. Core tests shall be evaluated and shall be valid only if tests have been conducted in accordance with specified procedures.

b. When core testing is required, cores shall be obtained and tested in accordance with ASTM C 42. Cores shall be tested saturated-surface-dry or shall be tested air-dry depending as to whether the area where the questionable concrete is located shall be wet or dry under service conditions. Such determination shall be made by the Committee and they shall direct the condition of the cores at the time of testing. If the cores are to be tested dry, they shall be air dried (temperature 60 to 70 degrees F and relative humidity less than 60 percent for seven (7) days before the test. If the cores are to be tested wet, they shall be tested after moisture conditioning in accordance with ASTM C 42. The laboratory report shall state whether the cores were tested saturated-surface-dry or surface-dry.

c. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Committee so as to least impair the strength of the structure.

d. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal from the structure, or is obviously defective, replacement cores shall be taken.

e. Concrete in the area represented by a core test, made and tested in accordance with the specified requirements above will be considered adequate for structural strength if the average strength of the three cores taken from the immediate area of the questionable concrete is equal to or greater than the specified strength and no single core strength is less than 85 percent of the specified strength (f'c).

f. The Committee shall determine the area where the cores are to be taken and they shall determine the number of cores to demonstrate the adequacy of the questionable concrete. Corrections to the strength values shall be made if the length to the diameter ratio is different from two. No strength correction shall be made for the age of the concrete cores.

g. If the average strength of the cores as tested is less than the required value, the Committee will make a recommendation as to whether the values obtained are acceptable or they will recommend that the values obtained be checked against a structural analysis as covered in Paragraph 3.07 C.

h. Core holes shall be plugged solid as specified.

5. Evaluation Committee:

a. The following shall constitute a Committee for the investigation and the evaluation of the quality of the concrete when there are indications that the requirements of Paragraph 3.07 B are not being met. The Resident Engineer (who shall act as Chairman of the Committee), the Supervising Engineer for Concrete Construction or his authorized representative, representatives of the Contractor, the Concrete Producer, the Testing Agency, the Architect/Engineer responsible for the design and such other members as the Commissioner may designate. Such members of the Committee as designated by the Chairman shall meet whenever request for such meeting is made by any member and/or as otherwise specified. Reports and recommendations of the Committee shall be submitted to the Contractor and the Commissioner. All viewpoints, if there is no complete agreement shall be noted in the report and reports shall be countersigned by all participating members of the Committee. The Contractor shall be responsible for the preparation and submission of reports.

b. The functions of the Committee and any reports, recommendations, etc., it submits shall be advisory in nature. The responsibility for the production and quality of the concrete remains solely and completely with the Contractor.

c. All expenses incurred due to the functioning of the Committee shall be borne by the Contractor except that all members of the Committee shall serve without fee.

6. Additional Curing:

a. If the concrete fails to meet the specified compressive strength requirements of this paragraph, additional curing as specified by the Supervising Engineer for Concrete Construction may be required and modifications may be required in the concrete mix design for the remaining concrete Work, at the expense of the Contractor, in addition to the measures outlined in Paragraph 3.07 B.

7. Acceptance of Concrete:

a. Concrete Strength:

1) Concrete not meeting the requirements of Item 2 of Paragraph 3.07 B shall be considered potentially deficient. Steps shall be taken to increase the strength to ensure that the strength level will be satisfactory. For potentially deficient concrete, see Paragraph 3.07 C.

b. Air Content:

1) Concrete not within the specified limits of air entrainment and tested in accordance with Paragraph 3.07 B shall be rejected.

2) Steps must be made to control the proper air content.

c. Slump:

1) Concrete not within the specified slump limits at the point of placement may be rejected.

2) When the concrete is tested and found to be out of specifications the Contractor shall immediately adjust the mix to bring the mixture within the specified slump limits.

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C. Acceptance of Structure:

1. General:

a. Notwithstanding the provisions of any section of this "General Specification," all concrete shall conform to the requirements of the New York State Building Code.

b. Completed concrete Work which meets all applicable requirements will be accepted without qualification.

c. Completed Concrete Work which fails to meet one or more requirements shall be considered potentially deficient. Potentially deficient concrete which has been repaired to bring it into compliance will be accepted without qualification. The decision as to whether it has been brought into compliance except as otherwise noted in this Section shall rest with the Supervising Engineer for Inspection subject to approval of the Commissioner and the Building Department.

d. Potentially deficient concrete which cannot be brought into compliance shall be evaluated by the Committee noted in Paragraph 3.07 B and a report submitted to the Commissioner. The Commissioner will then, in writing, either accept without qualification or accept subject to Retainage (as outlined in Item 8 of Paragraph 3.07 C) or direct that the concrete be reinforced or supplemented with additional construction to bring it into compliance after which it may be resubmitted to the Commissioner.

e. Repair potentially deficient concrete Work by removing and replacing or by reinforcing with additional construction as required by the Engineer. To bring the rejected Work into compliance, use repair methods that will maintain the strength of the structure and meet all other applicable requirements for function, durability, dimensional tolerances, and appearance.

f. Obtain acceptance by the Engineer for repair methods and materials and for modifications needed to assure that concrete Work complies with requirements in the Contract Documents.

g. The Contractor shall pay all costs incurred including redesign and reverification in bringing the concrete Work into compliance and acceptance.

2. Dimensional Tolerances:

a. Formed surfaces resulting in concrete outlines smaller than required by an amount exceeding the requirements of Section 3.3 of ACI 347R shall be considered deficient in strength and subject to the provisions of Item 4 of Paragraph 3.07 C.

b. Formed surfaces resulting in concrete outlines larger than required, by an amount exceeding the requirements of Section 3.3 of ACI 347R may be rejected and the excess material shall be subject to removal. If removal of the excess material is permitted, it shall be accomplished in such a manner as to maintain the strength of the section and to meet all other applicable requirements of function and appearance.

c. Concrete members cast in the wrong location may be rejected if the strength, appearance, or function of the structure is adversely affected or misplaced items interfere with other construction.

d. Inaccurately formed concrete surfaces exceeding the requirements of Section 3.3 ACI 347R and which are exposed to view may be rejected and shall be repaired or removed and replaced if required.

3. Appearance:

a. Concrete exposed to view with defects which adversely affect the appearance of the specified finish may be repaired, if possible. If, in the opinion of the Supervising Engineer for Concrete Construction, the defects cannot be repaired, the concrete shall be considered potentially deficient, such concrete shall be evaluated by the Committee noted in Paragraph 3.07 B and a report submitted to the Commissioner. The Commissioner will then in writing, either accept without qualification or accept subject to Retainage (as outlined in Item 8 of Paragraph 3.07 C) or direct that other remedial measures be taken after which it may be resubmitted to the Commissioner.

4. Strength of Structure:

a. The strength of the structure in place will be considered potentially deficient if it fails to comply with any requirements which control the strength of the structure, including but not necessarily limited to the following conditions:

1) Low concrete compression test strength as evaluated by Paragraph 3.07 B above. However, in those areas or members containing such concrete, if a structural analysis by the architect/engineer indicates the

completed structure will be suitable for its intended use, i.e., that the stresses which will be developed under design load in the members containing below-strength concrete are less than the design stress permitted for the actual compression test strengths reported and the analysis is approved by the Building Department, the member or members will be accepted without qualification.

2) Low concrete core tests as evaluated by Paragraph 3.07 B above. However, in those areas or members where core tests are made in accordance with Article 3.07 Paragraph B.4, if a structural analysis as specified in Item 1) above indicates the suitability of the structure for its intended use, i.e., that the stresses which will be developed under design load in the members containing below-strength concrete are less than the design stress permitted for the actual core test strengths reported, and the analysis is approved by the Building Department, the areas or members will be accepted without qualification.

3) Reinforcing steel size, quantity, strength, position or arrangement at variance with the specified requirements or the Contract Drawings.

4) Concrete which differs from the required dimensions or location in such a manner as to reduce the strength.

5) Curing less than specified.

6) Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

7) Mechanical injury, construction fires, accidents or premature removal of formwork likely to result in deficient strength.

8) Poor workmanship likely to result in deficient strength.

5. Action Required When Strength Is Potentially Deficient:

a. When the strength of the structure is considered potentially deficient, the following actions may be required by the Engineer/Architect:

1) Structural analysis or additional testing or both may be required.

2) Core tests may be required.

3) If testing is inconclusive or impractical or if structural analysis does not confirm the Safety of the structure, load tests may be required and their results evaluated in accordance with ACI 318.

4) Concrete Work rejected by structural analysis or by results of a load test shall be reinforced with additional construction as required by the Engineer/Architect, or replaced.

5) Document all repair Work performed to bring strength-deficient concrete Work into compliance with Contract Documents, and submit the documentation to the Engineer/Architect for acceptance.

6. Durability:

a. The durability of the concrete Work will be considered deficient and therefore the concrete Work shall be rejected, if it fails to comply with any of the requirements which control the durability of the structure, including, but not necessarily limited to, the following conditions:

1) Strength failing to comply with Paragraph 3.07 B above.

2) Materials for concrete not conforming with the specified requirements of Part 2 above.

3) Concrete not conforming with either the specified air-entrainment requirements or the air content limits.

4) Curing not accomplished in accordance with Contract Documents.

5) Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

7. Withholding:

a. Where concrete is placed which is considered to be deficient, whether in strength, appearance, durability, or any other quality defined, payment may be withheld at the discretion of the Supervising Engineer for Concrete Construction. If such concrete is subsequently accepted without qualification, then payment shall be made for such concrete including return of all monies withheld.

8. Retainage:

a. Deficient concrete which cannot be brought into compliance and is nevertheless accepted by the Commissioner shall be subject to the following permanent retainage. For every cubic yard of concrete so placed, an amount equal to 10 % of the unit price for concrete in place for unit price contracts or 10% of the price established in the detailed estimate for concrete in place for lump sum contracts shall be permanently retained.

9. Rejected Concrete:

a. Concrete which has been rejected, in writing, by the Commissioner, shall be removed and replaced. The cost of all such removed and replaced concrete shall be borne by the Contractor.

10. Protection of In-Place Concrete:

a. Loading and Support of Concrete:

1) Do not allow construction loads to exceed the superimposed load which the member, with necessary supplemental support, is capable of carrying safely and without damage. Submit for acceptance data on the amount of loading, method of distributing load, and any proposed supplemental support during construction.

b. Protection from Mechanical Injury:

1) During the curing period, protect, the Contractor shall protect the concrete and its shoring from damaging mechanical equipment inducing shock and vibrations at all times. Protect all concrete surfaces from damage by construction traffic, equipment, materials, rain or running water, and other adverse weather conditions.

3.08 CONCRETE REPAIRS

A. Repair of Formed Surfaces:

1. The following defects shall be repaired in all types of formed finishes:

a. Spalls, air bubbles, rock pockets, form depressions, and other defects which are more than 1/4-inch in depth.

b. Holes from tie rods and other form tie systems.

c. Fins, offsets, and other projections which extend more than 1/4-inch beyond the designated member surface.

d. Structural cracks, as defined by the Engineer.

e. Non-structural cracks, as defined by the Engineer, which are greater than 0.010 inches wide. In water retaining members, elevated slabs subject to rainfall and washdown, and below grade members, any crack which shows any amount of leakage. Where it is not possible to verify that a crack is not leaking, it shall be repaired.

f. Stains and substances marring the surface.

2. The following defects shall be repaired in smooth finish surfaces, in addition to those listed above:

a. Spalls, air bubbles, rock pockets, form depressions, and other defects which extend to more than 1/2-inch in width in any direction, no matter how deep.

b. Spalls, air bubbles, rock pockets, form depressions, and other defects of any size which exceed 3 in number in a 12-inch square or 12 in number in a 3-foot square.

c. Fins, offsets, and other projections shall be completely removed and smoothed.

d. Scratches and gouges in the surface.

e. Surfaces that exceed allowable tolerances.

f. Texture and color irregularities. At water retaining surfaces, texture and color irregularities need not be repaired when greater than 12 inches below the minimum normal operating water surface except where such defects are indicative of reduced durability.

3. Where a smooth rubbed or grout cleaned finish is specified, minor surface defects repairable by the finishing process need not be repaired prior to the finish application, when approved by the Engineer.

B. Method of Repair of Formed Surfaces:

1. Repair and patch defective areas with cement mortar or concrete repair mortar immediately after removal of forms and as directed by Engineer.

2. Repairs made to water bearing and below grade surfaces shall be made with repair mortar only. Repairs of form tie holes in water bearing or buried surfaces shall be made with non-shrink grout as specified in General Specification Section 03600 - Grout.

3. Cut out honeycomb, rock pockets, voids, and holes left by tie rods and bolts, down to solid concrete but, in no case, to a depth of less than 1 inch for cement mortar and 1/2-inch for repair mortar. Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, thoroughly clean and brush-coat the area to be patched with the specified bonding agent. Where concrete repair mortar is used, the surface shall be prepared and mortar placed per manufacturer's recommendations. Compact mortar in place and strike off slightly higher than the surrounding surface. Cure as specified.

4. Repairs to surfaces exposed to public view shall match the color and texture of surrounding concrete.

5. Provide test areas at inconspicuous locations to verify mixture, texture and color match before proceeding with the patching.

6. Structural cracks shall be pressure grouted using epoxy injection in accordance with the manufacturer's directions and recommendations.

7. Non-structural cracks shall be pressure grouted using hydrophilic resin in accordance with the manufacturer's directions and recommendations.

8. Fill holes extending through concrete by means of a plunger-type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to ensure completely filling.

9. Remove stains, grout accumulations, sealing compounds, and other substances marring surfaces by scrubbing, power washing, or abrasive blast using sand finer than No. 30 and air pressure from 15 to 25 psi.

C. Repair of Unformed Surfaces:

1. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish according to ACI 117. Correct low and high areas as herein specified.

2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.

3. Repair finish of unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects include crazing, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.

4. Repair structural cracks as defined by the Engineer in all structures.

5. Repair non-structural cracks as defined by the Engineer which are greater than 0.01 inches wide, which are in below grade structures, or which are exposed to public view. In water retaining structures, repair any crack which shows any amount of leakage and all cracks where leakage potential cannot be determined.

D. Methods of Repair of Unformed Surfaces:

1. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.

2. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Where the concrete has already set and repairs are required, sawcut around the perimeter of the area to be repaired to a 1/2-inch depth and remove concrete so that the minimum thickness of the repair is 1/2-inch. Apply specified concrete repair mortar in accordance with the manufacturer's directions and recommendations.

3. Remove defective areas to sound concrete with clean, square cuts, to a minimum depth of 1.5 inches. Provide 3/4-inch clearance all around exposed reinforcing steel. Clean and dampen all concrete surfaces in contact with patching concrete and brush with the specified bonding agent. Place patching concrete while the bonding agent is still tacky. Mix patching concrete of the same materials and proportions to provide concrete of the same type or class and color as the adjacent finished concrete. Place, compact, and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

4. Repair isolated random non-structural cracks in members which are not below grade or water retaining, and single holes not over 1-inch diameter, by the dry-pack method. Groove the top of cracks, and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen all cleaned concrete surfaces and brush with the specified bonding agent. Place dry-pack grout before the cement grout takes its initial set. Mix dry-pack grout as specified in Section 03600 - Grout. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.

5. Structural cracks shall be pressure grouted using an epoxy injection system. Apply in accordance with the manufacturer's directions and recommendations.

6. Non-structural cracks in below grade and water retaining structures shall be pressure grouted using hydrophilic resin. Apply in accordance with the manufacturer's directions and recommendations.

7. Where flooring material is to be installed, assure that surface is acceptable for flooring material to be installed in accordance with manufacturer's recommendations.

E. Other Methods of Repair:

1. Repair methods not specified above may be used with written approval of the Engineer.

"Table 1 -- Concrete Mix Requirements" is given in the following page

TABLE 1 - CONCRETE MIX REQUIREMENTS

Classes of Concrete	Coarse Aggregate Sizes (ASTM C 33)			Minimum Cementitious Materials (lbs/cu yd)	Cement Type (ASTM C 150)	Mineral Admixtures (%)		W/(C + P) Maximum	Specified Strength (psi)	
	A	B	C			A	B		fc minimum field condition	f_{cr} minimum for mix design
45	#57 (1" to No. 4)	#8	---	660	II	CL. F (20%)	GR.100 40%	0.42	4,500 at 28 days	5,850 at 28 days
45 w/ 3/8" aggregate	3/8" to No. 16	#8	---	660	II	CL. F (20%)	GR.100 40%	0.40	4,500 at 28 days	5,850 at 28 days
25	#57 to #67	---	---	376	II	CL. F (20%)	GR.100 40%	0.60	2,500 at 28 days	3,250 at 28 days

NOTES:
1. Concrete containing coarse aggregate smaller than #67 shall only be used with the approval of the Engineer.
2. Mineral admixtures may be substituted for cement by weight at the percentages indicated of the total weight of cementitious materials. Only one (1) mineral admixture will be approved per mix. Either fly ash (A) or GGBS (B) may be used.
3. Combine aggregates in columns A, B, and C following the requirements of paragraph 2.03.E.3.
4. Total quantity of cementitious materials (cement plus mineral admixtures) shall be used to calculate the maximum water/cementitious materials ratio.

CONCRETE PLACEMENT CARD

Contract:	**Contractor:**		
Placement Date:		**Concrete Mix:**	
Scheduled Start Time:		**Approximate Quantity:**	**cu. yds.**
Identification of Placement: **Placement No:**			
Item	**Initials** **Inspector**	**Date**	**Remarks**
Foundations			
Construction Joint Preparation			
Forms and Blockouts			
Waterstops			
Reinforcement			
Embedments/Anchor Bolts			
Piping/Test			
Temperature Checkout			
Cleanup			
Provisions for Weather			
Contractor			
Electrical Contractor			
HVAC Contractor			
Plumbing Contractor			
Structures Contractor			

Environmental Protection

Mix Design
Proportions Summary Sheet
MDS

- Use One Form Per Mix Design -

Contract:	Mix Design No. (DEP Only):	Class (Specified Strength): PSI + %	Trial Batch Date:	Submittal Date:
Mix Description (Common Name):	Contractor:		Testing Laboratory:	
	Concrete Supplier:		Testing Laboratory Address:	
☐ Conv. ☐ LW	Concrete Supplier Address:		City:	State: / Postal Code:
☐ Pump ☐ Grout	City: / State: / Postal Code:		Fly Ash: ☐ Yes, List %: ☐ No	Field Curing: ☐ Yes, Min. Days: ☐ No
☐ NW				

Specimen Transport, Testing & Disposal Ages (Use Comments Area, If Applicable):	No. of Specimens (Per Set)	Transport Age (Days)	Test Age (No. of Specimens at Days)						Disposal Age for Unused Specimens (Days)
			Preliminary		Final		Other(s)		
			Qty	Days	Qty	Days	Qty	Days	
☐ Yes ☐ No CQAP Standard	5	2	2	7	3	28	-	-	28
☐ Yes ☐ No Other:									

Cement /Slag /Fly Ash		
Grade/Class:	Source:	PCY:
Cement/Slag /Fly Ash		
Grade/Class:	Source:	PCY:
Crushed Stone		
Size Number:	Source:	PCY (SSD):
Crushed Stone		
Size Number:	Source:	PCY (SSD):
Sand		

DETAILED SPECIFICATION 03300G – CAST-IN-PLACE CONCRETE
CONTRACT CRO-624G

Type:	Source:		FM:	PCY (SSD):
Water				
		PCY:		GAL/CY:
Air Entraining Admixture				
Designation:	Brand:			OZ/CY:
_____-Range Water Reducing Agent				
Designation:	Brand:			OZ/CY:
Water-Reducing/Retarding Agent				
Designation:	Brand:			OZ/CY:
Other Admixtures				
Designation:	Brand:			OZ/CY:
Designation:	Brand:			OZ/CY:
Designation:	Brand:			OZ/CY:

Specified Slump (IN):	Specified Air Content (%):	Yield (CY):	Theoretical Unit Weight (PCF):	Water-Cement Ratio (from trial batch):
Comments:				
- Submit To NYCDEP CQAP At 1-800-673-2816 -				
Submitted By (Print):	Testing Laboratory:	Signature:		Date:

Environmental Protection

Mix Design
Submittal of Proportions
MDS

Contract:	Mix Design No. (DEP Only):	Class (Specified Strength): PSI + %	Trial Batch Date:	Submittal Date:
Contractor:	Concrete Supplier:		Testing Laboratory:	

Cement (ASTM C150)

Type:	Sp. Gr.:	Class/Grade:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Other Cementitious Materials (ASTM C18)

Type:	Sp. Gr.:	Class/Grade:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Aggregate No. 1, Fine (ASTM C33)

Type:	SSD Sp. Gr.:	Size:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Dry Rodded Unit WT (PCF):	Absorption (%):	FM:

Aggregate No. 2, Coarse (ASTM C33)

Type:	SSD Sp. Gr.:	Size:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Dry Rodded Unit WT (PCF):	Absorption (%):	

Aggregate No. 3, 4 Coarse (ASTM C33)

Type:	SSD Sp. Gr.:	Size:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Dry Rodded Unit WT (PCF):	Absorption (%):	

Aggregate No. 2, Lightweight Alternative (ASTM C330)					
Type:	Sp. Gr. Factor:	Size:	Source:	Oven Dry (PCY):	Volume (CU FT):
Loose Unit WT (PCF):		Estimated Wet (PCF):			

Chemical Admixtures (OZ/CY)			
No. 1 ASTM C:	Type:	Source:	Name:	WT (OZ):
No. 2 ASTM C:	Type:	Source:	Name:	WT (OZ):
No. 3 ASTM C:	Type:	Source:	Name:	WT (OZ):

Water (Total)			Air Content		Total Mixture Mass and Volume	
GAL:	PCY:	CU FT:	%	CU FT:	LB/CU FT:	CU FT:

Comments:

Submitted By (Print): Company: Signature: Date:

Mix Design
Aggregate Gradations
MDS

Contract:	Mix Design Number (DEP):	Class (Strength): _____ + _____ psi %	Trial Batch Date:	Submittal Date:
Contractor:	Concrete Supplier:	Testing Laboratory:	Source of Fine Aggregate:	Source of Coarse Aggregate:

Sieve Size	Percent Passing Aggregate No.								
	1 (Fine)		2 (Coarse) Stone Size (no):_____		3 (Coarse) Stone Size (no):_____		4 (Coarse) Stone Size (no):_____		Combined Gradation
	Per ASTM C33:	Tested:	Per ASTM C33:	Tested:	Per ASTM C33:	Tested:	Per ASTM C33:	Tested:	
3 IN									
2 1/2 IN									
2 IN									
1 1/2 IN									
1 IN	-								
3/4 IN	-								
1/2 IN	-								
3/8 IN	100								
1/4 IN	-								
#4	95-100								
#8	80-100								

#16	50-85								
#30	25-60								
#50	5-30								
#100	0-10								
Dry Unit WT (PCF)									
Absorption (%)									
FM									
Remarks:									

Mix Design
Trial Batches Proportions
MDS

Contract:	Mix Design No. (DEP):	Class (Strength): _____ psi +	Trial Date:	Testing Laboratory:

Material (Trial Batch Proportions Per Cubic Yard)	Trial Batch No. #1	#2	#3	#4
1. Cement				
Type: / Source:	LB:	LB:	LB:	LB:
2. Other Cementitious Material				
Type: / Source:	LB:	LB:	LB:	LB:
Grade/Class:				
3. Aggregate No. 1 (Fine) SSD				
Type: / Source:	LB:	LB:	LB:	LB:
Sp. Gr.: / FM: / Absorption (%):				
4. Aggregate No. 2 (Coarse) SSD				
Type: / Source:	LB:	LB:	LB:	LB:
Sp. Gr.: / Size: / Absorption (%):				
5. Aggregate No. 3 & 4 (Coarse) SSD				
Type: / Source:	LB:	LB:	LB:	LB:
Sp. Gr.: / Size: / Absorption (%):				
6. Aggregate No. 2 (Lightweight, Alternative)				
Type: / Source:	Oven Dry: LB:	LB:	LB:	LB:
Sp. Gr.: / Size: / Absorption (%):	Wet: LB:	LB:	LB:	LB:
7. Water (Total):	LB:	LB:	LB:	LB:

8. Water-Cementitious Ratio:				
9. Chemical Admixtures				
No. 1 Type:	WT (OZ):	WT (OZ):	WT (OZ):	WT (OZ):
No. 2 Type:	WT (OZ):	WT (OZ):	WT (OZ):	WT (OZ):
No. 3 Type:	WT (OZ):	WT (OZ):	WT (OZ):	WT (OZ):
10. Total Mass	LB:	LB:	LB:	LB:
11. Total Mass Per Cubic Foot (Theoretical Unit Weight)	PCF:	PCF:	PCF:	PCF:

Mix Design
Mixture Properties
MDS

Contract:	Mix Design No. (DEP):		Trial Date:			Testing Laboratory:
Properties	ASTM	Target Per Specification	Trial Batch No.			
			#1	#2	#3	#4
1. Fresh Concrete						
Temperature (F):	C1064					
Slump (IN):	C143					
Before Add HRWR						
End of Mixing						
15 (MIN)						
30 (MIN)						
45 (MIN)						
1 (HR)						
Unit WT (PCF):	C138					
Air Content (%):	C231/C173					
Mortar Content (%):						
Yield (CU FT/CU YD):						
Water-Cementitious Ratio						
Time of Set (MIN):	C403					
Initial (MIN):						

Final (MIN):						
Difference (MIN):						
2. Hardened Concrete						
Cylinder No.			1 (A-_____)	2 (A-_____)	3 (A-_____)	4 (A-_____)
Compressive Strength (PSI):	C39/C192					
3 Days						
Specimen 1						
Specimen 2						
Average						
7 Days						
Specimen 1						
Specimen 2						
Average						
28 Days						
Specimen 1						
Specimen 2						
Specimen 3						
Average						

Mix Design
Mixture Properties
MDS

Contract:	Mix Design No. (DEP):		Trial Date:		Testing Laboratory:	
Properties	ASTM	Target Per Specification	Trial Batch No.			
			#1	#2	#3	#4
56 Days (If Required by Contract Only)						
Specimen 1						
Specimen 2						
Average						
Shrinkage (%):	C157					
_____ Days						
Specimen 1						
Specimen 2						
Average						
_____ Days						
Specimen 1						
Specimen 2						
Average						
Observations						
Color						
Bleeding						

Heat Signature (If Specified in the Specification and for the Submitted Batch Only)						
Trial Batch No. (Submitted and Recommended for Approval by the Performing Lab Director):						
Comments:						
Laboratory Director (Print):	Company:		Signature & Seal:		Date:	
CQAS WITNESS (Print):	Company:		Signature:		Date:	
Contractor (Print):	Company:		Signature:		Date:	
Designer of Record (Print):	Company:		Signature:		Date:	

Mix Design
Laboratory Trial Batch Mix Design Data
MDS

- TO BE COMPLETED BY CQAS -

Contract No.	Contract Name:	Basic Description of Specified Mix Design (Mix Design Common Name):		Trial Batch Date:
Batch Plant Name:	Design Trial Lab Name:	Class (Specified Strength): PSI + %	Weight Type: ☐ Normal ☐ Lightweight	Concrete Type: ☐ Pump ☐ Conventional

Description				Weight Per Cubic Yard			
Mix Point No.:				1	2	3	4
Cement:			LBS				
Cementitious:			LBS				
Sand:			LBS				
Stone:			LBS				
Stone:			LBS				
Water:			GAL				
Water:			LBS				
Admixture:		Air	OZ				
Admixture:		HRWR/ MRWR	OZ				
Unit Weight:			PCF				

Description			Laboratory Trial Batch Weights			
Mix Point No.:			1	2	3	4
Cement:		LBS				
Cementitious:						
Sand:		LBS				

Stone:		LBS					
Stone:		LBS					
Water:		LBS					
Admixture:	Air	ML					
Admixture:	HRWR/ MRWR	ML					

Description		Trial Batch Results							
Mix Point No.:		1		2		3		4	
Time:		Initial	30 MIN	Initial	30 MIN	Initial	30 MIN	Initial	30 MIN
Slump:	IN								
Water Content:	LBS								
Water Used:	LBS								
Computed Mix Water:	LBS								
Total Mix Water:	LBS								
Unit Weight:	LBS								
	PCF								
Air:	%								
Temp:	DEG								
Actual W/C Ratio									

Comments:

CQAS WITNESS (Print): Company: Signature: Date:

Mix Design
Trial Batch Strength Test Results Form
ASTM C39/ C192

- TO BE COMPLETED BY CQAS -

Contract No.	Contract Name:	Design Trial Lab Name:	Class (Specified Strength): PSI + %	Trial Batch Date:

Preliminary Strength Testing (See Page 1 for Preliminary Strength Age):

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAS WITNESS (Print): Company: Signature: Date:

Final Strength Testing (See Page 1 for Final Strength Age):

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4

Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print):	Company:	Signature:	Date:

CQAS CPM Comments (Preliminary & Final Age Testing):

CQAS CPM (Print):	Company:	Signature:	Date:

Environmental Protection

k Design
al Batch Strength Test Results Form
TM C39/ C192

- TO BE COMPLETED BY CQAS -

Contract No.	Contract Name:	Design Trial Lab Name:	Class (Specified PSI + %	Trial Batch Date:

Additional Strength Testing:

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

Additional Strength Testing:

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				

Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

CQAS CPM Comments (Preliminary & Final Age Testing):

CQAS CPM (Print): Company: Signature: Date:

END OF SECTION

DETAILED SPECIFICATION 04120 – BRICK MASONRY REPAIR
CONTRACT CRO-624G

SECTION 04120
Brick Masonry Repair

NOTE: Detailed Specification 04120 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 04120.

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:
1. Repairing brick masonry.
2. Painting steel uncovered during the work (not including lintels to be replaced)

1.02 RELATED SECTIONS

General Specification 04051	-	Mortar and Masonry Grout
Detailed Specification 04121	-	Brick Masonry Repointing
General Specification 07620	-	Sheet Metal Flashing and Trim

1.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for performing any Work required under this specification.

1.04 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm

B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

C. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of bricks to freezing and thawing.

1.05 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site
a. Verify brick masonry repair personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, sequencing, tolerances, and required clearances.

c. Quality-control program.
d. Coordination with building occupants.

1.06 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform brick masonry repair work in the following sequence, which includes work specified in this and other Sections:
1. Remove plant growth.
2. Inspect masonry for open mortar joints and point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to "Brick Masonry Patching" Article. Patch holes in mortar joints according to Section 04121 "Brick Masonry Repointing."

1.07 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use.
3. Include test data substantiating that products comply with requirements.

B. Shop Drawings:
1. Include plans, elevations, sections, and locations of replacement bricks on the structure, showing relation of existing and new or relocated units.
2. Show provisions for expansion joints or other sealant joints.
3. Show steel lintels and window frames.
4. Show provisions for flashing, lighting fixtures, conduits, and weep holes as required.

5. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Initial Selection: For the following:
   1. Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches long by 1/4 inchwide, set in aluminum or plastic channels.
      a. Have each set contain a close color range of at least three Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
      b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.
   2. Sand Types Used for Mortar: Minimum 8 oz. of each in plastic screw-top jars.
   3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.
      a. Have each set contain a close color range of at least three Samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.
   4. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:
   1. Each type of brick unit to be used for replacing existing units. Include sets of Samples to show the full range of shape, color, and texture to be expected. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.
   2. Each type of patching compound in the form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
   3. Accessories: Each type of accessory and miscellaneous support.

1.08 INFORMATIONAL SUBMITTALS

A. Quality-control program.

1.09 QUALITY ASSURANCE

A. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

B. Mockups: Prepare mockups of brick masonry repair to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
   1. Masonry Repair: Prepare sample areas for each type of masonry repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches in least dimension. Construct sample areas in locations in existing walls where directed by Engineer unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
      a. Replacement: Four brick units replaced.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on brick masonry as follows:
   1. Provide test specimens as indicated and representative of proposed materials and existing construction.
   2. Existing Brick: Test each type of existing brick indicated for replacement according to testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Engineer. Take testing samples from these units.
   3. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Engineer for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.
   4. Temporary Patch: As directed by Engineer, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver bricks to Project site strapped together in suitable packs or pallets or in heavy-duty cartons and protected against impact and chipping.

B. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

F. Handle bricks to prevent overstressing, chipping, defacement, and other damage.

1.12 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit brick masonry repair work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repair brick masonry only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for masonry repair unless otherwise indicated:
   1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.
   2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after repair.

D. Hot-Weather Requirements: Protect masonry repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain each type of material for repairing brick masonry (brick, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.02 MASONRY MATERIALS

A. Face Brick: As required to complete brick masonry repair work.

1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork and with physical properties to match existing.

    a. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

2. Special Shapes:

    a. Provide molded, 100 percent solid shapes for applications where core holes or "frogs" could be exposed to view or weather when in final position and where shapes produced by sawing would result in sawed surfaces being exposed to view.
    b. Provide specially ground units, shaped to match patterns, for arches and where indicated.
    c. Mechanical chopping or breaking brick, or bonding pieces of brick together by adhesive, are unacceptable procedures for fabricating special shapes.

3. Tolerances as Fabricated: According to tolerance requirements in ASTM C216, Type FBX

B. Building Brick: ASTM C62, of same vertical dimension as face brick, for masonry work concealed from view.

1. Grade SW where in contact with earth.
2. Grade SW or MW for concealed backup.

C. Thru-wall Flashing
1. See related sections

2.03 MORTAR MATERIALS

A. See related sections.

2.04 ACCESSORY MATERIALS

A. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of bricks, less the required depth of pointing materials unless removed before pointing.

B. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

C. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI #23 (surface-tolerant, anticorrosive metal primer) or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating

1. Surface Preparation: Use coating requiring no better than SSPC-SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.
2. VOC Limit: Use coating with a VOC content of [400 g/L or less.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

2.05 MORTAR MIXES

A. See related sections

3.01 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove gutters and downspouts and associated hardware adjacent to masonry and store during masonry repair. Store in a protected area on site. Reinstall when repairs are complete.

1. Provide temporary rain drainage during work to direct water away from building.

C. Close up all openings to fully protect building and contents at end of work day each day.

3.02 MASONRY REPAIR, GENERAL

A. Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 20 feet away by Engineer.

B. Complete all masonry repair prior to window installation.

3.03 ABANDONED ANCHOR REMOVAL

A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items no longer in use unless indicated to remain.

1. Remove items carefully to avoid spalling or cracking masonry.
2. Notify Engineer before proceeding if an item cannot be removed without damaging surrounding masonry. Do the following where directed:

    a. Cut or grind off item approximately 3/4 inch beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
    b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.

3. Patch hole where each item was removed unless directed to remove and replace bricks.

3.04 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area.

C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

D. Notify Engineer of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

E. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.

F. Replace removed damaged brick with new brick to matching existing brick. Do not use broken units unless they can be cut to usable size.

G. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

1. Maintain joint width for replacement units to match existing joints.
2. Use setting buttons or shims to set units accurately spaced with uniform joints.

H. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.

1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
2. Rake out mortar used for laying brick before mortar sets according to Section 04121 "Brick Masonry Repointing." Point at same time as repointing of surrounding area.
3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.

I. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.

1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.05 PAINTING STEEL UNCOVERED DURING THE WORK

A. Notify Engineer if steel is exposed during masonry removal. Where Engineer determines that steel is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:

1. Surface Preparation: Remove paint, rust, and other contaminants according to SSPC-SP 3, "Power Tool Cleaning", as applicable to comply with paint manufacturer's recommended preparation.

2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).

B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than 1/16 inch , notify Engineer before proceeding.

3.06 BRICK MASONRY PATCHING

A. Patch the following bricks unless another type of repair or replacement is indicated:

1. Bricks indicated to be patched on drawings

3.07 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.08 FIELD QUALITY CONTROL

A. Testing Agency: DEP will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Engineer's Project Representatives: Engineer will assign Project representatives to help carry out Engineer's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Engineer's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

C. Notify inspectors and Engineer's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors and Engineer's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.09 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.

B. Masonry Waste: Remove masonry waste and legally dispose of off the Project site.

END OF SECTION

DETAILED SPECIFICATION 04120 – BRICK MASONRY REPAIR
CONTRACT CRO-624G

NO TEXT ON THIS PAGE

SECTION 04121
Brick Masonry Repointing

NOTE: Detailed Specification 04121 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 04121.

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Repointing joints with mortar.

1.02 MEASUREMENT AND PAYMENT

A. No separate payment will be made for performing any Work required under this specification.

1.03 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm

1.04 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site
   a. Verify brick masonry repointing personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Materials, material application, sequencing, tolerances, and required clearances.
   c. Quality-control program.
   d. Coordination with building occupants.

1.05 SEQUENCING AND SCHEDULING

A. Order sand and gray portland cement for pointing mortar immediately after approval of mockups. Take delivery of and store at Project site enough quantity to complete Project.

B. Work Sequence: Perform brick masonry repointing work in the following sequence, which includes work specified in this and other Sections:

1. Remove plant growth.
2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry.
5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
6. Repair masonry, including replacing existing masonry with new masonry materials.
7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in bricks according to Section 04120 "Brick Masonry Repair." Patch holes in mortar joints according to "Repointing" Article.

1.06 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use.
3. Include test data substantiating that products comply with requirements.

B. Shop Drawings:
1. Include plans, elevations, sections, and locations of repointing work on the structure.
2. Show provisions for expansion joints or other sealant joints.
3. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples for Initial Selection: For the following:
1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches long by 1/4 inch wide, set in aluminum or plastic channels.
    a. Have each set contain a close color range of at least three Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.

b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.

2. Sand Type Used for Pointing Mortar: Minimum 8 oz. of each in plastic screw-top jars.
3. Sealant materials.
4. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:
1. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches long by 1/4 inch wide, set in aluminum or plastic channels.
a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.
2. Sealant materials.
3. Accessories: Each type of accessory and miscellaneous support.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For including field supervisors and workers and testing service.

B. Preconstruction Test Reports: For existing bricks and mortar.

C. Quality-control program.

1.08 QUALITY ASSURANCE

A. Brick Masonry Repointing Qualifications: Engage an experienced brick masonry repointing firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.

1. Field Supervision: Brick masonry repointing firms shall maintain experienced full-time supervisors on Project site during times that brick masonry repointing work is in progress.

B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

C. Mockups: Prepare mockups of brick masonry repointing to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Repointing: Rake out joints in two separate areas, each approximately 36 inches high by 48 inches for each type of repointing required and repoint one of the areas.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.09 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on masonry units as follows:

1. Provide test specimens as indicated and representative of proposed materials and existing construction.
2. Existing Brick: Test each type of existing brick indicated for repointing according to testing methods in ASTM C67 for compressive strength, 24-hour cold-water absorption, five-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by Architect. Take testing samples from these units.
3. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repointing work to be performed according to product manufacturers' written instructions and specified requirements.

B. Temperature Limits: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for mortar-joint pointing unless otherwise indicated:

1. When air temperature is below 40 deg F, heat mortar ingredients and existing masonry walls to produce temperatures between 40 and 120 deg F.
2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven days after pointing.

D. Hot-Weather Requirements: Protect mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain each type of material for repointing brick masonry (cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.02 MORTAR MATERIALS

A. See related sections.

2.03 ACCESSORY MATERIALS

A. Sealant Materials:

1. Sealant manufacturer's standard elastomeric sealant(s) of base polymer and characteristics indicated below and according to applicable requirements in Section 07900 "Caulking and Sealants."

a. Type: Single-component, nonsag urethane sealant

2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.

B. Joint-Sealant Backing:

1. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended in writing by sealant manufacturer for preventing sealant from adhering to rigid, inflexible, joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

C. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

2.04 MORTAR MIXES (also see related sections)

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

C. Do not use admixtures in mortar unless otherwise indicated.

PART 3 - EXECUTION

3.01 PROTECTION

A. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
2. Keep wall area wet below pointing work to discourage mortar from adhering.
3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

B. Remove gutters and downspouts and associated hardware adjacent to masonry and store during masonry repointing. Reinstall when repointing is complete.

1. Provide temporary rain drainage during work to direct water away from building.

3.02 MASONRY REPOINTING, GENERAL

A. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.

3.03 REPOINTING

A. Rake out and repoint joints to the following extent:

1. All joints in areas indicated, see drawings.

B. Do not rake out and repoint joints where not required.

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Remove mortar from joints to depth of minimum 2 times joint width and not less than that required to expose sound, unweathered mortar. Do not remove unsound mortar more than 2 inches deep; consult Architect for direction.
2. Remove mortar from brick and other masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of brick or other masonry units or widen joints. Replace or patch damaged brick or other masonry units as directed by Architect.

D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

E. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.

2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer and allow it to become thumbprint hard before applying next layer.
3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
6. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.04 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.

1. Do not use metal scrapers or brushes.
2. Do not use acidic or alkaline cleaners.

B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.

C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Remove masking materials, leaving no residues that could trap dirt.

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives

use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

C. Notify inspectors and Architect's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors and Architect's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 04200G
Unit Masonry

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 04200 – Unit Masonry, except as modified herein.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Replace Section 2.01 A. with the following:

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Subject to compliance with requirements, available Face Brick manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Belden Brick Company (The).
2. Boral Bricks, Inc; Boral Limited.
3. Endicott Clay Products Co.

C. Subject to compliance with requirements, available Concrete Block manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. BASF Corporation.
2. Euclid Chemical Company (The); an RPM company.
3. GCP Applied Technologies Inc.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 04901G
Masonry and Stonework Restoration and Cleaning

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 04901 – Masonry and Stonework Restoration and Cleaning, except as modified herein.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Add the following to Masonry and Stonework Restoration and Cleaning (Section 2.01 A.):

1. Subject to compliance with requirements, available manufacturers offering cleaning products that may be incorporated into the Work include, but are not limited to the following:

   a. Prosoco, Inc.
   3741 Greenway Cir
   Lawrence, KS 66046
   Phone: (800) 255-4255
   Web: www.prosoco.com

   b. Diedrich Technologies, Inc.
   310 Wayto Road
   Schenectady, NY 12303
   Phone: 800-283-3888
   Web: www.diedrichtechnologies.com

   c. American Building Restoration Products
   9720 South 60th St.
   Franklin, WI 53121
   Phone: (800)346-7532
   Web: www.abrp.com

2.02 MATERIALS

Replace Section 2.02 B. with the following:

B. Replacement masonry materials shall be as specified in the Detailed Specifications 04200 - Unit Masonry.

Add the following to Section 2.02:

D. Masonry Sealer:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Protectosil CHEM-TRETE PB 100 Low VOC Water Repellent as manufactured by:

   a. Evonik Corporation
   299 Jefferson Road
   Parsippany, NJ 07054
   Phone: (800) 828-0919
   Web: www.corporate.evonik.com

   b. Description: Clear, colorless liquid containing pure alkyltrialkoxysilanes with activator.

   c. Testing:

      1) ASTM C140: 99.7% effective.

      2) ASTM C67: 99.6% effective.

      3) ASTM C642: 97.5% effective.

      4) ASTM E514: 100% reduction in leakage.

      5) ASTM D1653: 100% breathable.

   d. Application:

      1) Apply with 15 to 25 psi pumping equipment with fan type spray nozzle, power roller, or brush.

      2) Tape off, cover and protect all non-coated areas from overspray.

2. Or, subject to compliance with requirements, provide comparable product by one of the following:

   a. W.R. Meadows
   2150 Monroe Street
   York, PA 17404
   Phone: (717) 792-2627
   Web: www.wrmeadows.com

   b. Prosoco, Inc.
   3741 Greenway Cir

Lawrence, KS 66046
Phone: (800) 255-4255
Web: www.prosoco.com

c. Any other manufacturer

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 05501G
Metal Fabrications

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 05501 – Metal Fabrications except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03 A, B, C with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.01 MATERIAL

Replace 2.01 B. with the following:

B. Aluminum shapes and plate shall be 6061-T6 aluminum alloy with mill finishes (unless finish is specified otherwise on drawings) and shall be fabricated into finished products with welded or bolted connections as detailed on the Contract Drawings. Extruded shapes shall conform to the requirements of ASTM B221 and ASTM B308; plate and sheets shall conform to ASTM B209.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 05511G
METAL STAIRS

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 05511 – Metal Stairs, except as modified herein.

1.03 PAYMENT

Replace 1.03A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

Replace Articles 1.04 Submittals with the following:

1.04 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specification of the metal stairs for the approval of the Engineer. Submittals shall include but not limited to:

1. Detailed Shop Drawings for fabrication and erection showing in plan the location of products, elevations, and details for the pre-engineered steel stair Work. Show anchorages and accessory items. Include details of all connections between all materials.

2. Complete layout and installation drawings and schedules with clearly indicated dimensions for metal stairs.

3. All grating shop drawing shall clearly indicate the orientation of the bearing bars.

B. Product Data:

1. Supplier’s published literature for pre-engineered steel stairs proposed.

2. Supplier’s specification for stairs, including all materials proposed.

3. Proposed coating products, surface preparation, and coating application procedures.

C. Samples:

1. Representative samples of materials including nosing, tread material, and other items requested by the Engineer. Review will be for type only.

D. Design Data:

1. Signed and sealed drawings and calculations for the pre-engineered steel stairs and appurtenances, prepared by Supplier's licensed professional engineer licensed to practice in the State of New York.

E. Qualification Statements:

1. Manufacturer.

2. Supplier's professional engineer.

Add a new article 1.06 as follows:

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Engage a single fabricator, with undivided responsibility for detailing and performance of the metal stairs.

2. Engage a firm which can show five years previous successful experience in detailing and fabrication of metal stair systems of scope and type similar to the required work.

3. Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests shall not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

B. Installer Qualifications:

1. Engage a single installer skilled, trained and with successful experience in the installation of metal stair systems and with specific skill and successful experience in the erection of the types of materials required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of work. Submit names and qualification to the Engineer along with the following information on a minimum of three successful projects:

a. Names and telephone numbers of owner, architects or engineers responsible for projects.
b. Approximate contract cost of the metal stair work.
c. Amount of area installed.

C. Professional Engineer Qualifications:

1. Engage a registered professional engineer legally qualified to practice in the State of New York and experienced in providing engineering services of the kind indicated.
2. Submit qualifications data.
3. Responsibilities include:
   a. Carefully reviewing pre-engineered steel stairs performance and design criteria stated in the Contract Documents.
   b. Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to Engineer by Contractor.
   c. Preparing or supervising preparation of design calculations and related drawings, Shop Drawings, test plan development, and test-resul interpretation as required, and comprehensive engineering analyses verifying compliance of pre-engineered steel stairs with requirements of the Contract Documents.
   d. Signing and sealing all calculations, design drawings, and Shop Drawings.
   e. Certifying that it has performed the design of pre-engineered steel stairs in accordance with performance and design criteria stated in the Contract documents.
   c. Certifying the design conforms to all applicable local, state, and federal Laws and Regulations, and to prevailing standards of practice.

D. Performance Criteria:

1. Metal stairs shall comply with all applicable loading and other stair related requirements indicated in the local and state building code in effect.

2. Metal stairs shall comply with the General Requirements, All Classes of Stairs, in Section 1 of the NAAMM, "Metal Stairs Manual".

3. Sizes of miscellaneous items such as carrier angles, anchors, fasteners, inserts and platform stiffeners, and design stresses shall be as recommended in Section

4 of the "Metal Stairs Manual" unless more stringent requirements are required by governing authorities.

4. All required stair loadings and other stair related requirements shall comply to seismic restraints in accordance with the requirements of Detailed Specification 01410 – Regulatory Requirements to the extent that the most stringent provisions are utilized in developing the design seismic forces. Refer to the General Structural Notes on the Structural Drawings for site and structure specific seismic design criteria. Entire assembly shall be constructed to support a minimum live load of 100 pounds per square foot or a concentrated load of 300 pounds on an area 4 square inches located at the center of the tread, whichever produces the greatest stress without exceeding the allowable design working stress in the material involved.

5. Loading criteria used for calculations to determine required detailing and assembly, and fabrication profiles shall not produce Maximum Clear Span Deflections greater than 1/4-inch.

6. In addition to loads applied directly to treads and platforms, metal stair components shall be detailed and fabricated to withstand all loading contributed from performance criteria requirements of railing and handrailing system loads acting on the metal stair work as required by OSHA and as specified in General Specification 05523.

7. Anchor bolts shall be selected by the metal stair manufacturer to withstand, without failure, a load equal to six times the load imposed when installed in masonry and equal to four times the load imposed when installed in concrete as determined by testing performed in compliance with ASTM E488 conducted by a qualified independent testing agency.

E. Source Quality Control:

1. The Contractor shall be responsible for all compliance with all performance criteria and installation of metal stair work and shall submit Working Drawings for the work showing all details, loadings, connections, materials and calculations prepared, signed and stamped with the seal of a Licensed Professional Engineer licensed to practice in the State of New York and a recognized expert in the type of work required.

2. Provide qualified welding processes and welding operators in accordance with AWS “Structural Welding Code” D1.1, Section 5, Qualification.

3. Provide certification that all welders employed on, or to be employed for, the fabrication of metal stairs have satisfactorily passed AWS qualification tests within the previous twelve months. The Contractor shall ensure that all certification are kept current.

Add Article 1.07 as follows:

1.07 JOB CONDITIONS

A. Coordination:

1. The Contractor shall review installation procedures under other Sections and coordinate the work that must be installed with or attached to the stairs.

2. Notify other Contractors in advance of the metal stair work to provide them with sufficient time for the installation of and coordination of items included in their contracts that must be installed in conjunction with the metal stairs.

PART 2 PRODUCTS

2.02 STEEL PAN STAIRS

Replace 2.02.E with the following:

E. Steel framing stringers shall be fabricated of structural steel shapes of the minimum sizes shown on the Contract Drawings and in accordance with the Suppliers professional engineers design. Closure pieces shall be provided for exposed ends of stringers. All structural steel elements shall be galvanized.

Replace 2.02.G with the following:

G. Steel metal pan units shall be formed of metal pans of 0.1084 inch thick structural steel sheets (12 gage minimum) for the platforms and 0.0747 inch thick sheets (14 gage minimum) for the risers and subtreads. The shapes of pans shall conform to the configurations shown on the Contract Drawings.

PART 3 EXECUTION

3.01 FABRICATION
Add the following to Article 3.01 – FABRICATION:

H. Steel brackets and bearing surfaces shall be provided as detailed and as required to anchor and contain the stairs to the supporting structure. Where masonry walls occur, supporting struts shall be provided and shall be designed for the erection and support of stair components before installation of masonry.

I. Steel framing stringers shall be fabricated of structural steel channels as shown. Closure pieces shall be provided for exposed ends of stringers. All structural steel elements shall be galvanized.

J. Platforms and sublandings shall be constructed of structural steel channel headers and miscellaneous steel framing members as shown on the Contract Drawings and on approved Working Drawings. Headers shall be bolted to stringers and framing members shall be bolted to stringers and headers. All nuts, bolts and washers for fastening of aluminum shall be stainless steel. Aluminum surfaces in contact with steel shall be properly isolated.

K. Riser and tread supports shall be constructed with steel angle supporting brackets welded to the stringers and provided with holes for tread and platform attachment before stringers are hot-dipped galvanized. Cast aluminum treads and platforms shall be secured to the brackets with stainless steel fasteners.

3.02 INSTALLATION

Add the following to Article 3.02 – INSTALLATION:

E. Perform cutting, drilling and fitting required for the installation of the metal stairs. Assembly of system components shall be performed in strict accordance with the manufacturer's recommendations for installation as shown on approved Working Drawings.

F. Fit exposed connections accurately together to form tight hairline joints. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dipped galvanized after fabrication and are intended for bolted or screwed field connections.

* * * * *

SECTION 05531G
Steel Floor Gratings and Checkered Plates

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 05531 – Steel Floor Gratings and Checkered Plates, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.05 DESIGN REQUIREMENTS

Add the following to Article 1.05 – Design Requirements:

G. Complete design calculations and Shop Drawings shall be prepared, signed and stamped with the seal of a Licensed Professional Engineer, licensed to practice in the State of New York.

1.06 SUBMITTALS

Add the following to Article 1.06 - Submittals:

3. Design calculations, detailed drawings, and details of connections.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 05533G
Aluminum Floor Gratings and Checkered Plates

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 05533 – Aluminum Floor Gratings and Checkered Plates, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.05 DESIGN REQUIREMENTS

Add the following to Article 1.05 – Design Requirements:

D. Complete design calculations and Shop Drawings shall be prepared, signed and stamped with the seal of a Licensed Professional Engineer, licensed to practice in the State of New York.

1.06 SUBMITTALS

Add the following to Article 1.06 - Submittals:

3. Design calculations, detailed drawings, and details of connections.

END OF SECTION

NO TEXT ON THIS PAGE

DETAILED SPECIFICATION 06410 – PLASTIC LAMINATE CLAD CABINETS
CONTRACT CRO-624G

NOTE: Detailed Specification 06410 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 06410.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish and install all materials, equipment and appliances required for the custom casework as shown on the Contract Drawings, specified in the Detailed Specifications, and specified herein.

B. Principal items of work include:

1. Plastic-laminate-clad architectural cabinets.
2. Solid surface material countertops.
3. Hardware and fastening devices.
4. Finishes.

C. The following index of this Section is presented for convenience:

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification..

1.03 RELATED SECTION

A. General Specification 06100 - Rough Carpentry

1.04 REFERENCES

A. ANSI A208.1 - Particleboard, Mat-Formed Wood.

B. ANSI/BHMA A156.9 - Cabinet Hardware.

C. ANSI/NEMA LD3 - High-Pressure Decorative Laminates.

D. ANSI/NEMA LD3.1 - Performance, Application, Fabrication and Installation of High-Pressure Decorative Laminates.

1.05 GENERAL REQUIREMENTS

A. Cabinets shall be wood, factory-manufactured, factory finished of the manufacturer's standard sizes and of the type, design and configuration indicated on the Contract Drawings.

B. Wall and base cabinet assemblies shall consist of individual units joined into continuous sections as indicated on the Contract Drawings.

C. Fastenings shall be accomplished to permit removal and replacement of individual units without affecting the remainder of the installation.

D. Counters shall be provided with watertight sink rims where indicated.

E. Drawers shall be removable and shall be equipped with position stops to avoid accidental complete withdrawal.

F. Shelves shall be fixed or adjustable as indicated on the Contract Drawings.

G. Coordinate locations of utilities that will penetrate countertops or backsplashes.

1.06 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for approval of the Engineer. Submittals shall include, but not be limited to:

1. Complete layout and installation drawings and schedules with clearly indicated dimensions.
2. Detail drawings indicating joint details, hardware location and anchorage for the work.
3. Manufacturers product literature, specification data sheets, schedule of finishes and installation instructions.

B. The Contractor shall also include the following Samples:

1. Two 6-inch by 6-inch samples illustrating cabinet finish material, color and sheen.
2. Two 6-inch by 6-inch samples illustrating counter top material, finish, color and sheen.
3. Two samples of all hardware.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical architectural cabinets as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 VERIFICATION OF DIMENSIONS AND COORDINATION

A. The Contractor shall become familiar with all details of the work, verify all dimensions in the field and advise the Engineer of any discrepancy before performing any work.

B. The Contractor for this Contract shall notify other Contractors in advance of the installation of the work included herein to provide the other Contractors with sufficient time for the installation and coordination of items that must be installed in conjunction with the work included in this Section.

C. Work shall be coordinated with placement of any required support framing and anchors in walls and ceiling.

D. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is

operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.08 DELIVERY, STORAGE AND HANDLING

A. Casework shall be delivered in factory packed, unopened containers bearing the manufacturer's labels and container contents.

B. Store all materials in clean, dry protected area in such a manner to preclude damage of any nature.

C. Handle all materials with care as recommended by the manufacturer to avoid denting, marring, warping or other distortions during delivery, storage and handling.

PART 2 PRODUCTS

2.01 WOOD MATERIALS

A. Quality Standard: Comply with the Architectural Woodwork Standards Grade - Custom. Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

B. Wood moisture content: 5 to 10 percent.

C. Wall and base cabinets, doors and shelves shall be of the same Medium Density Fiberboard (MDF) board construction and same outside appearance. MDF to comply with ANSI A208.2, Grade 130. Type of construction: Face Frame.

D. Shelves shall be fully adjustable or fixed, as indicated on drawings, and shall be MDF board.

E. Doors and Drawer fronts shall be MDF board. Style: Reveal Overlay. Reveal dimension: 1/2".

2.02 FINISHES

A. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Formica Corporation.

2. Pionite; a Panolam Industries International, Inc. brand.

3. Wilsonart LLC.

4. Any approved equal

B. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade VGS.
4. Edges: Grade HGS

C. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS
2. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish
3. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
4. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
5. Drawer Bottoms: Thermoset decorative panels

D. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

E. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

F. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

G. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Engineer from laminate manufacturer's full range in the following categories:
    1. Solid colors, matte finish.

2.03 HARDWARE

A. Hardware shall conform to ANSI/BHMA A156.9, shall be suitable for casework use and shall include all miscellaneous hardware for a complete installation.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CompX International, Inc.
2. Hettich America L.P.
3. Knape & Vogt Manufacturing Company.
4. Any approved equal.

B. The types and finishes of hardware shall be as selected by the Engineer from the manufacturer's standard.

2.04 SOLID SURFACE MATERIAL COUNTERTOPS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.

1. Subject to compliance with requirements, provide Formica Solid Surfaces collection, with integral sink bowls where indicated on drawings, color and pattern as selected by Engineer from manufacturer's full range:

Formica

10155 Reading Road
Cincinnati, OH 45241
Phone: (800) 367-6422
Web: www.formica.com

2. Or comparable product by one of the following:

a) Wilsonart.
b) Avonite Sufaces.
c) Or approved equal.

B. Cove type shall be as indicated on drawings.

C. Backsplash shall be as indicated on drawings.

D. Fasteners per manufacturer’s recommendation.

E. Installation by fabricator, or by fabricator approved installer. Provide installers qualifications.

F. Warranty: Contractor shall obtain and provide to DEP the manufacturer's warranty in acceptable form, warranting against defects in design, materials, and degradation of finish beyond normal wear for a period of 10 years from date of installation.

G. Testing: meet or exceed Basis of Design Product testing data for all testing criteria.

PART 3 EXECUTION

3.01 INSTALLATION

A. Casework shall be arranged and located as indicated on the Contract Drawings and shall be secured in place in true alignment, level and plumb and so installed that the work of other trades will not be damaged during installation. Units shall be secured with screws through backs to cleats that have been anchored to building structure with toggle or expansion bolts.

B. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

C. Wall-hung cabinets shall be installed in such manner as to firmly and rigidly support the weight of the cabinets plus the normally expected weight of the contents of the cabinets. Fasteners shall be spaced 12 inches on center using at least three bolts in each 3 or 4-foot unit width.

D. Adjoining cabinets in an assembly shall be securely joined together at top and bottom with inconspicuously placed bolts or clips. Cabinets shall be bolted to bases at cabinet corners.

E. Openings occurring between the casework and wall surfaces due to irregularity of surfaces shall be closed with a filler or scribing strip of the same material and finish as adjacent casework.

F. Countertops installed by fabricator or fabricator's approved installer.

3.02 FABRICATION

A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Resident Engineer seven days in advance of the dates and times architectural cabinet fabrication will be complete.

2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

C. Field cutting of Monolithic Countertops is not permitted.

3.03 PROTECTION AND CLEANING

A. The Contractor shall adequately protect surfaces against accumulation of paint, mortar, mastic and any disfiguration, discoloration or damage.

B. Prior to final acceptance of the installation, the Contractor shall remove protection, align doors, adjust hardware and thoroughly clean work and have it free from discoloration, scratches, dents and other surface defects.

C. The finished installation shall be free of defects and before final acceptance, the Contractor shall repair and/or replace defective work to the satisfaction of the Engineer and the City at no additional expense.

END OF SECTION

SECTION 07170G
Bentonite Waterproofing

NOTE: This Detailed Specification 07170G – Bentonite Waterproofing replaces General Specification 07170 – Bentonite Waterproofing in its entirety. Whenever a reference appears in the Contract Documents to General Specification 07170, it shall now be deemed to refer to Detailed Specification 07170G.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section describes a system of contaminant resistant sodium bentonite filled geotextile sheet waterproofing membrane with an integrated polyethylene liner, sodium bentonite water stops, sodium bentonite clay-based construction joints, sealants and other system components and accessories specified and required for contaminant resistant bentonite waterproofing with an integrated polyethylene liner to perform in a permanently waterproof and vapor resistant manner. Complete technical services as available from the manufacturer and on-site technical representation by manufacturer's Technical Representative during the time of delivery, storage and installation of the work of this Section and other work which may affect the work of this Section as specified herein is also included. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install and place into satisfactory service, all bentonite waterproofing work.

B. An index of the Articles in this Specification is presented hereinafter for the convenience of the Contractor.

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 02317 - Backfilling.
B. General Specification 03100 - Concrete Formwork
C. Detailed Specification 04200 - Unit Masonry.
D. Detailed Specification 07210 - Building Insulation.
E. Detailed Specification 07900 - Joint Filler, Caulking and Sealants.

1.03 REFERENCES

A. ASTM D526 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

B. ASTM D903 - Test Method for Peel or Stripping Strength of Adhesive Bonds.

C. ASTM D1970 - Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

D. ASTM D4632 - Grab Breaking Load and Elongation of Geotextiles R (1996).

E. ASTM D4716 - Determining the (In-Place) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

F. ASTM D4833 - Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.

G. ASTM D5084 - Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

H. ASTM D5261 - Test Method for Measuring Mass per Unit Area of Geotextiles.

I. ASTM D5385 - Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.

J. ASTM D5438 - Practice for Collection of Floor Dust for Chemical Analysis.

K. ASTM E329 - Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

L. ASTM E946 - Water Absorption of Bentonite by the Porous Plate Method.

M. CSBC - Connecticut State Building Code, 2009 amendments to the 2005 Connecticut Supplement to the 2003 International Building Code

1.04 SYSTEM DESCRIPTION

A. Provide contaminant resistant bentonite waterproofing with an integrated polyethylene liner, prevent the passage of liquid water under hydrostatic pressure and vapor transmission, install without defects, damage or failure. Waterproofing shall be two high strength geotextiles interlocked encapsulating minimum one pound (0.45 kg) per square foot (0.1 sq m) of dry, granular geotextile composite sodium bentonite with an integrated polyethylene liner.

1.05 SUBMITTALS

A. General: Prepare and submit specified submittals in accordance with Division 1 Submittals Section.

B. Product Data: Submit manufacturer’s product data, with complete general and specific installation instructions, recommendations, and limitations.

C. Product Samples: Submit representative samples of the following for approval.

D. Job Mock-Up: Prior to the installation of bentonite waterproofing system, but after Engineer's approval of Working Drawing submittals, erect a stepped-back job mock-ups using materials and application techniques specified for final work. Provide special features and all components of the perimeter drain system including crushed

stone and geotextile filter fabric, showing the correct configurations of the various parts and the workmanship quality which shall be achieved in the work. Build mock-ups at the site, in location approved by the Engineer, of full thickness and approximately 8 foot - 0 inches long by 6 foot high. Indicate the proposed workmanship to be expected in the finished work. Include methods of installation typical to the work including wall penetration and system termination details using all system components and accessories specified and approved for the work. Also include an area of honeycombing and in removal for the Engineer's approval. Obtain the Engineer's acceptance of mock-up before start of work. Retain and protect mock-up before start of work. Retain and protect mock-up during construction as a standard of judging completed work. Do not alter or destroy mock-up until given written permission by the Engineer.

E. The Contractor Certificate: Submit written certification that installer has current Approved Applicator status with waterproofing material manufacturer.

F. Test Reports: Submit for approval the following:

1. Copies of test reports verifying compliance with physical properties specified herein.

2. Copies of testing agencies background and experience in performing similar tests to those specified.

3. Water Sample Test in accordance with Section 07170-1.06.G below.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Installing company should have at least five (5) years experience in work of the type required by this Section, who can comply with manufacturer's warranty requirements, and who is an Approved Applicator as determined by waterproofing/drainage system manufacturer.

B. Manufacturer Qualifications: Bentonite geotextile waterproofing and all accessary products shall be provided by a single manufacturer with a minimum of five (5) years experience in the direct production and sales of bentonite waterproofing systems. The Manufacturer shall be capable of providing field service representation during construction, approving an acceptable installer, recommending appropriate installation methods, and conducting a final inspection of the bentonite waterproofing application.

C. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field installation to establish procedures to maintain required working conditions and to coordinate this work with related and adjacent work. Verify that final waterproofing details comply with waterproofing manufacturer's current installation requirements and recommendations.

D. Materials: Obtain bentonite geotextile waterproofing from a single manufacturer to assure material compatibility.

E. Inspection: The manufacturer's representative shall inspect waterproofing installation periodically during application to verify that waterproofing has been installed in accordance with manufacturer's guidelines and recommendations.

F. Testing Agency: Engage a testing laboratory regularly engaged in the testing of construction materials, and who complies with ASTM E329.

G. Water Sample Test: Project site water sample supplied to manufacturer by waterproofing Contractor thirty (30) days prior to the commencement of the work to determine type of bentonite system (contaminate resistant (CR) sodium bentonite) to be utilized on the project. It is likely that a contaminate resistant sodium bentonite will be required therefore there shall be no additional charge for use of contaminate resistant material if the (CR) sodium bentonite is required for the project. The manufacturer shall conduct test free of charge. The Contractor is responsible for collection and shipment of one liter of actual site water. Water should be shipped in uncontaminated, sealed plastic container to: CETCO Technical Center, Attn: BMG Water Sample Technician, 1350 West Shure Drive, Arlington Heights, IL 60004 or an approved equal facility. Also provide project name, city and state along with return address to forward test results. Test results shall be submitted to the Engineer for review.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling: Deliver materials in factory sealed and labeled packaging. Sequence deliveries to avoid delays, while minimizing on-site storage. Handle and store following manufacturer's instructions, recommendations and material safety data sheets. Protect from construction operation related damage, as well as, damage from weather, excessive temperatures and prolonged sunlight. Remove damaged material from site and dispose of in accordance with applicable regulations.

B. Storage: Do not double-stack pallets during shipping or storage. Protect waterproofing materials from moisture, excessive temperatures and sources of ignition. Provide cover, top and all sides, for materials stored on-site, allowing for adequate ventilation.

1.08 PROJECT CONDITIONS

A. Substrate Condition: Proceed with work only when substrate construction and preparation work is complete and in condition to receive waterproofing system.

B. Weather Conditions: Perform work only when existing and forecasted weather conditions are within the guidelines established by the manufacturer of the

waterproofing materials. Do not apply waterproofing materials into standing or ponding water conditions.

1.09 WARRANTY

A. Waterproofing Warranty: Upon completion and acceptance of the work required by this Section, the waterproofing materials manufacturer will provide a written ten (10) year system warranty covering both materials and labor. Issuance of Manufacturer's System Warranty requires the following: (1) Manufacturer's Approved Applicator to install bentonite waterproofing products; and (2) in Section 3 work, sodium bentonite butyl rubber waterstop compound must be installed in all applicable horizontal and vertical cold pour concrete construction joints. The manufacturer's warranty shall be independent from any other warranties made by the Contractor under requirements of the Contract Documents and may run concurrent with said warranties.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Provide bentonite geotextile waterproofing or contaminate resistant bentonite geotextile as required due to testing results with applicable accessories as manufactured by the following:

a. Colloid Environmental Technologies Company (CETCO), Voltex DS/CR 1350 West Shure Drive, Arlington Heights, Illinois 60004-1440, Phone: (847) 392-5800; Fax: (847) 506-6195; Web-site: http://www.cetco.com;.

b. Carlisle Coatings & Waterproofing (CCW) MiraClay EF (additional polyethylene liner will be required to meet specification requirements). 900 Hensley Lane, Wylie, Texas 75098, Phone: 800-527-7092, Web-site: http://carlisle-ccw.com;

c. Tremco Incorporated, Paraseal Membrane, Phone:800 852 8173;

d. Or approved equal.

2.02 MATERIALS

A. NSF Certified: Standard bentonite geotextile waterproofing membrane with integrated polyethylene liner shall be certified by NSF International to conform to the requirements of NSF Standard 61 – Drinking Water System Components – Health Effects.

B. Sodium Bentonite: Specially selected Wyoming granular bentonite containing approximately 90% montmorillonite with 10% maximum unaltered volcanic ash and other native sediments. Free Swell Rating: 2 grams sifted into deionized water swells to occupy a minimum volume of 16 cc. Grading: Granular bentonite passes 90% through a 20 mesh sieve and less than 10% through a 200 mesh sieve.

C. Geotextile Fabrics: Bentonite geotextile waterproofing shall consist of one woven and one non-woven polypropylene geotextile, interlocked using a needlepunching process. The non-woven geotextile fibers shall pass through the bentonite layer and integrate into the woven geotextile to produce several interlocks each square inch (6.45 sq. cm) over the entire surface area of product.

D. Voltex DS/CR Bentonite Geotextile Waterproofing

1. Volclay Voltex DS/CR: 4-feet x 15-feet (1.22 x 4.57m) roll of interlocked geotextiles encapsulating a minimum of 1.0 pound (0.45 kg) per square foot (0.1 sq m) of contaminant resistant granular sodium bentonite with an integrated polyethylene liner, or approved equal.

   Volclay Voltex DS/CR or approved equal shall have the following properties:

Property	**Test Method**	**Value**
Peel Adhesion to Concrete	ASTM D903 mod.	15 lbs./in. (2.6 kN/m) min.
Hydrostatic Pressure Resistance	ASTM D5385 mod.	231 ft. (70 m)
Permeability	ASTM D5084	1×10^{-9} cm/sec.
Grab Tensile Strength	ASTM D4632	95 lbs. (422 N)
Puncture Resistance	ASTM D4833	140 lbs. (445 N) min.
Low Temperature Flexibility	ASTM D1970	Unaffected at -25F (-32C)
Geotextile Interlock Peel	ASTM D4632	15 lbs. (65 N)
Water Vapor Transmission Rate	ASTM E 96 (B)	0.03 grains/hr/ft2

E. Accessory Waterproofing Products: All accessory waterproofing materials shall be as provided by the bentonite waterproofing manufacturer or shall have the manufacturer's written approval for substitution. The following terminology is based on Cetco manufactured product and are listed below for basis-of-design purposes. Any approved equal accessory waterproofing materials shall be compatible with the system approved for use on the project:

1. Volclay Bentoseal: Trowel grade sodium bentonite compound used as a detailing mastic around penetrations, corner transitions and grade terminations.

2. Volclay Hydrobar Tubes: 2-inches (5 cm) diameter x 2-feet 0-inches (60 cm) long, water soluble tube container filled with granular sodium bentonite; 3 lbs. (1.36 kg) per tube total weight.

3. Volclay Waterstoppage: 50 lbs. (22.7 kg) bag of specially processed dry granular sodium bentonite.

4. Volclay Waterstop-RX 101T: Rolls of flexible bentonite/butyl rubber strip waterstop for use in concrete construction joints. Secured with Volclay WB-Adhesive.

5. Volclay SeamTape®: 2-inches (50 mm) wide butyl rubber sealant tape.

6. Termination Bar: Min. 1-inch (25 mm) wide aluminum bar with pre-punched holes on 12-inches (300 mm) centering for fastening.

7. Cementitious Wall Board: ½-inch thick cementitious board for protection of waterproofing during the removal of metal soldier pile cap and top lagging boards.

8. Volclay TB-Boot®: performed EPDM tie-back cover or field fabricated 26 gauge galvanized sheet metal tie-back covers.

PART 3- EXECUTION

3.01 GENERAL

A. Comply with manufacturer's product data, including product application and installation instructions as well as manufacturer's shipping and storage recommendations.

3.02 INSPECTION

A. The installer shall examine conditions of substrates and other conditions under which this Section work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected and are acceptable for compliance with manufacturer's warranty requirements.

3.03 SURFACE PREPARATION

A. Protect adjacent work areas and finish surfaces from damage or contamination from waterproofing products during installation operations.

B. Soil Substrates: Grade substrates should consist of well leveled soils without voids and debris, and compacted to a minimum of 85% Modified Proctor density for uniform support and containment of waterproofing sheets. If substrate consists of large aggregate, place a high-strength geotextile layer over the aggregate and then

provide several inches of compacted soil or sand for uniform support and containment of waterproofing sheets.

C. Concrete Substrates: Concrete to receive waterproofing shall be of sound structural grade with a smooth finish, free of debris, oil, grease, laitenance, dirt, dust, or other foreign matter which will impair the performance of the waterproofing and drainage system and which do not comply with manufacturer's warranty requirements. Do not apply waterproofing over lightweight insulating concrete.

1. Horizontal deck or roof concrete surfaces should be sloped for proper drainage.

2. Remove fins, ridges, and other protrusions leveled and smoothly finished to match monolithic concrete surface. Completely fill honeycomb, aggregate pockets, holes are other voids with non-shrink cementitious grout leveled and smoothly finished to match monolithic concrete surface.

3. All expansion joints should be cleaned, primed, fitted with a proper compression seal product and caulked with polyurethane sealant or applicable expansion joint assembly product manufactured by others. Expansion joint material manufacturer is responsible for water tightness of the expansion joint material.

   NOTE: Related work to be completed under Specification 03300 – Cast-In-Place Concrete. Volclay Waterstop-RX 101T or approved equal shall be installed in all applicable vertical and horizontal concrete construction cold pour joints and around applicable penetrations. Installation shall be in accordance with the manufacturer’s recommendations.

3.04 GENERAL INSTALLATION GUIDELINES

A. Install Bentonite Goetextile Waterproofing System or approved equal with the dark gray woven geotextile side facing the concrete (polyethylene liner side away from concrete) to be waterproofed in both horizontal and vertical applications the woven side of the geotextile liner facing the concrete to be waterproofed in both horizontal and vertical applications.

B. Prevent bentonite waterproofing products from hydrating before material is contained with overburden or backfill. When threat of rain is imminent, installed bentonite products not already contained by overburden or backfill should be covered with polyethylene sheeting to decrease the chance of hydration. Remove polyethylene prior to overburden or backfill operations.

C. Expansion Joints: Bentonite geotextile waterproofing is not an expansion joint filler or sealant, but may be used as an expansion joint cover over properly installed expansion joint material placed during substrate preparation. Expansion joints shall be covered in accordance with the manufacturer’s recommendations.

3.05 UNDER SLAB INSTALLATION

A. Reinforced structural foundation slabs should be a minimum of 8-inches (20 cm) thick when placed on a working mud slab. Reinforced concrete slab(s) on compacted grade shall be a minimum of 4-inches (10 cm) thick. When hydrostatic conditions exist, install bentonite geotextile waterproofing under all footings, elevator pits and grade beams.

B. Detail all penetrations and pile caps with a ½-inch (1.2 cm) layer of Waterstoppage (granular bentonite) extending around each a minimum radius of 6-inches (15 cm).

C. Install underslab Voltex DS/CR or approved equal membrane extending to base of shoring wall (poly side down; dark gray woven geotextile side up) fully overlapping the 12-inches (300 mm) horizontal tail of the Voltex DS corner transition sheet installed per Section 3.05 Work. Secure corner edge of membrane with washer-head fasteners or pneumatic staples 12-inches (300 mm) on center.

D. Place Voltex DS/CR or approved equal directly on properly prepared substrate with adjoining edges overlapped a minimum of 4-inches (10 cm). Stagger sheet end seams a minimum of 24-inches (60 cm). Mechanically fasten or staple Voltex DS/CR or approved equal as required to prevent movement from construction operations or concrete placement. When the slab is poured in sections, extend Voltex or approved equal a minimum 12-inches (30 cm) beyond the slab edge to enable proper overlapping.

E. Cut Voltex DS/CR or approved equal to fit snugly around penetrations and pile caps. (Do not extend Voltex DS/CR or approved equal over pile cap.) Around base of penetrations, trowel ¾-inch (1.8 cm) thick fillet of Bentoseal or approved equal and extend the Bentoseal onto Voltex DS/CR. Around base of pile caps, trowel 2-inch (5 cm) thick fillet of Bentoseal and extend the Bentoseal onto Voltex DS/CR.

F. Provide a minimum of 12-inches (30 cm) overlap between underslab and vertical wall waterproofing by either extending the Voltex DS/CR or approved equal beyond the form or turning it up in the form and securing.

G. Detail all slab penetrations, grade beams, and pile caps, install ¼-inch (6 mm) thick layer of waterstoppage extending a 6-inch (150 mm) radius. Cut Voltex DS/CR or approved equal to fit snugly around penetrations and pile caps. Around base of penetrations trowel ¾-inch (18 mm) thick fillet of Bentoseal or approved equal and extend the Bentoseal up the penetration 1-1/2-inches (38 mm) and onto the Voltex DS/CR or approved equal. Around base of pile caps and grade beams trowel ¾-inch (18 mm) thick fillet of Bentoseal and extend the Bentoseal up the cap and onto Voltex DS/CR or approved equal a minimum 2-inches (50 mm).

H. Inspect finished Voltex DS/CR or approved equal installation and repair any damaged material prior to concrete placement. Assure that Voltex DS/CR or approved equal is not moved during concrete placement.

3.06 BACKFILLED POURED-IN-PLACE CONCRETE WALLS

A. Place Hydrobar Tubes or approved equal along the wall/footing intersection with ends Abutted together to form a continuous installation.

B. Trowel ¾-inch (1.8 cm) thick Bentoseal or approved equal fillet at all inside corner transitions.

C. Starting at the base of the wall, install Voltex DS/CR or approved equal sheet horizontally covering the Hydrobar Tubes (or approved equal) and extending onto the footing a minimum of 6-inches (15 cm). For hydrostatic conditions, cover the entire footing and overlap under slab waterproofing a minimum of 6-inches (15 cm). Attach Voltex DS/CR or approved equal using washer-headed mechanical fasteners centered 24-inches (60 cm) around the edge. Stagger all vertical overlap seams a minimum of 24-inches (60 cm).

D. Cut Voltex DS/CR or approved equal to fit snugly around penetrations. Detail around all penetrations with ¾-inch (1.8 cm) cant of Bentoseal or approved equal. Extend Bentoseal ¼-inch (0.6 cm) thick over Voltex DS/CR (or approved equal) a minimum radius of 6-inches (15 cm) around penetration.

E. Terminate at grade with metal termination bar fastened 12-inches (30 cm) on center. Cover top edge of Voltex DS/CR or approved equal with ½-inch (1.2 cm) thick, 2-inch (5 cm) wide layer of Bentoseal or approved equal.

F. Inspect finished Voltex DSCR or approved equal installation and repair any damaged material prior to backfill placement. Assure that Voltex DSCR or approved equal is not disturbed during backfill placement or soil compaction.

3.07 BACKFILL

A. Closely coordinate bentonite geotextile waterproofing installation with backfilling in accordance with Detailed. Specification 02317G. Care should be used during backfill operation to avoid damage to the waterproofing system. Follow generally accepted practices for backfilling and compaction. Backfill should be added in 6-inch to 12-inch (15-30 cm) lifts and compacted to a minimum 85% Modified Proctor density. At grade line and other areas that can not be fully compacted, a termination bar is recommended across the top termination of the membrane.

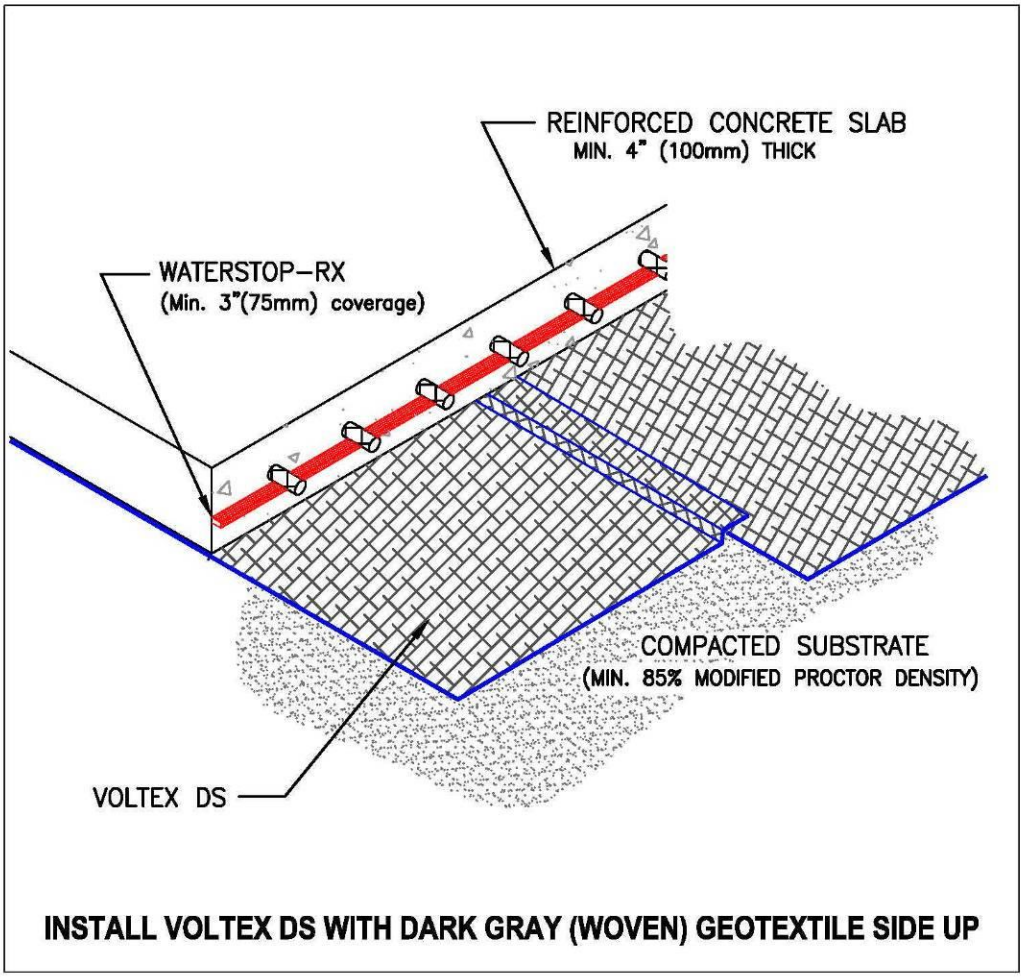
3.08 CLEAN UP

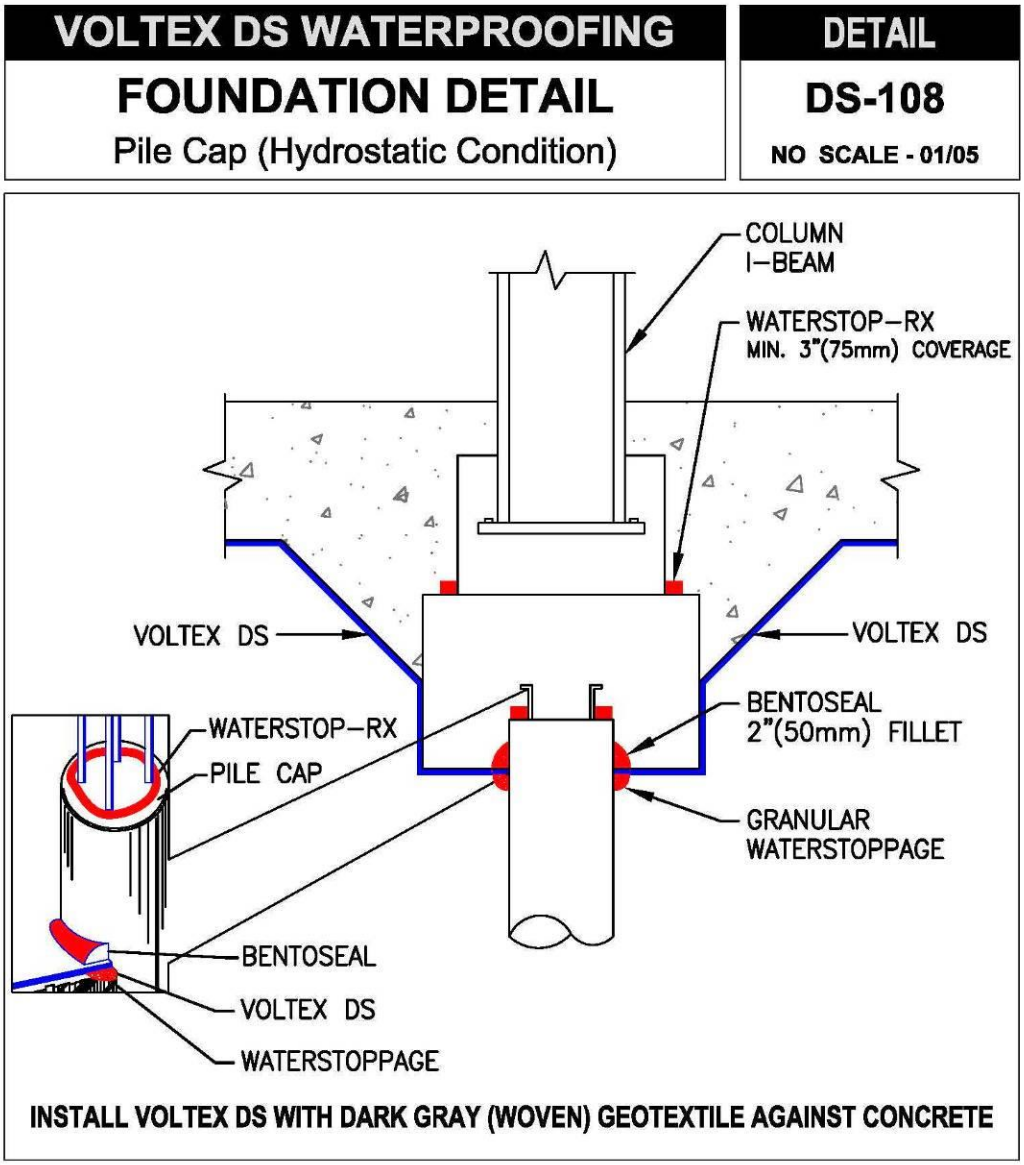
A. In areas where adjacent finished surfaces are soiled by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their recommendations and instructions. Remove all tools, equipment and remaining product on-site. Dispose of section work debris and damaged product following all applicable regulations.

3.09 MANUFACTURERS STANDARD DETAILS

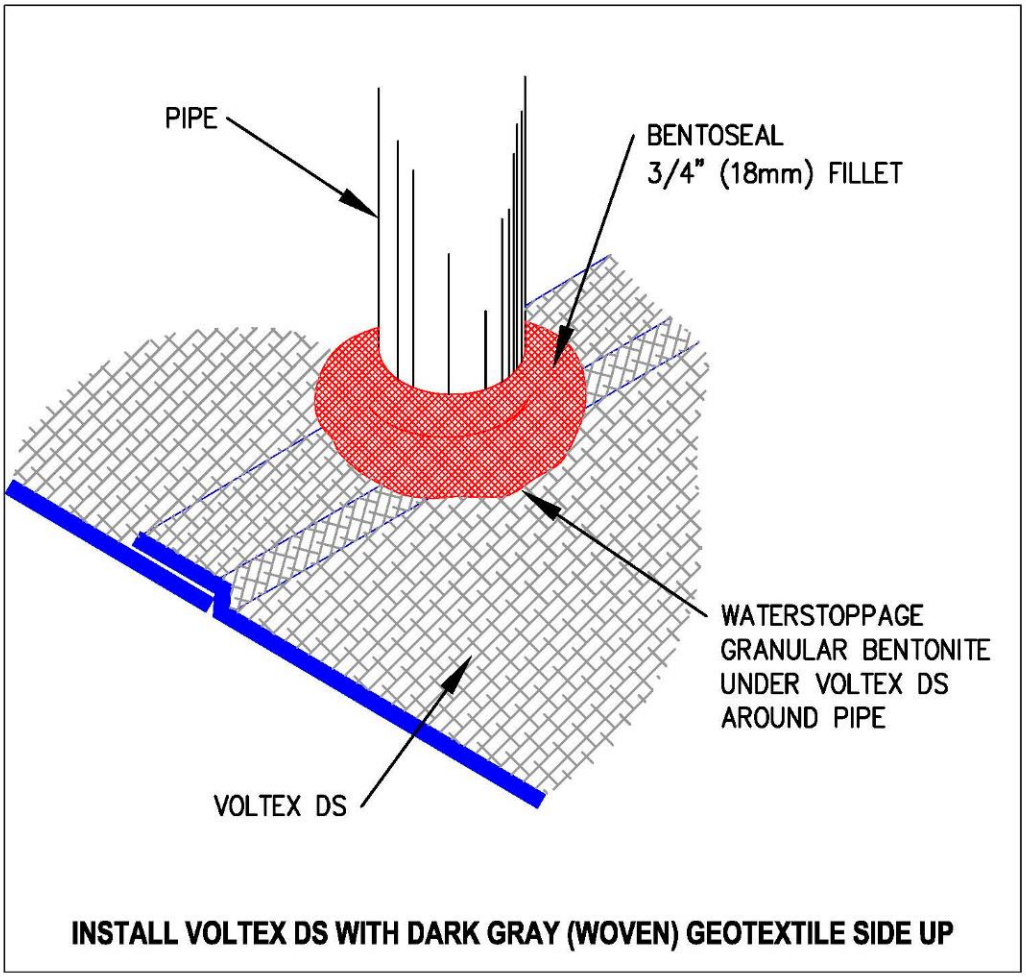
A. Following pages depict manufacturer's details that are referenced to a specific product, Voltex DS. The details shall apply to Voltext DSCR. The Contractor may submit another product manufacturer's details for Engineer's approval:

VOLTEX DS WATERPROOFING	DETAIL
FOUNDATION DETAIL Structural Slab On Compacted Substrate	**DS-100** NO SCALE - 01/05



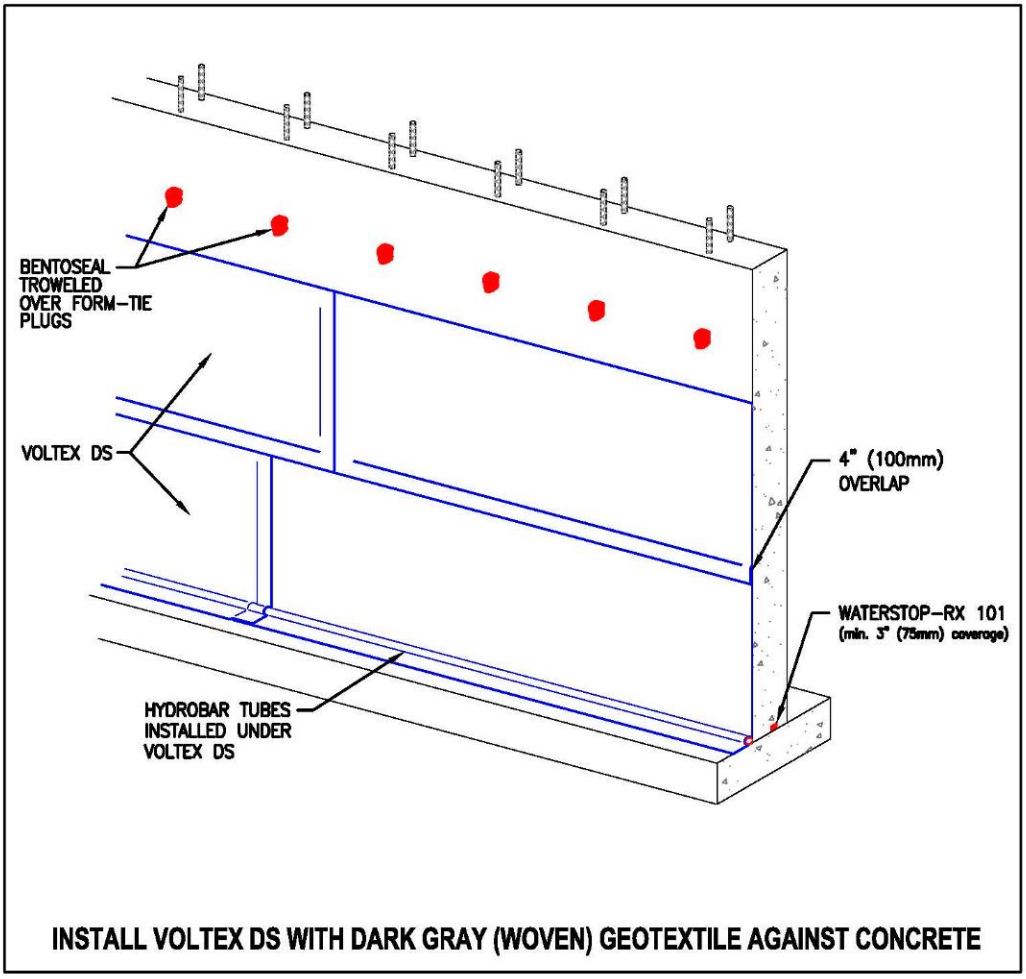

VOLTEX DS WATERPROOFING
DETAIL
FOUNDATION DETAIL
Pile Cap (Hydrostatic Condition)
DS-108
NO SCALE - 01/05
COLUMN
I–BEAM
WATERSTOP–RX
MIN. 3"(75mm) COVERAGE
VOLTEX DS
VOLTEX DS
BENTOSEAL
2"(50mm) FILLET
WATERSTOP–RX
PILE CAP
GRANULAR
WATERSTOPPAGE
BENTOSEAL
VOLTEX DS
WATERSTOPPAGE
INSTALL VOLTEX DS WITH DARK GRAY (WOVEN) GEOTEXTILE AGAINST CONCRETE

VOLTEX DS WATERPROOFING	DETAIL
FOUNDATION DETAIL Typical Penetration	**DS-112** NO SCALE - 01/05



INSTALL VOLTEX DS WITH DARK GRAY (WOVEN) GEOTEXTILE SIDE UP

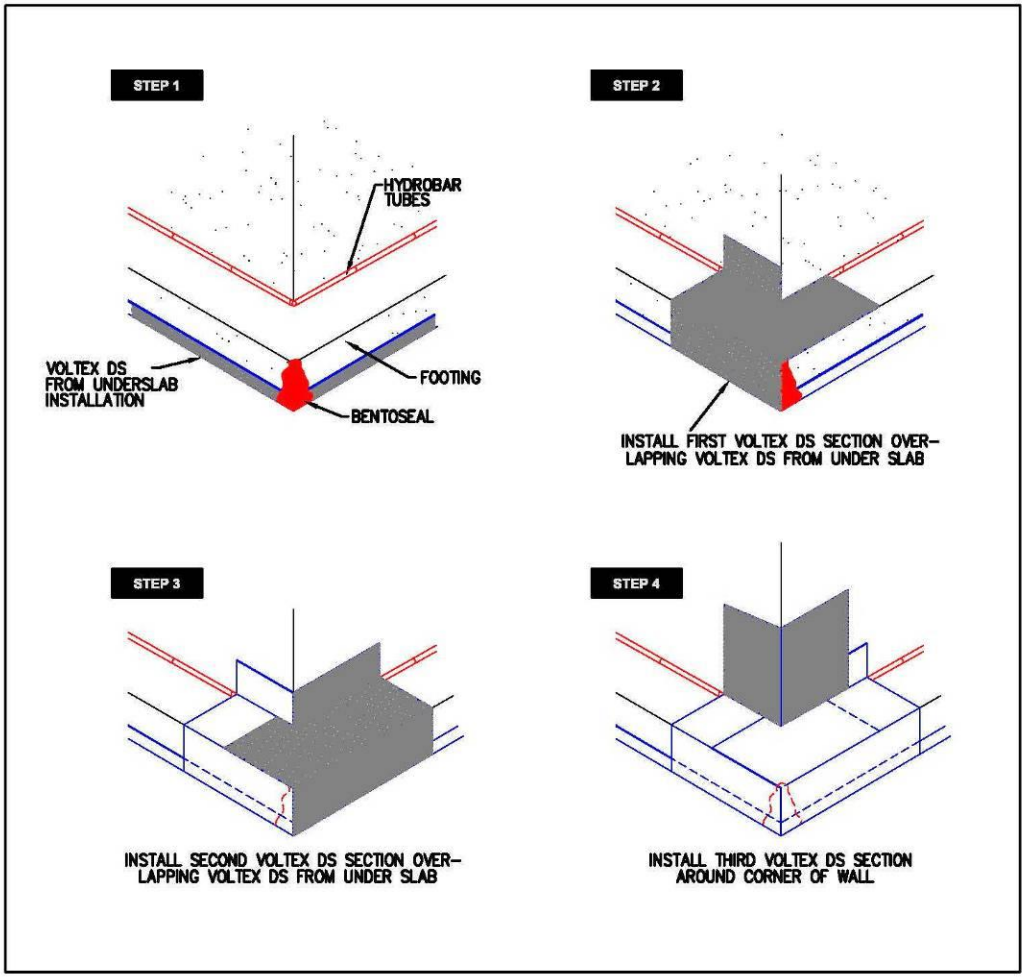
VOLTEX DS WATERPROOFING	DETAIL
FOUNDATION WALL Typical Concrete Wall Installation	DS-200 NO SCALE - 01/05



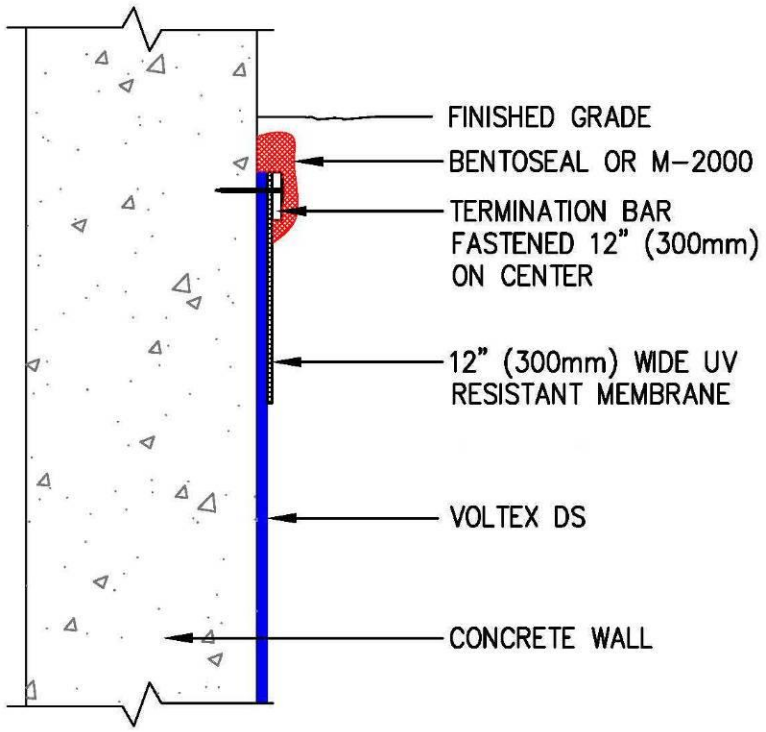
VOLTEX DS WATERPROOFING | **DETAIL**

FOUNDATION WALL | **DS-202**

Outside Footing Corner - Hydrostatic | NO SCALE - 01/05

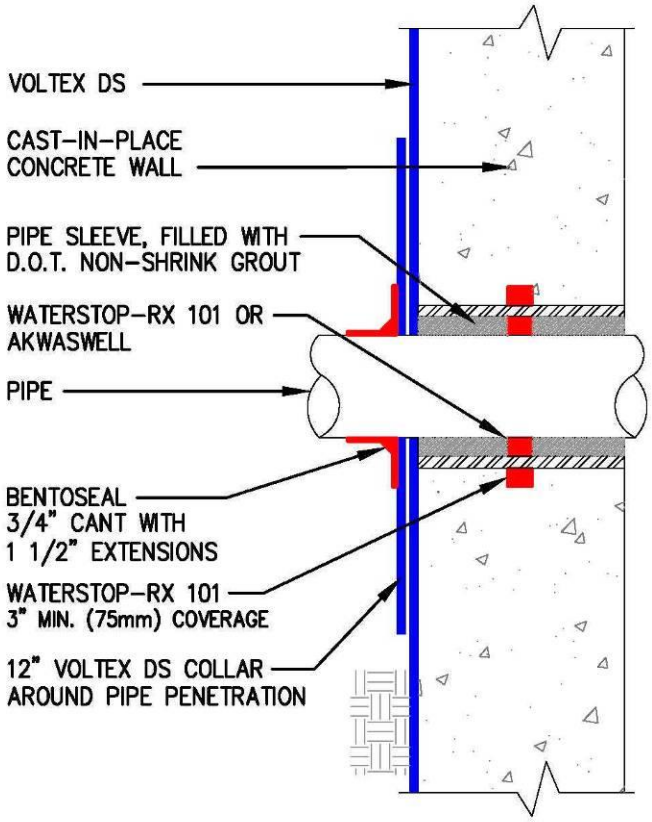


VOLTEX DS WATERPROOFING	DETAIL
FOUNDATION WALL Typical Termination At Grade	**DS-208** NO SCALE - 01/05



INSTALL VOLTEX DS WITH DARK GRAY (WOVEN) GEOTEXTILE AGAINST CONCRETE

VOLTEX DS WATERPROOFING	DETAIL
FOUNDATION WALL Sleeved Pipe Penetration	**DS-215** NO SCALE - 01/05



INSTALL VOLTEX DS WITH DARK GRAY (WOVEN) GEOTEXTILE FACING INSTALLER.

- END OF SECTION -

NO TEXT ON THIS PAGE

SECTION 07210G
Building Insulation

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 07210 – Building Insulation, except as modified herein.

PART 2 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 3 PRODUCTS

Replace 2.01 D. 3. And 4. With the following:

3. Thickness: for wall cavity indicated on drawings for each wall type.

4. Nominal width: for stud type and spacing indicated on drawings for each wall type.

Replace 2.01 D. 5. With the following:

5. Facer: FSK foil scrim vapor retarder.

   a. ASTM E84 compliance: 25/50 flame and smoke

   b. ASTM E96: .05 perms

Add the following to Section 2.01 D.:

6. Product and Manufacturer: Provide one of the following:

   a. FSK-25 Thermal Batt Insulation as manufactured by:

      1) Johns-Manville
      437 North Grove Street
      Berlin, NJ, 08009
      Phone: 1-856-768-7000

      2) Or approved equal.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 07312
Slate Shingles

NOTE: Detailed Specification 07312 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 07312.

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:
1. Slate shingles.
2. Underlayment.
3. Flashing.

1.02 RELATED SECTIONS

A. General Specification 07620 - Sheet Metal Flashing and Trim

1.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for performing any Work required under this specification.

1.04 DEFINITIONS

A. Roofing Terminology: See ASTM D1079 and glossary in NRCA's "NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.05 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.06 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.
1. Slate Shingles: Full size.
2. Fasteners: Three fasteners of each type, length, and finish.

C. Samples for Initial Selection: For each type of slate shingle.

D. Samples for Verification: For the following products, of sizes indicated:

1. Slate Shingle: Full size, of each color, size, texture, and shape.
2. Fasteners: Three fasteners of each type, length, and finish.

1.07 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For each slate variety, based on evaluation of comprehensive tests performed by a qualified testing agency.

B. Evaluation Reports: For synthetic underlayment, from ICC-ES or other testing and inspecting agency acceptable to authorities having jurisdiction, indicating that product is suitable for intended use under applicable building codes.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Slate Shingles: 20% of each type and color, in unbroken bundles.

1.09 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Build mockups for slate shingles including related roofing materials.
      a. Size: 48 inches long by 48 inches wide
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store underlayment rolls in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer's written instructions.
   1. Store on end, on pallets or other raised surfaces. Do not double-stack rolls.

B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

C. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.11 FIELD CONDITIONS

A. Environmental Limitations: Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.12 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
   1. Special warranty includes Delamination (extensive flaking) of the face of the slate and Substantial Deterioration (softening) of the body of the slate
   2. Warranty Period: 50 years from Date of Substantial Completion.

B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of slate-shingle roofing that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

2.01 PERFORMANCE REQUIREMENTS

C. Exterior Fire-Test Exposure: Provide slate shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance according to ASTM E108 or UL 790 by Underwriters Laboratories Inc. or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

2.02 SLATE SHINGLES

A. Slate Shingles: ASTM C406/C406M, Grade S1; hard, dense, and sound; with chamfered edges and nail holes machine punched or drilled and countersunk; with no broken or cracked slates, no broken exposed corners, and no broken corners on covered ends that could sacrifice nailing strength or laying of a watertight roof.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      a. Evergreen Slate Company, Inc.
      b. Greenstone Slate Company, Inc.
      c. Vermont Structural Slate Company, Inc.
      d. Or approved equal.

   2. Thickness and Surface Texture: Nominal 1/2 to 3/4 inch, Heavy Grade; coordinate with Engineer to match existing thicknesses for each location of repair,

3. Length: match existing for each location of repair.
4. Width: match existing for each location of repair.
5. Nail Holes: Two per shingle.
6. Butt Shape: match existing
7. Color: match existing
8. Weather-Exposure Color Change: Weathering.

B. Starter Slate: Slate shingles with chamfered nail holes front-side punched.

1. Length: Exposure of slate shingle plus head lap.

2.03 UNDERLAYMENT MATERIALS

A. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D1970/D1970M, minimum of 40-mil- thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle Coatings & Waterproofing Inc.
b. Henry Company.
c. Johns Manville; a Berkshire Hathaway company.
d. Or approved equal.

2.04 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D4586/D4586M, Type II, asbestos free.

B. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.

C. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in slate-shingle roofing and remain watertight.

D. Slating Nails: ASTM F1667, copper, smooth-shanked, wire nails; 0.135-inch minimum thickness; sharp pointed; with 3/8-inch- minimum diameter flat head; of sufficient length to penetrate a minimum of 3/4 inch into substrate.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

PART 2 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provision has been made for flashings and penetrations through roofing.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

B. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install lapped in direction that sheds water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches, staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
2. Extend self-adhering sheet underlayment over entire repair areas.

3.03 ADJUSTING AND CLEANING

A. Remove and replace damaged or broken slate shingles.

B. Remove excess slate and debris from Project site.

3.04 ROOFING INSTALLER'S SAMPLE WARRANTY

A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:

1. Owner: <Insert name of Owner>.

2. Address: <Insert address>.
3. Building Name/Type: <Insert information>.
4. Address: <Insert address>.
5. Area of the Work: <Insert information>.
6. Acceptance Date: <Insert date>.
7. Warranty Period: <Insert time>.
8. Expiration Date: <Insert date>.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:

    a. Lightning;
    b. Peak gust wind speed exceeding <Insert Project wind speed> mph;
    c. Fire;
    d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. Vapor condensation on bottom of roofing; and
    g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in

connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <Insert day> day of <Insert month>, <Insert year>.

1. Authorized Signature: <Insert signature>.
2. Name: <Insert name>.
3. Title: <Insert title>.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 07450
PVC Roof Membrane

NOTE: Detailed Specification 07540 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 07540.

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the general requirements for a single-ply membrane roofing system and for a complete water- and weather-tight installation of the system complying with all governing codes and standards and including the system manufacturer's special warranty in addition to installer's guarantee.

B. The Contractor shall provide all labor, materials, equipment and incidentals necessary to perform the work of this Section as shown on the Contract Drawings, specified herein, or required otherwise for a complete installation.

C. PVC Roof Membrane includes the following:

1. Adhesives and sealants.
2. PVC sheet roofing.
3. PVC flashing.

D. The following index of this Section is presented for convenience:

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

A. General Specification 07620 Sheet Metal Flashing and Trim

1.04 REFERENCES

A. NYSBC New York State Building Code

B. ASTM D4434 Standard specification for Polyvinyl Chloride (PVC) roofing.

C. FM 1-28 FM Global Property Loss Prevention Data Sheet, Wind Design

D. FM 1-29 FM Global Property Loss Prevention Data Sheet, Roof Deck Securement and Above-Deck Roofing Components

E. FM 1-28R FM Global Property Loss Prevention Data Sheets, Roof Systems

F. FM 1-49 FM Global Property Loss Prevention Data Sheet, Perimeter Flashing

1.05 SYSTEM DESIGN REQUIREMENTS

A. The single ply roofing system to be provided under this Section shall include a complete system of PVC roofing and PVC flashing capable of direct installation on an existing substrate.

B. Installation of the System shall meet the requirements of FM Approval Rating Class 1-90.

C. Wind Uplift Resistance:

1. Per project wind speeds and loads as indicated on drawings.

D. Exterior Fire-Test Exposure: Class A.

E. Sustainable Design Requirements: Products applied on site and within the building's weatherproofing system shall comply with VOC limits of authorities

having jurisdiction and the following VOC limits of when calculated according to SCAQMD Rule 1113 and Rule 1168:

1. Multipurpose Construction Adhesive: VOC not more than 70 g/L.
2. Single-Ply Roof Membrane Sealants: VOC not more than 450 g/L.
3. Nonmembrane Roof Sealants: VOC not more than 300 g/L.
4. Sealant Primers for Nonporous Substrates: VOC not more than 250 g/L.
5. Sealant Primers for Porous Substrates: VOC not more than 775 g/L.
6. Other Adhesives and Sealants: VOC not more than 250 g/L.

F. Substitutions:

1. Do not change products, system components, manufacturers after Shop Drawing approval by Engineer.
2. Clearly identify, in a manner which is highlighted to Engineer, all proposed substitutions, modifications, variations, unspecified features and "or equal" products. Provide complete comparative data with specified products at time of Shop Drawing submission.

1.06 QUALITY ASSURANCE AND QUALIFICATIONS

A. Requirements of Regulatory Agencies: All roofing work shall comply with fire-resistance ratings as shown, and as required by governing authorities having jurisdiction and the New York State Building Code and shall be in accordance with the following requirements:

1. Material and Equipment Acceptance Division of the Board of Standards and Appeals of New York State Department of Buildings: Where, in order to be incorporated into the Work, a particular item or product system specified by Engineer requires acceptance by the New York State Commissioner of Buildings, the Contractor shall assist the product manufacturer in obtaining such approval, without additional expense to the City, and in providing the City with an approved certified copy of the board's resolution giving the MEA number for the item or product system which shall be submitted to Engineer as part of the Shop Drawing approval process. Contractor may submit, in place of products specified by Engineer, products which are "equal" in all ways to the product specified but which have already achieved an MEA number. Such "or equal" product submissions shall not change the requirements of these Sections as to performance, required features or properties, as determined by Engineer, and shall not require additional compensation to Contractor or additional expense to the City. Final acceptance of "equal" is at the sole determination of Engineer.

2. In those instances where the Commissioner of Buildings requires a certificate of compliance of the manufacturer or producer certifying that the item or product system was tested and is equivalent to material of the same kind and quality regularly being manufactured by such manufacturer or producer Contractor shall provide all such certificates to the Commissioner of Buildings without additional expense to the City.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's products on existing installed roof and areas of re-roof and that is eligible to receive manufacturer's special warranty.

C. Installer provide written documentation from roof membrane manufacturer of existing roofs indicating their qualification to perform work without voiding existing warranties.

1.07 WARRANTY

A. Installer’s Warranty: The Contractor shall furnish a written, single source warranty covering all system components, which shall agree that, during the warranty period, prompt repair or replacement of defective materials shall be made without additional cost to the City.

1. Warranty Period: 5 years from date of Substantial Completion.

B. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

1.08 SUBMITTALS

A. Contractor shall submit Shop Drawings for approval of the Engineer. Submittals shall include, but not be limited, to:

1. Samples: Submit for approval the following:

a. 12-inch by 12-inch sample of each roofing product and each accessory and miscellaneous material to be used in the Work.

b. Samples will be reviewed by Engineer. Compliance with other requirements is the responsibility of Contractor.

2. Product Data: Submit for approval the following:

a. Copies of specifications, installation instructions and general recommendations from the roofing manufacturers, for each type of product. Include manufacturer's data substantiating that the materials comply with the requirements.

b. Copies of test reports verifying compliance with physical properties and environmental features specified herein.

3. Shop Drawings: Flashing details at edges and penetrations.

4. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

5. Installer certifications.

6. Manufacturer Certificates:

a. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "System Design Requirements" Article.

1) Submit evidence of compliance with requirements.

7. Sample warranty: for all Warranties.

8. Closeout:

a. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

b. Maintenance data and instructions required for Warranties.

1.09 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Materials shall not be delivered to the project site before the time of installation.

2. Materials shall be delivered in sufficient quantities to allow continuity of the Work.

B. Storage of Materials:

1. Materials shall be stored in original, undamaged containers with manufacturer's labels and seals intact. Labels shall include the following:

a. Name of material.

b. Manufacturer's stock number and date of manufacture.

c. Material safety data sheet.

2. All materials shall be stored in a dry, enclosed area, out of direct sunlight, off the ground and away from all possible contact with water, ice, or snow.

3. Damage to materials during storage shall be prevented primarily by minimizing the amount of time they are stored at the project site before being incorporated into construction systems.

C. Handling of Materials:

1. Materials shall be handled carefully in order to avoid damage or breakage.

2. Materials shall not be exposed to detrimental conditions or physical damage. Materials which are so exposed shall be permanently removed from the project site and shall not be incorporated into the Work.

3. Materials shall be handled in such a manner so as to prevent inclusion of foreign materials.

4. Packages or containers shall not be opened until all necessary, preparatory Work is complete and installation is to begin immediately. Materials shall not be allowed to become wet or soiled or covered with ice or snow.

1.10 PROJECT CONDITIONS

A. Roofing shall not be applied in ambient temperatures below 40 degrees F, or to a damp, frosty, snow covered, or contaminated surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Sika Sarnafil.

2. Johns Manville.

3. Duro-Last.

4. Or approved equal.

2.02 MATERIALS

A. General: Furnish all components of roofing system from a single manufacturer, and from a single supplier with adequate resources to provide products of

consistent performance characteristics, physical properties and appearances, without delaying the work.

B. Adhesives and Primers:

1. Low-emitting adhesives and sealants.
2. As recommended by the manufacturer for the substrate.

C. PVC (Polyvinyl-Chloride) Sheet Roofing: ASTM D4434.

1. Description: PVC Type 2, glass-fiber reinforced heat weldable adhesive adhered membrane.
2. Backing: Fleece backed, for installation on existing substrate.
3. Thickness: 80 mil minimum.
4. Color: White.

D. Sheet Flashing: Same as PVC sheet, provide in thickness required for Warranty.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Contractor shall verify that areas to receive roofing are fully prepared.

3.02 SURFACE PREPARATION

A. Surfaces to receive roofing shall be clean and free of all foreign matter.

B. Voids, rock pockets, and rough surfaces shall be repaired with approved non-shrink grout, or shall be ground to match the unrepaired areas.

C. All sealant shall be allowed to cure tack free.

D. Flashing shall be applied to a minimum height of 8 inches on the vertical surface, and 4 inches on the deck surface. Flashing shall be terminated in accordance with the manufacturer's recommended details.

E. Splices or seams shall not be allowed within 3 inches of drains. Flashing shall be terminated under the drain clamping ring, and the inner portion of flashing shall be cut away. Flashing shall be pressed against the primed surface to ensure good adhesion.

3.03 INSTALLATION

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

C. Membrane Roofing: Fully Adhered.

3.04 PROTECTION

A. All components of the Work shall be protected from detrimental weather and damage during construction.

B. Protect roof drains from becoming clogged or obstructed throughout the period of work.

C. Roofing system shall be protected from all damage until Final Acceptance by the City.

3.05 ADJUSTMENT

A. System components which are dislodged, damaged, expanded, broken, penetrated or crushed by subsequent installation operations or damaged by detrimental weather shall be immediately replaced with undamaged material in compliance with the Sections and properly protected as specified.

3.06 FIELD QUALITY CONTROL

A. Water testing of drains: Flow test roof drains within areas of work and ensure that all roof drains are operating properly at completion of work.

END OF SECTION

SECTION 07210
Building Insulation

NOTE: Detailed Specification 07620 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 07620.

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish, fabricate and install all sheet metal fabrications not specifically included in other Sections and required for the completion of the work as shown on the Contract Drawings and as specified herein.

B. Sheet metal fabrications shall be provided complete with all accessories, base attachments, fastenings and other appurtenances as specified and as may be required for a satisfactory installation.

C. Section Includes:
1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed steep-slope roof sheet metal fabrications.
4. Wall sheet metal fabrications.

D. An index of the Articles in this Section is presented hereinafter for the convenience of the Contractor.

1.02 RELATED SECTIONS

A. Detailed Specification 04120 - Brick and Masonry Repair

B. General Specification 04200 - Unit Masonry

C. Detailed Specification 04200 - Unit Masonry

D. General Specification 07312 - Slate Shingles

1.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for performing any Work required under this specification.

1.04 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.05 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site
1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.06 ACTION SUBMITTALS

A. Product Data: For each of the following
1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.
1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches

C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

D. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

E. Samples for Verification: For each type of exposed finish.
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.

2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.08 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

B. Special warranty.

1.09 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless DEP specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.
3. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation

1.11 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

B. Warranty Period: 50 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. SPRI Wind Design Standard: Manufacture and install flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
   1. Design Pressure: As indicated on Drawings

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces

2.02 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Hussey Copper Ltd.
      b. Revere Copper Products, Inc.
      c. Or approved equal.

   2. Source Limitations: Obtain sheet from single source from single manufacturer.
   3. Copper-Sheet Finish: Brown Pre-patinated Copper ASTM B882

C. Stainless Steel Sheet: ASTM A240/A240M, Type 316, dead soft, fully annealed; with smooth, flatsurface.
   1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <Insert value> percent.
   2.
   3. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled)
      a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
      b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
         1) Run grain of directional finishes with long dimension of each piece.
         2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.03 UNDERLAYMENT MATERIALS

A. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Carlisle WIP Products; a brand of Carlisle Construction Materials.
      b. Henry Company.

c. Owens Corning.
d. Or approved equal.

2. Source Limitations: Obtain underlayment from single source from single manufacturer.
3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

2.04 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

C. Solder:
1. For Copper: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead.
2. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

I. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

J. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.
   1. Source Limitations: Obtain reglets from single source from single manufacturer.
   2. Material: [Copper, 32 oz./sq. ft.Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
   3. Accessories:
      a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
      b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
   4. Finish: Brown Pre-patinated Copper

2.05 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
   1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
   2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
   3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.

4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:
1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams:
1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

H. Do not use graphite pencils to mark metal surfaces.

2.06 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. NRCA and SMACNA offer recommendations for profiles, dimensions, thicknesses, fastenings, and installation of steep-slope roof sheet metal fabrications. Coordinate flashing shapes and dimensions with applicable steep-slope roofing Section. Base-metal thicknesses cited for copper sheets, for copper-clad stainless steel sheet, and for zinc sheet are from manufacturer's literature.

B. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:

1. Lead Coated Copper: 32 oz./sq. ft.

C. Valley Flashing: Fabricate from the following materials:
1. Lead Coated Copper: 32 oz./sq. ft.

D. Drip Edges: Fabricate from the following materials:
1. Lead Coated Copper: 32 oz./sq. ft.

E. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
1. Lead Coated Copper: 32 oz./sq. ft.

F. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Lead Coated Copper: 32 oz./sq. ft.

G. Flashing Receivers: Fabricate from the following materials:
1. Lead Coated Copper: 32 oz./sq. ft.

H. Roof-Penetration Flashing: Fabricate from the following materials:
1. Lead Coated Copper: 32 oz./sq. ft.

2.07 WALL SHEET METAL FABRICATIONS

A. Embedded Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:

1. Asphalt-saturated glass fabric scrim coated 7 oz (with 12 oz end dams) flexible sheet copper, coarse texture, Hohmann & Barnard C-FAB or equal. Affixed with surface mounted stainless steel termination bar (.019 inch/26 gauge x 1.5 inches) with continuous sealant on 3/8 inch sealant flange top edge.

2. Installation: Lap existing flashing to remain over new flashing for a continuous seal. Install termination bar and apply sealant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Retain subparagraph below for sheet metal flashing and trim that are part of roof assembly that depends on air- or water-resistant barriers to prevent air infiltration or water penetration and that are located immediately beneath roofing.
4. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
    a. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.
8. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.
    a. Install in shingle fashion to shed water.
    b. Lap joints not less than 4 inches.

3.03 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
7. Do not field cut sheet metal flashing and trim by torch.
8. Do not use graphite pencils to mark metal surfaces.
9. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
10. Coat concealed side of stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
11. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
12. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
    a. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
    b. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
    c. Use lapped expansion joints only where indicated on Drawings.
13. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws
    a. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
14. Seal joints as required for watertight construction.
    a. Use sealant-filled joints unless otherwise indicated.

1) Embed hooked flanges of joint members not less than 1 inch into sealant.

2) Form joints to completely conceal sealant.

3) When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.

4) Adjust setting proportionately for installation at higher ambient temperatures.

5) Do not install sealant-type joints at temperatures below 40 deg F.

6) Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

15. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

a. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.

b. Do not use torches for soldering.

c. Heat surfaces to receive solder, and flow solder into joint.

1) Fill joint completely.

2) Completely remove flux and spatter from exposed surfaces.

d. Stainless Steel Soldering:

1) Tin edges of uncoated sheets, using solder for stainless steel and acid flux.

2) Promptly remove acid-flux residue from metal after tinning and soldering.

3) Comply with solder manufacturer's recommended methods for cleaning and neutralization.

e. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

3.04 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.
4. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.

3.05 INSTALLATION OF WALL FLASHINGS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.06 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.07 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

3.08 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Engineer.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 07621G
Gutters and Downspouts

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 07621 – Gutters and Downspouts, except as modified herein.

PART 1 GENERAL

1.09 WARRANTY

Replace Section 1.09 A with the following.:

A. Contractor shall execute his own written guarantee direct to the City warranting all gutters and downspouts for a period of two years after date of Substantial Completion thereof by the City. Imperfections, by reason of defective materials, workmanship or arrangement of the various parts shall be made good to the satisfaction of the City at Contractor's expense.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Add the following to Section 2.01 A.:

1. Components in this section are custom shop-fabricated.
2. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    a. Any manufacturer.

2.02 MATERIALS

Add the following to Section 2.02 A.:

1. Components in this section are custom shop-fabricated
2. See drawings for material type, profiles, and special shapes.

Add the following to Section 2.02 G.:

1. Replace ‘factory fabricated’ with ‘shop-fabricated’.
2. Field fabrication/forming of items is not acceptable.
3. Finish of aluminum components in this section to match aluminum window and framing finish.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 07900G
CAULKING AND SEALANTS

NOTE: All Work for this Section shall be in accordance with the requirements of General Specification 07900 – Caulking and Sealants, except as modified herein.

PART 1 GENERAL

1.01 SUMMARY

Replace 1.01C with the following:

C. The Contractor shall provide all labor, materials, equipment, and incidentals necessary to perform the Work of this Section as shown on the Contract Drawings, or required otherwise for a complete job.

1.02 PAYMENT

Replace 1.02A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.02 MATERIALS

Add the following after 2.02D

E. Primary structural expansion joints:

1. Provide closed-cell preformed foam sealer. Material shall maintain watertight seal under rapid rates of joint movement. Provide expansion control system product by one of the following manufacturers, subject to requirements:
    a. EMSEAL Joint Systems, Ltd, Westborough, MA
    b. Tremco Incorporated, Beachwood, OH
    c. Schul International Company, Inc., Pelham, NH
    d. Or approved equal.
2. Design Criteria:
    a. Nominal Joint Width: As indicated on the Contract Drawings.
    b. Movement Capability: one hundred percent (100%) (+50%, -50%)

c. Color: As selected by Resident Engineer from manufacturer's full range.

PART 3 EXECUTION

3.03 INSTALLATION

Add the following after 3.03I:

J. Preformed Foam Sealer: Install with adhesive recommended by manufacturer.

END OF SECTION

SECTION 08361
SECTIONAL OVERHEAD DOORS

NOTE: Detailed Specification 08361 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 08361.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section describes the general requirements for sectional overhead doors and auxiliary system components including electric operators and operating systems, accessories and fasteners. Sectional overhead doors shall conform to the requirements specified herein, and in the Detailed Specifications; and as shown on the Contract Drawings. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install and place into satisfactory service, all sectional overhead doors and related system component work.

B. Principle Items of Work Include:

1. Aluminum, very-high-cycle, industrial quality, sectional overhead doors with insulated panels and full perimeter weatherstripping.
2. Electrically operated sectional overhead doors with motors, control stations, starters, safety edge devices, control systems, all power and control connections (including disconnect switches) and similar and associated auxiliary system components.
3. Tracks, angles, brackets, supports, anchors and fasteners.
4. Miscellaneous materials and accessories for a completely functioning system.

C. The following index of this Section is presented for convenience:

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

A. Not used

1.04 REFERENCES

A. NYCBC - New York City Building Code

B. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

C. AIEE - American Institute of Electrical Engineers

D. National Fire Protection Association, NFPA 70 - National Electrical Code

E. National Electrical Manufacturers Association, NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)

F. National Electrical Manufacturers Association, NEMA ICS 1, Industrial Control and Systems: General Requirements

G. National Electrical Manufacturers Association, NEMA ICS 2, Industrial Control and Systems: Controllers, Contactors and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC

H. National Electrical Manufacturers Association, NEMA ICS 6, Industrial Control and Systems: Enclosures

I. National Electrical Manufacturers Association, NEMA MG 1, Motors and Generators

J. National Electrical Manufacturers Association, NEMA Standards Publication 250, Enclosures for Electrical Equipment (1000 Volts Maximum)

K. National Association of Architectural Metal Manufacturers, NAAMM AMP 500, Architectural Metal Products Division

L. South Coast Air Quality Management District (SCAQMD)

1. Rule 1113, Architectural Coatings
2. Rule 1168, Adhesives and Sealants

M. GS–11 - Green Seal Environmental Standard for Paints and Coatings.

N. GC–03 - Green Seal Environmental Criteria for Anti-Corrosive Paints.

O. ISO 3575 Continuous Hot-Dip Zinc-Coated Carbon Steel of Commercial and Drawing Qualities

P. ISO 4998 Continuous Hot-Dip Zinc-Coated Carbon Steel of Structural Quality

1.05 DEFINITIONS

A. Operating Cycle: One complete cycle of a sectional overhead door begins in the closed position. The door is then moved to the open position and back to the closed position.

1.06 PERFORMANCE CRITERIA

A. Structural Performance: Prepare calculations for the purpose of determining acceptable detailing and fabrication of sectional overhead door components, confirming resistance to the following loads:

1. Wind Loading: Provide resistance to both positive and negative wind pressure loading of 30 pounds per square foot acting over entire plane of door curtain slats when subjected to a 115 mile per hour wind.

2. Dead Loading: Provide resistance to deformation of door components caused by the effects of gravity loads.

3. Applied loadings shall not cause either short-term or permanent deformation of any system component. Doors shall remain operable and in undamaged condition during, and after, application of specified wind pressure loading.

B. Helically-Wound Torsion Springs: Provide Very-High-Cycle design capable of performing for 100,000 operational cycles. Provide non-resetable electric counters for all sectional overhead doors.

C. Electric Operators and Controls:

1. Design operators so that motor may be removed without disturbing the limit-switch adjustment and without affecting the emergency auxiliary operator.

2. Design operators for 100,000 service-free, operating cycles.

3. Provide fixtures that are listed and labeled as specified.

D. Emergency Chain Hoist Operation: Design reduction roller chain and sprocket drive or suitable gearing, mounted on counterbalance shaft, to operate with a maximum 35 pounds of pulling force.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings for approval of the Engineer. Submittals shall include, but not be limited to:

1. Shop Drawings: Submit for approval the following:

a. Drawings showing all components and their assembly, all with accurately marked dimensions. Include details at frames showing existing construction, elevations of each sectional overhead door design type, details of construction and conditions at openings.

b. Copies of manufacturer's specifications and data sheets, roughing-in diagrams, and installation instructions for each type and size of sectional overhead door. Include manufacturer's data on operators, operating instructions and maintenance data. Indicate by transmittal form that installer has received a copy of diagrams and installation instructions.

c. Calculations showing that detailing and fabrication of components are in compliance with structural performance specified.

d. Electric operator and all other operating system component specifications indicating compliance with requirements specified. Complete interconnecting wiring diagrams for power, signal and control systems indicating all system operating components and control station wiring as required for a completely operational system in compliance with the Specifications. Provide motor nameplate data and ratings as specified in General Specification 16221 - Electric Motors; and

characteristics, mounting arrangements, size and location of winding termination lugs, conduit entry and grounding lugs; and coatings. Define and differentiate between components that are furnished and installed as part of sectional overhead door work; both at the Site and in the factory, and those that must be furnished, or installed, as part of the work of other Sections or Contracts.

e. Setting drawings; summary of loads on walls, jambs and structural elements; templates; and instructions and directions for installation of inserts and anchorage devices which shall be furnished by the sectional overhead door manufacturer but installed under other Sections of the Specifications.

2. Operation and Maintenance (O&M) Manuals: Include the following information:

a. Product name and number.

b. Name, address and telephone number of manufacturer and local distributor.

c. Detailed procedures for routine maintenance and cleaning.

d. Detailed procedures for light repairs.

e. Parts catalog listing all operating system parts and components by kind and purchasing designation number.

3. Reports:

a. Certified reports of motor tests, as specified.

1.08 QUALITY ASSURANCE AND QUALIFICATIONS

A. Installer Qualifications:

1. Engage a single installer for all sectional overhead door work, with documented successful experience in the type of work required, and who is an authorized representative of the sectional overhead door manufacturer for both installation and maintenance of units required, and who agrees to employ only skilled tradesmen with successful experience in this type of work.

2. Submit names and qualification to Engineer along with the following information on a minimum of three successful projects:

a. Names and telephone numbers of owner, architects or engineers responsible for projects.

b. Approximate contract cost of the sectional overhead doors.

c. Amount of area installed.

B. Submissions that indicate proposed installer does not have the necessary successful experience will not be approved by Engineer.

1.09 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver all units suitably crated, from the factory to the Site, braced and protected against distortion during transit and unloading. Label all parts to comply with approved Shop Drawing designations.

2. Upon delivery, inspect metal for damage. Minor damage may be repaired. Damage to items visible in the finished work, such as door panels, shall not be repaired. Replace such damaged items with new material.

3. Repair damaged items and restore condition in all respects to be equal to new items, if acceptable to Engineer. Remove and replace damaged items that cannot be successfully restored and replace with new.

B. Storage of Materials:

1. Store sectional overhead doors and auxiliary system components under cover and protected from all construction traffic and weather.

2. Place units up off of floors in a manner that will prevent rust or other damage.

3. Avoid the use of non-vented plastic or canvas shelters that could create a humidity chamber.

C. Handling of Materials:

1. Handle units and components in a manner that prevents damage to components and finishes. Units showing effects of rough handling shall not be used in the work and shall be removed and replaced with new undamaged material and components even if only discovered after installation, at no additional expense to the City.

PART 2 PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

A. Glazed Aluminum Sectional Overhead Door with Insulated Aluminum Panels.

a. Basis-of-Design Product: Subject to compliance with requirements, provide TITAN Model Aluminum Doors by:

Arm-R-Lite Door Manufacturing Co.

40 Colonial Drive, Piscataway, NJ 08854

Ph: 900-554-5816

Email: info@arm-r-lite.com

Web: www.arm-r-lite.com

b. Or comparable product by one of the following:

1) Any other manufacturer

2.02 MATERIALS

A. Construct stile and rail door sections from heli-arc welded 6063 T6 aluminum sections, including insulated panels of minimum .075” - .085” thick aluminum, per basis-of-design product. Finish: Clear Anodized.

1. Panel Thickness: 1-3/4 inches
2. Center Stile Width: 3-3/8 inches
3. End Stile Width: 3-3/8 inches
4. Meeting Rail Pair Width: 3-3/8 inches wide per pair
5. Top and Bottom Rail Width: 4-1/2 inches
6. Aluminum Panels: 1/2 inch thick insulated aluminum panels
7. Finish: Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611

B. Tracks and Supports:

1. Tracks: Manufacturer's standard galvanized steel track system shall be provided, sized for door size and weight, and designed for clearances shown. Provide complete track assembly including brackets, bracing and reinforcing for rigid support of

ball-bearing roller guides, for the required door type and size. Slot vertical sections of tract at 2 inches on centers for door drop safety device. Slope tracks at proper angle from vertical, or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.

2. Track Reinforcement and Supports: Provide galvanized steel track reinforcement and support members. Secure, reinforce and support tracks as required for size and weight of door to provide strength and rigidity, and to ensure against sag, sway, and detrimental vibration during opening and closing or doors.

3. Support and attach tracks at opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling tracks) with continuous angle welded to track and supported by laterally-bracked attachments to overhead structural members at curve and end of tracks.

C. Counterbalancing Mechanisms:

1. Extension Spring: Hang door assembly for operation by extension spring counterbalance mechanism with aircraft-type steel cable over ball-bearing sheaves. Provide oil-tempered, wired springs with internal safety rods. Combine operation with a spring bumper in each horizontal track to cushion door at end of opening operation.

2. Torsion Spring: Hang door assembly for operation by a torsion spring counterbalance mechanism, consisting of adjustable tension, tempered steel torsion springs mounted on a case-hardened steel shaft, and connected to door with galvanized aircraft-type lift cable.

3. Provide cast aluminum or grey iron casting cable drums, grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft with one additional mid-point bracket for shafts up to 16 feet-0 inches long and two additional brackets at 1/3 points to support shafts over 16 feet-0 inches long, unless closer spacing is recommended by door manufacturer.

4. Include a spring-loaded steel or bronze cam mounted to the bottom door roller assembly on each side, designed to stop door automatically if either cable breaks. Provide either a compression spring or leaf spring bumper installed at the end of each horizontal track to cushion door at end of opening operation.

D. Weather Seals: Provide continuous, rubber or neoprene, adjustable weatherstrip gasket at the tops, a compressible astragal on the bottoms

of each door and continuous flexible seals at door edges and between panel sections continuously along the meeting edges.

E. Vision Panels: Except as otherwise shown or specified, furnish 1/2-inch clear insulated tempered sheet glass vision panels in arrangement as shown. Set glass in rubber or neoprene in aluminum frames and stops.

F. Pass Doors: Provide pass doors where shown, complete with glazing, operating hardware, and mortise lock. Construct pass doors of the same materials and design as upward-acting sectional door unit.

1. Where door unit is power operated, provide safety interlock switch to disengage power supply when pass door is open.

2. Lock cylinder is specified in General Specification 08710 – Finish Hardware.

G. Hardware:

1. Provide heavy-duty, rust-resistant hardware, with stainless steel fasteners, as required for type of door.

2. Hinges: Provide heavy wrought steel hinges at each end stile and at each intermediate stile, as recommended by manufacturer for size of door. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners only where access to nuts is not possible. Provide double-end hinges, where required, for doors exceeding 16 feet-0 inches in width, unless otherwise recommended by door manufacturer.

3. Rollers: Provide heavy-duty rollers, with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide roller tires to suit size of track, 3-inch diameter for 3-inch track; 2-inch diameter for 2-inch track, and as follows:

a. Case-hardened steel tires, for normal installations.

4. Pull Handles, Locks and Latches: For manually-operated doors, furnish lifting handles, locks, and locking device as follows:

a. Fabricate locking device assembly with mortise lock, spring-loaded dead bolt, chromium-plated operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.

b. Lock cylinder is specified in General Specification 08710 – Finish Hardware.

2.03 AUXILIARY SYSTEM COMPONENTS

A. Emergency Chain Hoist:

1. Provide direct drive chain hoist, side-mounted unit consisting of an endless cadmium-plated alloy steel hand chain, cast iron pocket pulley and chain guard, mounted on counterbalance shaft, where direct drive units recommended for doors over 12 feet-0 inches high and not exceeding 12 feet-0 inches wide or 168 square feet are specified in the Detailed Specifications.

2. Provide reduction drive chain hoist, side-mounted unit consisting of an endless cadmium-plated alloy steel hand chain, chain pocket wheel and reduction unit of at least 3 to 1, roller chain and sprocket drive, end-mounted on counterbalance shaft, where reduction drive units generally recommended for doors not over 22 feet-0 inches wide or 308 square feet are specified in the Detailed Specifications.

3. Provide trolley-mounted reduction drive chain hoist, consisting of an endless cadmium-plated alloy steel hand chain, chain pocket wheel and guard, reduction unit of at least 3 to 1, driving through separate drive shaft to center trolley track. Connect to door through secondary drive roller chain and sprocket, where trolley drive units recommended for doors over 15 feet-0 inches high and doors area exceeds 195 square feet, are specified in the Detailed Specifications.

B. Electric Door Operators:

1. Furnish electric door operator assembly of the size and capacity recommended and provided by the sectional overhead door manufacturer, complete with electric motor and factory-prewired motor controls, including reversing starter, gear reduction unit, solenoid operated brake, clutch, remote control stations and control devices and wiring complying with the requirements of NFPA 70. Magnetic reversing starter shall be of the internal type with thermal overload protection and reset button.

2. Provide a hand-operated disconnect or mechanism for automatically engaging a sprocket chain operator and releasing brake for emergency manual operation. Mount disconnect and operator so that they are accessible from floor level. Include an interlock device to automatically prevent the motor from operating when emergency sprocket is engaged.

3. Design operator so that motor may be removed without disturbing the limit-switch adjustment and without affecting the emergency auxiliary operator.

4. Door Operator Type:

   a. Provide trolley or drawbar type, suitable for standard lift doors up to 400 square feet, V-belt and roller chain and sprocket primary drive, and chain and sprocket secondary drive, where specified in the Detailed Specifications.

   b. Provide gear reduction trolley type, for high frequency door operation of over 200 cycles per day and when dusty conditions prevail, with worm and worm gear reduction, enclosed running-in-oil primary drive, and chain or worm gear secondary drive, quick-clutch disconnect-release for manual operation, where specified in the Detailed Specifications.

   c. Provide jackshaft type, with clutch-disconnect release for manual operation, V-belt and roller chain drive connected to counterbalance shaft. Sidemount, centermount or jackshaft type should be used for high lift doors, and where trolley type cannot be used, where specified in the Detailed Specifications.

   d. Provide sidemount or centermount type, with V-belt and roller chain drive connected to counterbalance shaft, and with auxiliary chain hoist and disconnect switch, where specified in the Detailed Specifications.

   e. Provide sidemount or centermount gear hoist type, with worm and gear reduction drive for high-frequency and heavy-duty door operation, direct-couple chain to counterbalance shaft, and with auxiliary chain hoist and disconnect switch, where specified in the Detailed Specifications.

5. Electric Motors:

   a. Provide high-starting torque, reversible, continuous-duty, Class A insulated electric motors, complying with NEMA MG-1, with overload protection.

   b. Size to start, accelerate, and operate door in either direction, from any position, at not less than 8 inches nor more than 12 inches per second without exceeding nameplate ratings or considering service factor.

   c. Coordinate wiring requirements and current characteristics of motors with building electrical system;

d. Provide open-dripproof type, and controller with NEMA Type 1 enclosure, unless otherwise shown or specified in the Detailed Specifications.

e. Provide totally enclosed, nonventilated or fan-cooled motors, waterproof electric motors, fitted with a plugged drain, and controller with NEMA Type 4X enclosure, where specified in the Detailed Specifications.

f. Provide explosion-proof electric motors, and controller with NEMA Type 7 enclosure, fitted with UL approved drain and breather, certified and labeled to comply with UL Standards, where specified in the Detailed Specifications.

g. Provide adjustable limit switches, rotary-type, driven by a time chain and interlocked with motor controls set to automatically stop door at fully opened and closed positions. Geared limit switches shall contain a spare set of contacts.

6. Remote Control Station:

a. Unless otherwise shown, provide momentary-contact, 3-button control stations with push button controls labeled "open", "close" and "stop". Install at location as shown or scheduled.

b. Provide interior units, full-guarded type, surface-mounted, heavy-duty, with general purpose NEMA 1 enclosure, unless otherwise specified in the Detailed Specifications.

c. Provide exterior units, full-guarded type, standard duty, surface-mounted, weatherproof type, NEMA Type 4X enclosure, key-operated.

7. Safety Edge Device:

a. Provide each door with a pneumatic safety air switch, extending full width of the door bottom, and located within an U-shaped neoprene or rubber astragal mounted to the bottom door rail.

b. Unit shall operate such that contact with the switch before fully closing will immediately change the air chamber pressure sending a signal from the air switch to the electric motor to stop the downward travel and reverse the direction to the fully opened position.

c. Connect to the control circuit through a retracting safety cord with cable reels provided for each electric operating door.

d. The compressible strip shall also serve as a weatherseal along the bottom of the door.

8. Obstruction Detection Devices:

a. Provide each motorized door with external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.

b. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

c. Provide self-monitoring sensor designed to interface with door operator control circuit to detet damage to, or disconnection of, sensor device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.

2.04 FABRICATION

A. Reinforce bottom section with a continuous aluminum channel or angle conforming to the bottom section profile.

B. Reinforce sections with continuous horizontal and diagonal reinforcing, as required by door width, and the required structural performance criteria.

C. Insulate inner face of steel sections with manufacturer's standard glass fiber or polystyrene foam type insulation. Enclose insulation with manufacturer's standard steel sheet secured to door panel.

2.05 TESTING

A. All tests shall be performed in accordance with the requirements of the Contract Documents. The following tests are required:

1. Certified Shop Tests:

a. Motor tests in accordance with General Specification 16221 - Electric Motors.

B. Test equipment to demonstrate that it has been properly assembled, properly lubricated, is not overheating, is not overloading, and has no electrical or mechanical defects.

C. Perform all certified shop tests and submit shop test report to Engineer.

2.06 SOURCE QUALITY CONTROL

A. Provide each type of sectional overhead door as a complete unit, produced by a single manufacturer specializing in the production of this type of work, including hardware, accessories, mounting and installation components.

PART 3 EXECUTION

3.01 INSPECTION

A. Contractor shall examine the substrates and conditions under which the sectional overhead doors are to be installed and notify Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

3.02 INSTALLATION

A. Install all units and operating equipment complete with necessary hardware, jamb, and head moldings, anchors, inserts, hangers and equipment supports in accordance with final approved Shop Drawings, manufacturer's printed instructions and as specified herein.

B. Do all cutting, drilling, fitting and other work of similar character required for fitting and setting units in connection with this work and adjoining work of other trades.

C. Install, wire, connect and adjust doors, motors, starters, pushbutton stations, limit and safety switches and all other electrical accessories and connections required in full accordance with the manufacturer's written instructions, the approved Shop Drawings and as shown and specified in the Detailed Specifications.

3.03 FIELD QUALITY CONTROL

A. Upon completion of installation including the work by other trades, test controls and door operation in presence of Engineer to demonstrate compliance with the Specifications, the manufacturer’s design criteria and specified performance criteria. Demonstrate the presence of all options and features specified.

B. Provide a factory-authorized service representative on-Site for a minimum of 24 hours to perform startup services and to train the City’s maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices. Schedule training with the City to provide at least seven days’ advance notice to the City’s personnel.

C. Review all data contained in approved maintenance manuals with the City’s maintenance personnel.

3.04 PROTECTION, CLEANING AND ADJUSTMENT

A. Protect units prior to, during and after installation. Protection shall remain in-place until all work which may cause damage or defacement has been completed.

B. After installation, including work by other trades and Contracts, lubricate, test and adjust all sectional overhead door units to operate easily.

C. Repair and replace damage items and restore finishes to match adjacent finish. Where items and finish cannot be successfully restored, provide new undamaged items and finish as specified, at no additional expense to the City.

D. Adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 08411
ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

NOTE: Detailed Specification 08411 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 08411.

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes:

1. Aluminum Entrances and Storefronts.

B. Related Sections:

1. 08710 "Hardware"
2. 08800 “Glazing”

1.03 MEASUREMENT AND PAYMENT

A. No separate payment will be made for performing any Work required under this specification.

1.04 DEFINITIONS

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.05 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed entrance system shall withstand the effects of the following performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction. Engage a

qualified professional engineer to design aluminum-framed entrances and storefronts.

B. Aluminum Framed Entrance Performance Requirements:

1. Wind loads: see structural drawings.

2. Air Infiltration: For single acting offset pivot or butt hung entrances in the closed and locked position, the test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 1.57 psf (75 PA) for single and pairs of doors. A single 3'0" x 7'0" (915 mm x 2134 mm) entrance door and frame shall not exceed 1.0 cfm/ft^2.

3. Structural: Test according to ASTM E330/E330M as follows:

a. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.

b. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.

c. Test Durations: As required by design wind velocity, but not less than 10 seconds.

1.06 SUBMITTALS

A. Product Data: Include construction details, material descriptions, and fabrication methods, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum-framed entrance door indicated.

1. Recycled Content:

a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.

b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.

c. Indicate location recovery of recycled content.

d. Indicate location of manufacturing facility.

2. Environmental Product Declaration (EPD).

a. Include a Type III Product-Specific EPD.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum-framed entrance door and components required.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed entrance doors.

F. Fabrication Sample: Corner sample consisting of a door stile and rail, of full-size components and showing details of the following:

1. Joinery, including welds.

2. Glazing.

G. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum-framed entrance doors and storefronts that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum-framed entrance door and storefront through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum-framed entrance doors/storefronts and are based on the specific system indicated. Do not modify size and dimensional requirements.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup for types of swing entrance doors and storefronts indicated, in locations shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of aluminum-framed entrance door openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.09 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
2. Structural failures, including, but not limited to, excessive deflection.
3. Noise or vibration created by wind and thermal and structural movements.
4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
5. Water penetration through fixed glazing and framing areas.
6. Failure of operating components.
7. Warranty Period:10 (ten) years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:
    a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.

c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 (ten) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following:

1. KAWNEER Series 500T Insulpour Thermal Swing Entrance Door, Medium stile, 5” vertical stile, 5” top rail, 10” bottom rail, 2 1/4" frame depth, for high traffic applications.
2. Major portions of the door members to be 0.125" nominal in thickness and glazing molding to be 0.05" thick.
3. Insulated glazing
   a. Glazing gaskets and stops to be Square, snap-on, extruded-aluminum stops and preformed gaskets. Provide nonremovable glazing stops on outside of door.

B. Subject to compliance with requirements, provide a comparable product by the following manufacturers:

1. EFCO
2. YKK
3. Oldcastle Building Envelope
4. Or approved equal.

2.02 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum-framed entrance door manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090” wall thickness at any location for the main frame and door leaf members.

1. Recycled Content:
   a. Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific information that will be provided after product shipment.

b. Once product has shipped, provide project specific recycled content information, including:

1) Indicate recycled content; indicate percentage of pre- and post-consumer recycled content per unit of product.

2) Indicate relative dollar value of recycled content product to total dollar value of product included in project.

3) Indicate location recovery of recycled content.

4) Indicate location of manufacturing facility.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum-framed entrance door members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.

2.03 STOREFRONT FRAMING SYSTEM

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following:

1. KAWNEER Series Trifab 451UT.

2. Thermally broken entrance fraing- Kawneer IsoLock Thermal break with 1/4” separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.

a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

B. Subject to compliance with requirements, provide a comparable product by the following manufacturers:

1. EFCO.
2. YKK.
3. or approved equal.

C. Accessories

1. Non-Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
2. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
3. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

2.04 GLAZING

A. Glazing: As specified in Division 08 Section “Glazing”.

2.05 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum-framed entrance doors.

B. Standard Hardware:

1. Weather-stripping:
   a. Meeting stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
   b. The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
2. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners (Necessary to meet specified performance tests).

C. Other hardware: as specified in Div 08 “Finish Hardware”

D. Access Control Entrance Hardware: as specified in Div 08 “Finish Hardware”

2.06 FABRICATION

A. Fabricate aluminum-framed entrance doors in sizes indicated. Include a complete system for assembling components and anchoring doors.

B. Fabricate aluminum-framed glass doors that are reglazable without dismantling perimeter framing.

1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" (29 mm) long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.

2. Accurately fit and secure joints and corners. Make joints hairline in appearance.

3. Prepare components with internal reinforcement for door hardware.

4. Arrange fasteners and attachments to conceal from view.

C. Weather-stripping: Provide weather-stripping locked into extruded grooves in door panels or frames as indicated on manufacturer's drawings and details.

2.07 ALUMINUM FINISHES:

1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated installation.

B. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed entrance doors, hardware, accessories, and other components.

B. Install aluminum-framed entrance doors level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill threshold in bed of sealant, as indicated, for weather tight construction.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

E. Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.03 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide periodic site visit by manufacturer’s field service representative.

3.04 ADJUSTING, CLEANING, AND PROTECTION

A. Clean aluminum surfaces immediately after installing aluminum-framed entrance doors. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for DEP's

continued adjustment, maintenance, and removal and replacement of entrance door hardware.

2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment

END OF SECTION

SECTION 08521G
ALUMINUM WINDOWS AND FRAMES

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 08521 – Aluminum Windows and Frames, except as modified herein.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Replace Section 2.01A with the following:

A. Basis-of-Design Product: Subject to compliance with requirements, provide Double Hung Series 850DH by the following:

1. Boyd Aluminum Manufacturing Company

   P.O. Box 1565

   3248 E. Division Street

   Springfield, MO 65801-1565

   Phone: 800-737-2800

   Web: boydaluminum.com

B. Or provide comparable product by the following:

1. J. Sussman, Inc.
2. Any other manufacturer

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 08800G
GLASS, PLASIT AND GLAZING

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 08800 – Glass, Plastic and Glazing, except as modified herein.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

Add to Section 2.10 the following:

2. See Section 2.02 for additional manufacturers.

2.02 MATERIALS, GENERAL

Replace Article 2.02.I in its entirety with the following:

I. Fire Rated Glazing System - ASTM E119 UL to be located as indicated on the Contract Drawings of a minimum of 1/4-inch thickness, indicated in fire rated assemblies in doors, sidelights or windows unless noted otherwise as manufactured by SAFTI (Safety and Fire Technology, Inc.) as follows:

1. SuperLite II 90 28/28 glazing wall and door system UL Design #U518. Maximum vision area 28 square feet, 90-minute fire rate assembly. Sponsors: SAFTI, O'Keeff'e/GPX or approved equal.
2. SuperLite II-45 Door, window or sidelight ASTM E163 and E152 UL Design #R14212 Sponsors SAFTI, CECO or approved equal.
3. SuperLite II 60 28 glazing wall system with GPX frame. ASTM E119 UL Design #U518. Sponsors SAFTI, O'Keeff'e/GPX or approved equal.

Add to Section 2.02 the following:

L. Privacy Glass:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Walker Textures Opaque series as part of an insulated glass assembly by the following:

a. Walker Glass Company Ltd.

9551 Ray-Lawson Blvd.
Montreal, Quebec H1JIL5
Phone: 514-352-3030
Email: textures@walkerglass.com
Web: walkerglass.com

b. Or provide comparable product by the following:

1) Any other manufacturer

2. Surfaces: (1) etched side

3. Haze: 90.73%

M. Bird-safe Glass:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ornilux Bird Protection Laminated Glass by the following:

   a. Arnold Glas, Corp.

      18333 Egret Bay Blvd., Suite 301
      Houston, TX 77058
      Phone: 857-294-7768
      Email: lisa.schon@arnold-glas.com
      Web: www.arnold-glas.com

   b. Or provide comparable product by the following:

      1) Any other manufacturer

2. Surfaces:

   a. #2: Low-e coating

   b. #3: UV Bird protection coating

3. Exterior glass:

   a. Clear single pane - 6mm

4. Interior glass:

   a. Clear two panes laminated - 8.76mm with PVB interlayer.

5. Unit Width: 1 5/16”

6. Transmittance: VLT=70

7. U-Value: Calculated for entire window/door assembly to meet Energy Code Requirements. Contractor submits manufacturer’s data and calculations for each type of assembly and size specific to this project.

8. SHGC: Calculated for entire window/door assembly to meet Energy Code Requirements. Contractor submits manufacturer’s data and calculations for each type of assembly and size specific to this project.

END OF SECTION

SECTION 09206G
Metal Furring and Lathing

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 09206 – Metal Furring and Lathing, except as modified herein.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Add the following to Metal Furring and Lathing Manufacturers (Section 2.01 A.):

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. MarinoWARE, Inc.

      New York Sales Office
      51 John Street Ste 1
      Babylon NY 11702
      Sales: 800-627-4667
      631-691-2200
      Fax: 631-691-1492

   b. ClarkDietrich

      9050 Centre Pointe Drive, Suite 400
      West Chester, OH 45069
      Phone: (513) 870-1100
      Fax: (513) 870-1300

   c. MRI Steel Framing

      15 Salt Creek Lane
      Suite 412
      Hinsdale, IL 60521
      Phone: 1.630.616.1850
      Fax: 1.630.568.5979

   d. Or approved equal.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 09220G
CEMENT PLASTER

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 09220 – Cement Plaster, except as modified herein.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Replace Section 2.01 A. with the following:

A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Parex USA, Inc.
2. Sto Corp.
3. Dryvit
4. Or approved equal

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 09250G
GYPSUM BOARD SYSTEMS

NOTE: All Work for this Section shall be in accordance with the requirements of General Specification 09250 – Gypsum Board Systems, except as modified herein.

PART 1 GENERAL

1.01 GENERAL

Replace 1.01 A. with the following:

A. Gypsum board systems as specified herein include but are not limited to interior and water-resistant wallboard for ceilings and partitions, gypsum board for ceilings and soffits, tile backer board, abuse-resistant gypsum board, metal stud partitions, furring, suspension systems, and trim and appurtenances.

1.02 PAYMENT

Replace 1.02 A. with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.01 MANUFACTURERS

replace 2.01 A. with the following:

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Georgia-Pacific Gypsum LLC.
   133 Peachtree St NE
   Atlanta, GA 30303
   Phone: 1-866-435-5647
   Email: gpxpress@gapac.com

2. National Gypsum Company.
   2001 Rexford Road
   Charlotte, North Carolina 28211
   Phone: 704-365-7300

E-Mail: ng@nationalgypsum.com

3. USG Corporation.
   550 West Adams Street
   Chicago, IL 60661-3676
   Phone: 312-436-4000
   Web: www.usg.com

4. Or approved equal.

B. For interior impact or abuse resistant Gypsum Board where indicated on drawings provide mold, moisture, and very-high impact resistant Type X 5/8" thick gypsum board with green face and brown back papers:

   a. Basis-of-Design Product: Subject to compliance with requirements, provide Mold Tough VHI Firecode X Panels (UL Type AR) by:

      USG Corporation.

   b. Or comparable product by one of the following:
      (1) Any other manufacturer

2.02 MATERIALS

Add the following to 2.02:

R. Gypsum wall board shall comply with ASTM C1629 for impact resistance, in addition to all other requirements listed in General Specifications.

END OF SECTION

SECTION 09651
RESILIENT FLOORING

NOTE: Detailed Specification 09651 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 09651.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient flooring as specified herein shall include, but not be limited to, vinyl composition floor tile, vinyl wall base, stair treads and appurtenances.

B. Resilient flooring items shall be provided where shown on the Contract Drawings and as required for a complete installation.

C. The following index of this Section is included for convenience.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 REFERENCES

A.	ADAAG	The Americans with Disabilities Act of 1990 (Public Law 101-336), Appendix A to Title 28 Code of Federal Regulations Part 36 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities.
B.	ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials.
C.	ASTM E648	Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
D.	ASTM E662	Standard Test Method Specific Optical Density of Smoke Generated by Solid Materials.
E.	ASTM F1066	Standard Specification for Vinyl Composition Tile.
F.	ASTM F1861	Standard Specification for Resilient Wall Base.
G.	ASTM F2169	Standard Specification for Rubber Stair Treads.
H.	ASTM F710	Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
I.	NYBC	New York City Building Code.

1.04 DEFINITIONS

A. Critical Radiant Flux (CRF): According to ASTM E648, the measure of the ability of a floor covering to resist the spread of flames when located in a corridor exposed to flames and hot gases from a room fire. The higher the CRF value, the more resistant the material is to flame spread.

B. Non-Solvent Adhesives: Adhesives with a non-solvent base requiring no open time to permit solvent flash.

C. Optical Smoke Density: The optical density of smoke developed by burning a solid material, such as resilient tile flooring, established according to ASTM E662.

1.05 SYSTEM DESCRIPTION

A. Manufacturer's Standards: In additions to the standards listed herein, the resilient flooring products and their installation shall be in accordance with the manufacturer's published recommendations and sections.

B. Performance Requirements

1. Static-Load Resistance, ASTM F970: .005 inch or less at 125 psi.

2. Optical Smoke Density, ASTM E662: Less than 450

3. Critical Radiant Flux (CRF), ASTM E648: Not less than 0.45 watts per square centimeter; Class 1

1.06 SUBMITTALS

A. Contractor shall submit Shop Drawings for approval of the Engineer. Submittals shall include, but not be limited to catalog cuts and reference materials.

1. Product Data: The Contractor shall submit:

a. Copies of specifications, installation instructions, maintenance instructions, and general recommendations from the resilient flooring item manufacturers, for each type of resilient flooring product.

b. Manufacturer's data substantiating that the materials comply with the requirements shall be included.

2. Samples:

a. Samples of floor tile, base and treads shall be submitted for color selection and pattern.

b. Submit each type and color of resilient tile floor covering required. Provide full size samples of each type of tile product and 12-inch lengths of each auxiliary product and accessory specified.

c. Samples shall show the full range of color and pattern variation. Sample submittals will be reviewed for color, texture and pattern only.

3. Shop Drawings: Submit for approval the following:

   a. Plans drawn to a scale of 1/4 inch equal to 1 foot-0 inch showing all tiles and all stair covering units and components accurately located in final positions, as they will occur in the finished work, and showing actual dimensions of areas to receive the work.

   b. Show all patterns required for the work and the location of each color and texture required for each tile pattern.

   c. Details drawn to a scale of 1-1/2 inches equal to 1 foot-0 inch showing all intersections of stair covering components with actual dimensions of stair treads, risers, landings and stringers and with all products accurately located and positioned as they will occur in the finished work.

4. Installer's certification by flooring manufacturer.

5. Verification of Substrate Conditions: The Contractor shall submit:

   a. A verification that all substrate conditions are in accordance with the requirements of the sections, prior to commencement of resilient flooring installation.

1.07 QUALITY ASSURANCE

A. General: Provide resilient tile that complies with all applicable code requirements.

B. Requirements of Regulatory Agencies: All resilient flooring work shall comply with fire-resistance ratings as shown, and as required by governing authorities and the New York City Building Code and shall be in accordance with the following requirements:

1. Material and Equipment Acceptance Division of the Board of Standards and Appeals of New York City Department of Buildings: Where, in order to be incorporated into the Work, a particular item or product system specified by Engineer requires acceptance by the New York City Commissioner of Buildings, the Contractor shall assist the product manufacturer in obtaining such approval, without additional expense to the City, and in providing the City with an approved certified copy of the boards resolution giving the MEA number for the item or product system which shall be submitted to Engineer as part of the Shop Drawing approval process. Contractor may submit, in place of products specified by Engineer, products which are "equal" in all ways to the product specified but which have already

achieved an MEA number. Such "or equal" product submissions shall not change the requirements of these Sections as to performance, required features or properties, as determined by Engineer, and shall not require additional compensation to Contractor or additional expense to the City. Final acceptance of "equal" is at the sole determination of Engineer.

2. In those instances where the Commissioner of Buildings requires a certificate of compliance of the manufacturer or producer certifying that the item or product system was tested and is equivalent to material of the same kind and quality regularly being manufactured by such manufacturer or producer Contractor shall provide all such certificates to the Commissioner of Buildings without additional expense to the City.

C. Manufacturer Qualifications:

1. Provide all components of resilient tile flooring system and auxiliary products produced by a single manufacturer.

D. Installer Qualifications:

1. Engage a single installer certified by the flooring manufacturer and regularly performing installation of resilient tile flooring with documented skill and successful experience in the installation of the types of materials required; and who agrees to employee only tradesmen who are trained, skilled and have successful experience in installing the types of materials specified.

E. Source Quality Control

1. Furnish all components of resilient flooring system from a single manufacturer, and from a single supplier with adequate resources to provide products of consistent performance characteristics, physical properties and appearance, without delaying the work.

2. Obtain materials only from manufacturers who will, if required, send a qualified technical representative to the Site, for the purpose of advising installer of proper procedures and precautions for the use of the materials.

3. Colors and Patterns: Provide resilient floor tile with uniformly distributed color and pattern throughout the thickness of the tile, except as otherwise specified. Variation in shades and off pattern matches between containers will not be acceptable.

F. Allowable Tolerances

1. Surfaces to Receive Resilient Flooring Systems: Surface shall be smooth, level, at the required finish elevation, without more than 1/8 inch in 10 feet variation from level, or slopes, shown. Provide surfaces free of depressions, raised areas, or other defects that may telegraph through installed flooring.

G. Mock-Ups

1. Before proceeding with final purchase of materials and installation of resilient flooring systems, but after approval of Samples and Shop Drawings, install 100 square foot samples of each component of resilient flooring system, and one landing and run of stairs including all stair tread components and accessory trim, indicating the final relationship and configurations of the various parts and components and the quality of workmanship that will be achieved in the work. Locate mock-ups in areas selected by the Engineer to show a representative installation of each type of resilient flooring system.

2. Incorporate materials and methods of installation that are identical to Project requirements.

3. Obtain Engineer's acceptance of visual qualities of mock-up before start of resilient flooring system work. Retain and protect mock-up during construction as a standard for judging completed resilient flooring. Do not alter or remove approved mock-ups.

4. Build as many mock-ups as required to obtain Engineer's acceptance. Disassemble rejected mock-ups and remove all components from the Site. Do not incorporate rejected mock-up components into the work. Accepted mock-up may be incorporated into the finished work.

5. Resilient flooring system Work that proceeds without approved mock-ups shall be stopped, and mock-ups prepared for Engineer's approval.

6. Resilient flooring and components that do not meet the standard of workmanship on approved mock-ups shall be removed and replaced with new material.

1.08 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Materials shall not be delivered to the project Site before the time of installation.
2. Materials shall be delivered in sufficient quantities to allow continuity of the work.

B. Storage of Materials:

1. Materials shall be stored in original, undamaged containers with manufacturer's labels and seals intact.
2. All materials shall be stored in a dry, enclosed area, off the ground and away from all possible contact with water, ice or snow.
3. Damage to materials during storage shall be prevented primarily by minimizing the amount of time they are stored at the site before being incorporated into construction systems.

C. Handling of Materials:

1. Materials shall be handled in such a manner to avoid damage or breakage.
2. Materials shall not be exposed to detrimental conditions or physical damage. Materials which are so exposed shall be removed from the Site and shall not be incorporated into the work.
3. Materials shall be handled in such a manner so as to prevent inclusion of foreign materials.
4. Packages or containers shall not be opened until all necessary preparatory work is complete and installation is to begin immediately. Materials shall not be allowed to become wet or soiled or covered with ice or snow.

1.09 ENVIRONMENTAL REQUIREMENTS

A. The ambient temperature of the area in which the work occurs shall be at least 60 degrees F and rising. A minimum 60 degree F ambient temperature shall be maintained without interruption while the work is being done, and for at least three days after completion of the work.

1.10 WARRANTY

A. General: The special warranties specified in this Article shall not deprive City of other rights or remedies City may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under the Contract Documents.

B. Special Warranties

1. Resilient Flooring and Stair Treads Wear Extended Warranty: Provide written warranty, signed by the manufacturer and running to benefit of City, agreeing to replace, for a period of 10 years from the date of Substantial Completion, resilient tile and stair tread units that show excessive wear, as specified.

1.11 ATTIC STOCK

A. The Contractor shall furnish 50 floor tiles, 5 stair treads and risers, and 20 feet of wall base as replacements for each type, color and size of item used throughout the project from the same manufactured lot as the materials installed.

PART 2 PRODUCTS

2.01 VINYL COMPOSITION FLOOR TILE

A. Description: Tile composed of polyvinyl chloride resin, plasticizers, fillers, stabilizers and pigments with colors and texture dispersed uniformly throughout its entire thickness.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Armstrong Flooring, Inc.

2. Congoleum Corporation.

3. Mannington Mills, Inc.

C. Floor Tile standard: ASTM F1066, Class 2, thru-pattern.

D. Pattern and Color: as indicated on drawings.

E. Size: 12 inch x 12 inch.

F. Thickness: 1/8 inch.

2.02 VINYL COVE WALL BASE

A. Description: Type TV color-integrated cove profile wall base of thermoplastic vinyl.

B. Manufacturers: Same as for floor tile.

C. Corner pieces: Complete installation shall include preformed internal and external corner pieces.

D. Height: 4 inches.

E. Finish: Matte, per ASTM 1861.

2.03 RUBBER STAIR TREADS AND RISERS

A. Description: Conforming to ASTM F2169; Type TS, Class 2, color-integrated treads with low-profile raised squares on tread, with edge strips of contrasting color, and separate risers, of a vulcanized compound of 100% virgin elastomers and reinforcing agents, soil-releasing agents and migrating waxes

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Armstrong Flooring, Inc.
2. Roppe Corporation.
3. Mannington Mills, Inc.

C. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

D. Color: as indicated on drawings.

E. Thickness Treads and Risers: 1/8 inch.

F. Size: as indicated on drawings.

2.04 INSTALLATION MATERIALS

A. Adhesive: Provide adhesive for tile and base as recommended by the tile and base manufacturer for the type of floor and wall surface indicated on the Contract Drawings.

2.05 ACCESSORIES

A. Provide transition/reducing strips tapered to meet abutting materials.

B. Provide threshold of thickness and width as shown on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Contractor shall verify that areas to receive resilient flooring materials are properly prepared and completed to final grades and elevations.

B. Contractor and installer shall examine the areas and conditions under which resilient tile flooring work will be performed and notify Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

C. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.02 PREPARATION

A. General: Surfaces to receive floor tile, wall base, treads and risers, shall be prepared in accordance with the manufacturer's instructions, including technical bulletins, product catalog, installation instructions, and product carton instructions for installation and maintenance procedures.

B. Prior to commencing any work, test the substrate for moisture to ascertain its acceptability to receive the finish flooring. Remove all dirt, grease, oil and other contaminants which might impair the proper bond of materials. The surface shall be free of dust, solvents, varnish, paint, wax, oil, grease, sealers, release agents, curing compounds, residual adhesive, adhesive removers and other foreign materials that might affect the adhesion of resilient flooring to the concrete or cause a discoloration of the flooring from below. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents. Spray paints, permanent markers and other indelible ink markers must not be used to write on the back of the flooring material or used to mark the concrete slab as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate they must be mechanically removed prior to the installation of the flooring material. Refer to ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.

C. Concrete: Bond and moisture tests shall be performed on concrete floors and stairs to determine that the concrete is thoroughly cured and dry prior to installation. Tests and results shall be as recommended by the resilient flooring manufacturer.

3.03 INSTALLATION

A. Resilient flooring tile, wall base, treads and risers, shall be installed in accordance with the manufacturer's recommendations and approved Shop Drawings.

B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.

C. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

D. Lay out floor tiles square with room axis.

3.04 INSTALLATION OF ACCESSORIES

A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set wall base is required. Install base in lengths as long as practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.

B. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.

C. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.

3.05 PROTECTION

A. Protect installed flooring and stair components from mars, marks, indentations, and other damage from construction operations detrimental weather and placement of equipment and fixtures during the remainder of the construction period and to Substantial Completion. Use protection methods recommended in writing by the resilient flooring manufacturer.

B. Work which cannot for reasons acceptable to Engineer be covered with complete construction system before onset of weather detrimental to the work shall be completely covered and protected in such a manner as to

deflect water and weather from the installation without damaging adjacent work.

C. Resilient flooring work shall be protected from all damage and abuse until Final Acceptance by the City.

D. Resilient tile flooring and stair system components, damaged for any reason, shall be replaced with new, undamaged material, in compliance with the requirements of the Sections at no additional expense to the City.

3.06 ADJUSTMENT

A. System components which are dislodged, damaged, expanded, broken, penetrated or crushed by subsequent installation operations or damaged by detrimental weather shall be immediately replaced with undamaged material in compliance with the Sections and properly protected as specified.

3.07 CLEANING

A. The following operations shall be performed immediately after installing resilient products:

1. All adhesive and other surface blemishes shall be removed from resilient tile flooring, using neutral-type cleaners as recommended by the resilient tile flooring manufacturer.

2. Floors shall be vacuumed thoroughly.

3. Floors shall not be washed until after time period recommended by resilient tile flooring manufacturer.

4. Floors shall be damp mopped to remove marks and soil.

B. Floor surfaces shall be cleaned not more than four days before scheduled inspection to determine Substantial Completion of the work. Cleaning products shall be in accordance with the manufacturer's approved written recommendations.

C. Apply commercial grade floor polish type and number of coats as recommended by floor tile manufacturer.

END OF SECTION

SECTION 10400G
Identifying Devices

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 10400 – Metal Furring and Lathing, except as modified herein.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Replace Article 2.01.A.3 in its entirety with the following:

3. Safety Stripes Tape
    a. Permacel P-32 by Nitto Denko Company
    b. Or approved equal.

Replace Article 2.01.A.5 in its entirety with the following:

5. Metal Letters and Numbers (exterior)
    a. Nelson-Harking Industries, Chicago, IL.
    b. Or approved equal.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 11321G
Submersible Pumping Units for Wet Pit Service

NOTE: This Detailed Specification 11321G – Submersible Pumping Units for Wet Pit Service replaces General Specification 11321 – Submersible Pumping Units for Wet Pit Service in its entirety. Wherever a reference appears in the Contract Documents to General Specification 11321, it shall now be deemed to refer to Detailed Specification 11321G.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install submersible pumping units and appurtenances complete and operational. This Section describes the specific requirements for submersible pumping units for wet pit service, and supplements General Specifications 11310 – Requirements for All Pumping Units. Unless otherwise indicated, the design requirements apply only to pumps for permanent installation, and not to portable pumps. Pumping units shall be as specified herein and as shown on the Contract Drawings.

B. Electric motors furnished as part of pumping units shall comply with the provisions of General Specifications 16221 – Electric Motors.

C. Electrical equipment for the pumping units and all electrical connections to the pumping units shall be provided as required herein.

D. The following index of this Section is presented for convenience.

1.02 RELATED SECTIONS

A. General Specification 11310 - Requirements for All Pumping Units

B. General Specification 16121 - Electric Wires and Cables

C. General Specification 16221 - Electric Motors

1.03 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.04 REFERENCES

A. ASTM A48 - Standard Specification for Gray Iron Castings

B. ASTM A276 - Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes

C. National Electrical Manufacturers Association (NEMA)

1.05 DEFINITION

A. Submersible Pumping Unit: The term submersible pumping unit shall mean a submersible pump complete with, but not limited to, drive motor, close-coupled pump, power cable, discharge connection, guide bars with brackets, accessories, appurtenances and all associated equipment.

1.06 SERVICE DESCRIPTION

A. Pumps in sump pump service may be used occasionally or continuously, in an on-off operation. Pumps for continuous service shall be installed in duplex (pairs).

1.07 GENERAL DESCRIPTION

A. Pump Type

1. Vortex: Heavy duty, end suction, recessed vortex impeller in volute.

B. Pump Installation and Support

1. Pump shall automatically and firmly connect to a discharge connection when lowered into place in a single downward motion, by gravity, on a

guide rail system. There shall be no need for personnel to enter the wet pit to make the connection.

2. Discharge connection fitting shall be raised above the floor on grout, as required, and anchored.

3. Pump shall be removable for inspection and servicing without the need to disconnect any bolt, nut or fastener.

4. Pump shall be fitted with a lifting handle and lifting chain.

C. Drive Unit: The electric drive motor shall be designed for operation in submerged service and shall be an integral part of the pump. Sealing design of pump and motor mating surfaces shall incorporate metal-to-metal contact between machine surfaces. Critical mating surfaces requiring total water tightness shall be fitted with O-rings and shall not require specific torque limits. Fitting shall be the result of controlled compression of rubber O-rings on two planes and O-ring contact on four sides.

1.08 PUMPING UNIT DESIGN REQUIREMENTS

A. Rate of flow at design point: 61.4 gallons per minute.

B. Total head at design point: 12.1 feet H_2O.

C. Maximum speed at design point: 3500 rpm

D. Minimum efficiency at design point: 27.37%

E. NPSH required at design point (minimum) : 36.5 ft

F. Rate of flow at runout point: 100.3 gallons per minute

G. Total head at runout point: 0.2 feet

H. Shut-off head, approximate: 20.9 feet

I. Diameter of sphere in inches that will pass through pump: 2-inch

J. Motor horsepower, minimum: 1.2 horsepower

K. Motor speed, maximum: 3500 rpm

1.09 SUBMITTALS

A. In addition to the submittal requirements set forth in General Specification 11310 – Requirements for All Pumping Units, certified test reports shall be submitted for each of the tests specified in Article 2.16 - Shop Tests.

1.10 SPARE PARTS

A. The Contractor shall furnish and deliver to the Owner, at that part of the site and at such time as the Engineer may direct, the following spare parts.

1. One complete pump, including drive unit, for every five pumps or fewer of each type and size furnished

2. One complete set of pump bearings and cable entry seals for every five pumps or fewer of each type and size furnished

3. One complete set of gaskets for each pump furnished
4. Spare parts for motors as required by the Detailed Specifications and General Specification 16221 - Electric Motors
5. Spare impeller for every five pumps or fewer of each type and size furnished
6. One set of impeller wear rings for each pump supplied with wear rings

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Pumps for permanent installation shall be as manufactured by one of the following:

1. Xylem Flygt Corporation, Rye Brook, NY
2. KSB Pumps, Richmond, VA
3. Or approved equal

2.02 PUMPING UNIT COMPONENTS

A. All materials shall be of a quality to withstand the hostile environment and stresses to which the pumping units and components may be subjected.

B. Unless otherwise indicated, major pump components shall be Cast Iron, ASTM A48, Class 30B, 35B or 40B. All exposed nuts and bolts shall be type 304 stainless steel.

2.03 DISCHARGE CONNECTIONS AND GUIDE RAILS

A. Each pump shall be supplied with an auto-coupling guide rail system to automatically and firmly connect the pump to the discharge connection when lowered by gravity.

B. Guide rails shall be Type 304 stainless steel, supported by stainless steel brackets at the top and by the discharge connection at the bottom. Intermediate brackets shall be installed for guide rails over 20 feet in length.

C. The discharge connection fitting shall be of cast iron, anchored to the floor of the wet pit, and shall feature a flanged discharge elbow for connection to vertical discharge piping. No portion of the pump shall bear directly on the floor of the wet pit.

D. Sealing of the pump and discharge connection interface shall be accomplished by a machined metal-to-metal watertight contact. The additional use of a diaphragm, gasket or O-ring to ensure water tightness is not acceptable.

E. All components of the guide rail and discharge connector system shall be non-sparking.

F. A sliding guide bracket of Type 304 stainless steel shall be an integral part of each pump.

2.04 PRESSURE GAGES

A. Pump discharge pressure gages shall be dial-indicating gear movement bourdon tube type and be installed at a convenient-to-read location in the discharge pipe, as near to the pump as practicable.

B. Bourdon tube type gages shall be as manufactured by:

1. Ashcroft or Dresser Industries, Inc., Stratford, CT.

2. Ametek, Inc. Berwyn, PA.

3. Or approved equal.

C. General Requirements: Gages shall be weatherproof, designed and constructed to meet all requirements for satisfactory operation.

D. Materials: Pressure gages shall be constructed of sound, durable material free from all defects and imperfections that in any way may affect the accuracy and serviceability of the gages. Gages shall be constructed of the following materials:

1. Case - Phenolic or high impact polypropylene

2. Connection - 1/4 inch National Pipe Thread (NPT) male thread

3. Dial - White laminated plastic

4. Glass - Clear, blemish free, shatter-proof

5. Bourdon tube

a. Geared Type - Phosphor bronze or Type 316 stainless steel

6. Socket - Brass forging

7. Movement - Stainless steel

E. Gage Cases: The gage cases shall be of the blow-out protected type where the rear plate is removable. The gage cases shall be of an approved plastic material free from warpage, checks and other defects with surfaces smooth and free from chips, cracks and blisters.

F. Dials and Appurtenances: Dials shall be 4-1/2 inches nominal diameter and shall be white laminated plastic with standard graduations and numbers permanently marked on the dials in black. Scale shall extend over an arc not less than 270 degrees. Subdivisions of the scale shall conform to the requirements of ANSI/ASME B40.1 for Grade 2A gages, unless approved otherwise by the Engineer. Units of measure shall be distinctly and permanently marked on the dial or on laminated plastic nameplates cemented to the dial.

1. Glass windows shall be 1/8 inch thick clear glass tightly seated on durable gasket material so as to be fumeproof and waterproof.

2. Bourdon tubes shall be phosphor bronze silver-soldered or brazed to its brass socket; the assembly shall be tested carefully, over-pressured and stress relieved.

3. Socket stem shall extend at least 1-1/4 inches below the gage case and shall have large wrench flats.

4. Movement components for geared type gages shall be of stainless steel of the rotary gear or helical roller type, constructed so as to minimize wear and meet and maintain accuracy requirements specified. Movements shall have suitable corrosion-resistant bushings and wearing surfaces.

G. Adjustment: Gages shall have provision for adjustment of the zero reading. All calibration adjusting screws must be accessible from the rear without having to dismantle the gage.

H. Gage Ranges: Pressure gages shall be graduated in pounds per square inch with a range of 0 to a 15 psi.

I. Gage Protection and Accessories: Pressure gages shall have underpressure protection and be provided with pulsation dampers suitable for the service and shut-off cocks furnished by the gage manufacturer.

J. Mounting and Connections: Pressure gages shall be pipe mounted and have bottom 1/4-inch NPT male connections.

2.05 IMPELLERS

A. Recessed Impellers for vortex type pumps shall be open, end suction, multi-vane, mounted completely out of the flow path between pump inlet and outlet connection. Solid size shall be as large as discharge diameter. Impellers shall be dynamically balanced. Impellers shall be gray cast iron unless otherwise specified or approved. The impeller shall be attached to the motor shaft as specified for the non-clog pump.

2.06 PUMP SHAFTS

A. Pump and motor shaft shall be the same unit. Couplings shall not be acceptable. The shafting material shall conform to the requirements of ASTM A276, Type 420 stainless steel.

2.07 PUMP BEARINGS

A. The Pump and motor shaft shall rotate on two permanently lubricated bearings.

B. Lower bearing shall compensate for axial thrust and radial forces.

2.08 MECHANICAL SEALS

A. Each pump shall be provided with a tandem mechanical shaft seal system consisting of two independent seal assemblies. Seals shall run in an oil reservoir, which provides constant lubrication and is easily accessible for draining and inspection. The seals shall require neither maintenance nor adjustment and shall be easily replaceable. Each seal interface shall be held in contact by its own spring system.

1. The lower seal unit, between the pump volute and the oil chamber, shall be designed for abrasive conditions. The seal shall contain one stationary seal and one positively driven rotating ring, with both seal faces of solid silicon carbide or tungsten carbide.

2. The upper seal unit shall operate in the oil chamber, which acts as a barrier between pump and motor. These seals shall contain one stationary tungsten carbide ring or Type 316 stainless steel seat, and one positively driven rotating carbon graphite ring.

2.09 WEAR RINGS

A. A wear ring system shall be installed to provide efficient sealing between the volute and suction inlet for enclosed impeller. The wear ring shall be easily removable and replaceable.

2.10 PUMP DRIVE MOTORS AND POWER CABLES

A. Pump drive motors shall be as required by the provisions of the Detailed Specifications and General Specification 16221 - Electric Motors, except as otherwise specified herein.

B. The pump drive motors shall be vertical, squirrel cage induction shell type with grease lubricated ball bearings; the motors shall be submersible, air-filled, NEMA Design B and shall be of sufficient capacity to operate the driven equipment from shut-off head to the maximum rate of flow specified without loading beyond their rated nameplate current or power. Insulation shall be Class F.

C. The pump drive motors shall operate within rated temperature limits with fifteen starts per hour without being submerged. Temperature rise at the nameplate horsepower shall not exceed 80-degree C.

D. Motors shall be sufficiently cooled by the surrounding environment or pumped media. A water cooling jacket shall not be required.

E. Motor thrust bearings shall be designed for continuous thrust loads under all conditions of pump operation from zero head to shut-off. Bearings shall be rated for a B-10 life of 40,000 hours.

F. Cable entry water seal design shall not require specific torque to ensure a watertight and submersible seal. Cable entry shall be comprised of a single cylinder elastomer grommet, flanked by washer, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the entry body containing a strain relief function, separate from the function of sealing the cable. Assembly shall bear against a shoulder in pump top.

G. Power Cable

1. Power Cable shall be submersible hypalon jacketed, Type SPC cable (power plus ground plus control), UL-listed and labeled. No splices will be allowed in the cable.

2. Conductors shall be sized in accordance with NEC and ICEA Standards.

3. Cable shall be sufficiently long such that motor terminal box can be mounted at least 10 feet above vault top.

H. The cable entry junction chamber and motor compartment shall be separated by a terminal board which shall protect the motor interior from foreign material gaining

access through the top. Connection between the cable conductors and stator leads shall be made with threaded compressed type binding posts permanently affixed to the terminal board. Epoxies, silicones, or other secondary sealing systems are not acceptable.

I. Protective Devices

1. A moisture detection probe or seal failure sensor shall be provided in the oil chamber for detecting the presence of water. The moisture detection and warning system shall operate from a 120 volt source available at the motor terminal box. A control power transformer shall be provided within the box where required for low voltage operation.

2. Moisture detection control wire leads shall exit the motor casing along with the motor cable and be properly sealed for a submersible application.

3. Each motor shall be equipped with thermal sensors embedded in the stator winding for supplemental motor protection.

4. Motor thermal and moisture sensor probe cables shall be submersible hypalon jacketed and sufficiently long such that motor terminal box can be mounted at least 10 feet above tank top.

2.11 CONTROLS

A. Pumps shall be furnished with the following accessories and controls:

1. Pumping units shall be controlled with liquid level sensors with sufficient length of electrical cable. Load sensors shall be of the non-mercury, snap-action switch type, activated by a steel ball rolling within a switching tube in a plastic float housing.

2. Sump Pump Control Panel: Furnish and install an automatic pump control center in a NEMA 4X enclosure for operation on 208 Volt, 3 phase, 60 Hertz electrical power. Each pumping unit shall be provided with an individual disconnect switch, three phase overload protection with manual reset and a magnetic contactor. A 110-volt control circuit transformer with disconnect and overload protection shall be included. Provide an automatic electrical sequence for multi pumping units. Provide metal barrier between high voltage components and 110-volt circuits.

3. Control Panel:

a. General Construction Requirements:

1) Provide all electrical components and devices, support hard-ware, fasteners, interconnecting wiring and/or piping required to make the control panels as complete and operational units.

2) Locate and install all devices and components so that connections can be easily made and so that there is ample room for servicing each item.

3) Adequately support and restrain all devices and components mounted on or within the panel to prevent any movement.

4) Provide sub-panels for installation of all relays and other internally mounted components.

5) All wiring to panel connections from field instruments, devices, and other panels shall be terminated at master numbered terminal strips, unless otherwise specified.

6) Provide copper grounding studs for all panel equipment.

7) Provide the following convenience accessories inside each panel:

   a) One 120 Vac, 20A duplex, grounding type receptacle

   b) One 120 Vac fluorescent light fixture with 20 watt lamp and protective plastic shield

   c) One 120 Vac, 20A, snap switch, to turn on the light, mounted in an outlet box with a cover and located so that it is easily accessible from access door

   d) The service light with switch and duplex receptacle shall have its own circuit breaker.

8) A complete factory test for panel shall be performed. All signals (both analog and digital) shall be simulated. Simulation devices shall be of suitable quality so as not to mask control panel defects. A successful test will be defined as all components within the respective control panel, being tested and certified for their intended functions.

9) Control panel for duplex sump pumps station shall include the following for the portable spare submersible pump:

   a) Suitable power supply and control wire receptacle

   b) Combination magnetic only circuit breaker-starter with necessary relays, contacts and circuitry

   c) A start-stop push button and associated controls.

   d) Automatic shut down on low and low-low water and motor thermal and/or moisture detection.

   e) Red pump-on indication light.

   f) Inclusion in malfunction indication light and alarm signal.

10) CONTRACTOR shall be responsible for the detailed layout and design of the panels in accordance with standard practice and techniques. Cutouts and design are to be based on

instrument vendor's requirements. The actual layout shall be subject to approval by ENGINEER.

B. Control Description

1. NEMA 4X stainless steel enclosure factory wired for use with float switches with the following components:

   a. Contact relay

   b. Running lights showing through cabinet door - red

   c. Hand-Off-Auto switches

   d. High water condition light - amber

   e. 6-inch alarm bell for high water mounted on panel door

   f. Alarm silence button

   g. Dry contacts for remote high water alarm annunciation

   h. Combination type magnetic starter with overload reset and low voltage protection for 208 volt, 3 phase pumps only

   i. Overload reset button for 208 volt, 3 phase pumps only

   j. 208 volt to 120 volt control transformer

   k. Automatic alternator separately fused

   l. Wired terminal strip

   m. Control voltage shall be 120 volts

   n. All front of panel components to be metal NEMA 4X

   o. Malfunction alarms for each pump - overloads provide amber lens

   p. Wire repeat alarm contacts for remote indication to terminal block

C. Control Sequences: The controls for the duplex station shall include the following:

1. Pumps shall operate on a duty/standby configuration with only one pump in operation at a time, unless manually activated.

2. Controls shall be set such that the duty/standby pump automatically transfer roles after a 500-hour run time.

3. The duty pump shall automatically start at a preset adjustable level. If the duty pump fails to start, the standby pump shall automatically operate.

4. The duty pump, when operating, will automatically stop when a low liquid level is reached.

D. Float Switches

1. Support Pole: 1-inch diameter Type 304 stainless steel pipe threaded one end.

2. Support Bracket: Stainless steel.

3. Float Switch: Normally open, mechanically actuated, direct acting, mercury free switches**.** Float casing shall be polypropylene.

4. Switch Cable: Cable within sump Type SO neoprene jacket, 4 #18 conductor, 41 strand, 300 volt insulation. Cable between control panel and sump all conform to the requirements of General Specification 16121 – Electric Wires and Cables.

5. Cable Supports: Polypropylene composition clamp with stainless steel bolts.

6. High Water Alarm: 2 conductor cable with color coded cover.

2.12 LIFTING HANDLES AND CHAINS

A. Each pump shall be fitted with a steel handle, double hot dipped galvanized, and a Type 316 stainless steel lifting chain, both of adequate strength. Chain shall be of adequate length for pump removal from above.

B. For a pump installed in a sump or wet well more than 5-feet below the operating floor, a lifting system such as "Grip Eye" TM shall be provided, as manufactured by:

1. Xylem Flygt Corporation, Rye Brook, NY

2. Or approved equal,

2.13 CABLE CONNECTIONS

A. Power and float switch cables shall connect from the control box to the pumps and switches within the vault through electrical conduit and a below-grade concrete core of sufficient size to hold the wires.

2.14 SHOP TESTS

A. In addition to the tests performed under General Specification 11310 – Requirements for All Pumping Units, the following tests are required.

1. Motor and Cable Insulation Tests:

a. Run the pump for 30 minutes while submerged a minimum of 10-feet.

b. Stop motor and wait for 30 minutes with motor submerged before performing moisture tests on cable insulation and motor.

PART 3 EXECUTION

3.01 ALIGNMENT, INSTALLATION AND IDENTIFICATION

A. Tolerances for alignment, installation requirements for equipment and piping, and piping and equipment identification shall be in accordance with General Specification 11310 – Requirements for All Pumping Units, Part 3, Execution.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 12305G
Storage Equipment

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 12305 – Storage Equipment, except as modified herein.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Add the following to Manufacturers (Section 2.01 A.):

1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Global Industrial
   11 Harbor Park Drive
   Port Washington, NY 11050
   Phone: 1-800-645-1232
   Web: www.globalindustrial.com

   b. ULINE
   700 Uline Way
   Allentown, PA 18106
   Phone: 1-800-295-5510
   Web: www.uline.com

   c. Interlake Mecalux
   1600 North 25th Ave.
   Melrose Park
   Chicago, IL 60160
   Phone: 1-708-344-9999
   Web: www.interlakemecalux.com

   d. Or approved equal.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 13281G
Asbestos Management

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 13281 – Asbestos Management, except as modified herein.

PART 1 GENERAL

1.01 SUMMARY

Replace 1.01A, 1.01D, and 1.01E in their entirety with the following:

A. This Section details the requirements for construction and demolition activities affecting asbestos-containing materials (ACM), presumed asbestos-containing materials, trace asbestos materials (i.e., building materials containing 1% or less of asbestos), and asbestos-containing waste materials, as shown in the following report, tables attached to Section 01355 – Hazardous Materials Control and Tables 1 and 2 below, as shown on the Contract Drawings, specified herein, or required to complete the Work. All Work under this Section shall be performed using methods, tools, and equipment that have demonstrated effectiveness in preventing asbestos fibers from migrating outside of the Regulated Abatement Work Area and are in compliance with all applicable rules and regulations.

1. Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC.

D. The Contractor shall perform the abatement and disposal of additional ACM not included in the report listed in 1.01A. Unless otherwise specified, the Work of this Section shall also be performed in accordance with the most current New York City Department of Environmental Protection (DEP) Environmental Health and Safety (EHS) Policies and Procedures (including Asbestos Management, and Spill Prevention, Environmental Release Reporting and Investigation), NYCDEP Bureau of Engineering Design and Construction EHS Standards, and applicable federal, state, and local regulations.

E. All independent third party air monitoring shall be outside this contract and performed by others.

Insert 1.01G, and renumber accordingly:

G. The Contractor shall label all known ACM in the field to prevent accidental disturbance by workers.

Insert the following as 1.01.E and 1.01F, delete the original 1.01.E, and reorder the original 1.01.F and 1.01.G as 1.01.G and 1.01.H.

E. The Contractor shall provide for sampling and analysis of presumed asbestos-containing materials identified in Table 2 attached. Sampling shall be performed by a NYSDOH-certified Asbestos Inspector. Sample collection protocol, analysis and reporting shall be in accordance with 12 NYCRR 56.

F. All independent third party air monitoring shall be outside this contract and performed by others.

1.02 PAYMENT

Replace 1.02 in its entirety with the following:

A. No separate payment shall be made for performing the Work required under this Section. All cost for Work required by this Section shall be included in the applicable lump sum, unit price(s) or allowance(s) as set forth in Section 01270 – Measurement and Payment.

B. At the completion of abatement activities, the Contractor is responsible for submitting all of the following required documentation. Payment to abate and dispose of ACM and resulting asbestos-containing waste materials produced by this work will not be made until the following documentation is provided to the NYCDEP:

1. Copies of all NYSDOL and NYCDEP Asbestos Control Program (ACP)-approved asbestos project notifications, work permits, variances, Work Place Safety Plans, and any applicable documentation filed or received from the NYSDOL and NYCDEP ACP, including Notices of Violations (NOV);

2. Copies of the Asbestos Abatement Contractor's Handling license;

3. Copies of DEP and NYSDOL Asbestos Handler Supervisor and Asbestos Handler certificates, where applicable, for all workers engaged in the project;

4. A copy of the Asbestos Abatement Contractor's daily Isolation Barrier book (bound notebook). Copies of laboratory reports and chain-of-custody (COC) documents for Exposure Monitoring conducted by the Asbestos Abatement Contractor, including the name, address, and New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) registration number of the laboratory used for air sample analysis;

5. All data related to bulk sampling, including the results of any asbestos surveys performed by a NYSDOL-certified Asbestos Inspector;
6. The Asbestos Work Plan submitted in accordance with the requirements of this Section;
7. The total quantity of ACM abated;
8. The start and completion dates of the Asbestos Project(s);
9. A signed copy of the manifest from the asbestos-permitted landfill with complete COC documentation, certifying the amount of asbestos waste delivered;
10. The name and address of the asbestos waste transporter.

1.05 DEFINITIONS

Replace 1.05.UU in its entirety with the following:

UU. Presumed Asbestos-Containing Material (PACM): Material suspected of containing asbestos as described in 15 RCNY 1-38. PACM is considered to be ACM unless proven otherwise by appropriate bulk sampling and laboratory analysis.

1.08 SUBMITTALS

Replace 1.08.A.1 and 1.08.A.2 in their entirety with the following:

1. Asbestos Inspection and Sampling Plan: The Contractor shall provide an Asbestos Inspection and Sampling Plan to collect confirmatory samples of presumed asbestos-containing materials identified in the Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC, and Table 2 attached.
2. The Asbestos Inspection and Sampling Plan shall include at a minimum:
    a. Credentials of the individual responsible for inspection and sampling. At a minimum, the inspection shall be performed by a certified NYSDOL Asbestos Inspector, who shall have current HAZWOPER training and OSHA 10-hr certification, and confined space entry training, as applicable to the location or work, and shall have performed similar inspection work on at least three (3) projects of comparable scope.

b. Credentials of the laboratory providing sample analysis. The credentials shall include current certification by the NYSDOH ELAP.

c. Sample collection, analysis and reporting protocol in accordance with 12 NYCRR Part 56.

d. Health and safety protocol for all investigation activities.

END OF SECTION

Table 1
Estimated Quantities and Condition of Known Asbestos-Containing Materials

Material Description	Location	Estimated Quantity	Condition	Friability
Black gasket inside HVAC unit	Attic	88 linear ft	Damaged	Non-friable
Black residual mastic on HVAC ductwork	Attic	Approx. 275 spots (2x2 in) on 750 ft^2 of duct work	Damaged	Non-friable
Black shielding in radiators	Second Floor, Library and Conference Room (Microbiology Office)	46 ft^2 (2 radiators)	Good	Non-friable
Grey caulk around window frames	Second Floor, Library and Conference Room (Microbiology Office)	55 linear ft (2 windows)	Good	Non-friable
Black shielding in radiators	Second Floor, Drafting Room (Administration Office)	70 ft^2 (3 radiators)	Good	Non-friable
Grey caulk around window frames	Second Floor, Drafting Room (Administration Office)	82 linear ft (3 windows)	Good	Non-friable
Black shielding in radiator	Second Floor, Lunch Room	23 ft^2 (1 radiator)	Good	Non-friable
Grey caulk around window frame	Second Floor, Lunch Room	28 linear ft (1 window)	Good	Non-friable
Black shielding in radiator	Second Floor, Women's Restroom	23 ft^2 (1 location)	Good	Non-friable
Black caulk on radiator	Second Floor, Women's Restroom	3.5 linear ft (1 location)	Good	Non-friable
Grey caulk around window frame	Second Floor, Women's Restroom	28 linear ft (1 location)	Good	Non-friable
Black shielding in radiators	Second Floor, Watershed Division Engineer's Office (Directors Office)	46 ft^2 (2 locations)	Good	Non-friable
Grey caulk around window frames	Second Floor, Watershed Division Engineer's Office (Directors Office)	55 linear ft (2 locations)	Good	Non-friable
Black shielding in radiators	Second Floor, Watershed Office (Conference Room)	70 ft^2 (3 locations)	Good	Non-friable
Grey caulk around window frames	Second Floor, Watershed Office (Conference Room)	83 linear ft (3 locations)	Good	Non-friable
Black shielding in radiator	Second Floor, Men's Restroom	23 ft^2 (1 location)	Good	Non-friable
Black caulk on radiator	Second Floor, Men's Restroom	3.5 linear ft (1 location)	Good	Non-friable

Table 1
Estimated Quantities and Condition of Known Asbestos-Containing Materials

Material Description	Location	Estimated Quantity	Condition	Friability
Grey caulk around window frame	Second Floor, Men's Restroom	28 linear ft (1 location)	Good	Non-friable
Black shielding in radiator	Second Floor, Stairwell	23 ft^2 (1 location)	Good	Non-friable
Grey caulk around window frame	Second Floor, Stairwell	28 linear ft (1 location)	Good	Non-friable
Grey caulk around window frame	First Floor, Entrance	28 linear ft (1 location)	Good	Non-friable
Black shielding in radiator	First Floor, Entrance	25 ft^2 (1 location)	Good	Non-friable
Black shielding in radiators	First Floor, Reagent and Media Prep Room (Autoclave and Bottle Washing)	46 ft^2 (2 locations)	Good	Non-friable
Grey caulk around window frames	First Floor, Reagent and Media Prep Room (Autoclave and Bottle Washing)	55 linear ft (2 locations)	Good	Non-friable
Black insulation spot coating on ductwork	First Floor, Reagent and Media Prep Room (Autoclave and Bottle Washing)	720 ft^2	Unknown	Unknown
Green 9x9" floor tile	First Floor, Reagent and Media Prep Room (Autoclave and Bottle Washing)	500 ft^2	Good	Non-friable
White piping insulation	First Floor, Reagent and Media Prep Room (Autoclave and Bottle Washing)	28 linear ft	Good	Non-friable
White piping insulation elbows	First Floor, Reagent and Media Prep Room (Autoclave and Bottle Washing)	2 elbows	Good	Non-friable
Black shielding in radiators	First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)	46 ft^2 (2 locations)	Good	Non-friable
Grey caulk around window frame	First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)	28 linear ft (1 location)	Good	Non-friable
Green 9x9" floor tile	First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)	235 ft^2	Good	Non-friable
Black insulation spot coating on ductwork	First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)	180 ft^2	Unknown	Unknown

Table 1
Estimated Quantities and Condition of Known Asbestos-Containing Materials

Material Description	Location	Estimated Quantity	Condition	Friability
White pipe insulation	First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)	45 linear ft	Good	Non-friable
White pipe insulation elbows	First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)	12 elbows	Good	Non-friable
Black shielding in radiators	First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)	70 ft^2 (3 locations)	Good	Non-friable
Brown wire wrap in radiators	First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)	12 linear ft (3 locations)	Good	Non-friable
Grey caulk around window frames	First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)	82 linear ft (3 locations)	Good	Non-friable
Black insulation spot coating on ductwork	First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)	660 ft^2	Unknown	Unknown
Green 9x9" floor tile	First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)	800 ft^2	Good	Non-friable
White pipe insulation	First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)	100 linear ft	Good	Non-friable
White pipe insulation elbows	First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)	20 elbows	Good	Non-friable
Black shielding in radiators	First Floor, Physical Laboratory (Microbiology Lab)	70 ft^2 (3 locations)	Good	Non-friable
Brown wire wrap in radiators	First Floor, Physical Laboratory (Microbiology Lab)	15 linear ft (3 locations)	Good	Non-friable
Black insulation spot coating on ductwork	First Floor, Physical Laboratory (Microbiology Lab)	420 ft^2	Unknown	Unknown
Black insulation spot coating on ductwork	First Floor, Dark Room (Storage)	300 ft^2	Unknown	Unknown
Green 9x9" floor tile	First Floor, Dark Room (Storage)	86 ft^2	Good	Non-friable

Table 1
Estimated Quantities and Condition of Known Asbestos-Containing Materials

Material Description	Location	Estimated Quantity	Condition	Friability
Black shielding in radiators	First Floor, General Laboratory (Instrumentation)	70 ft^2 (3 locations)	Good	Non-friable
Brown wire wrap in radiators	First Floor, General Laboratory (Instrumentation)	15 linear ft (3 locations)	Good	Non-friable
Black insulation spot coating on ductwork	First Floor, General Laboratory (Instrumentation)	540 ft^2	Unknown	Unknown
Green 9x9" floor tile	First Floor, General Laboratory (Instrumentation)	465 ft^2	Good	Non-friable
Black shielding in radiators	First Floor, Offices	46 ft^2 (2 locations)	Good	Non-friable
Brown wire wrap in radiators	First Floor, Offices	9 linear ft (2 locations)	Good	Non-friable
Grey caulk around window frames	First Floor, Offices	55 linear ft (2 locations)	Good	Non-friable
Black insulation spot coating on ductwork	First Floor, Offices	120 ft^2	Unknown	Unknown
Green 9x9" floor tile	First Floor, Offices	300 ft^2	Good	Non-friable
White pipe insulation	First Floor, Offices	48 linear ft	Good	Non-friable
White pipe insulation elbows	First Floor, Offices	12 elbows	Good	Non-friable
Grey caulk around window frame	Basement, Boiler Room	22 linear ft	Good	Non-Friable
Black tar on floor	Basement, Boiler Room	4 ft^2 (3 locations)	Damaged	Non-Friable
White insulation*	Basement, Boiler Room	11 linear ft (5 locations)	Damaged	Friable
Black tar on floor	Basement, Hallway	2 ft^2	Damaged	Non-friable
Brown 4" pipe gaskets	Basement, Crawlspace	3.5 ft^2 (7 locations)	Damaged	Non-friable
Black tar on floor	Basement, Storage Room	4 ft^2	Damaged	Non-friable
Black membrane tar on canopy over north wall entranceway	Laboratory Exterior	132 ft^2	Damaged	Non-friable
Black membrane tar on canopy over south wall entranceway	Laboratory Exterior	132 ft^2	Damaged	Non-friable

Table 1
Estimated Quantities and Condition of Known Asbestos-Containing Materials

Material Description	Location	Estimated Quantity	Condition	Friability
White caulk around vents	Laboratory Exterior	18 linear ft (3 locations)	Significantly damaged	Non-friable

Notes:
* - Insulation extends through the wall into the Basement, Storage Room.

NO TEXT ON THIS PAGE

Table 2
Estimated Quantities and Condition of Presumed Asbestos-Containing Materials To Be Removed Under Unit Price Items

Material Description	*Location*	*Estimated Quantity*	*Condition*
Caulk behind door frame	Second Floor, Library and Conference Room (Microbiology Office)	20 linear ft	Unknown
Caulk behind door frame	Second Floor, Drafting Room (Administration Office)	20 linear ft	Unknown
Caulk behind door frame	Second Floor, Hallway	20 linear ft	Unknown
Caulk behind door frame	Second Floor, Lunch Room	20 linear ft	Unknown
Caulk behind door frame	Second Floor, Women's Restroom	20 linear ft	Unknown
Caulk behind door frames	Second Floor, Watershed Division Engineer's Office (Directors Office)	40 linear ft (2 locations)	Unknown
Caulk behind door frame	Second Floor, Watershed Office (Conference Room)	20 linear ft	Unknown
Caulk behind door frame	Second Floor, Men's Restroom	20 linear ft	Unknown
Brown wire wrap in radiator	First Floor, Entrance	5 linear ft	Unknown
Brown wire wrap in radiator	First Floor, Reagent and Media Prep Room (Autoclave and Bottle Washing)	9 linear ft (2 locations)	Unknown
Caulk behind door frame	First Floor, Reagent and Media Prep Room (Autoclave and Bottle Washing)	20 linear ft	Unknown
Brown wire wrap in radiators	First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)	9 linear ft (2 locations)	Unknown
Caulk behind door frame	First Floor, Sample Reception Room (Sample Log-in and Bottle Storage)	20 linear ft	Unknown
Caulk behind door frames	First Floor, Water and Sewage Laboratory (Wet Chemistry Lab)	40 linear ft (2 locations)	Unknown
Caulk behind door frame	First Floor, Physical Laboratory (Microbiology Lab)	20 linear ft	Unknown
Caulk behind door frame	First Floor, Dark Room (Storage)	20 linear ft	Unknown
Caulk behind door frame	First Floor, General Laboratory (Instrumentation)	20 linear ft	Unknown
Caulk behind door frames	First Floor, Offices	40 linear ft (2 locations)	Unknown

Table 2
Estimated Quantities and Condition of Presumed Asbestos-Containing Materials To Be Removed Under Unit Price Items

Material Description	*Location*	*Estimated Quantity*	*Condition*
Caulk behind interior door frame	Basement, Boiler Room	20 linear ft	Unknown
Caulk behind exterior door frame	Basement, Boiler Room	26 linear ft	Unknown
Arc panels in electrical panels	Basement, Boiler Room	33 ft^2 (3 locations)	Unknown
Caulk behind interior door frame	Basement, Storage Room	16 linear ft	Unknown
Caulk behind exterior door frame	Basement, Storage Room	20 linear ft	Unknown
Arc panels in electrical panels	Basement, Electrical Room	20 ft^2 (2 locations)	Unknown
Caulk behind door frame	Basement, Electrical Room	20 linear ft	Unknown

SECTION 13282G
Mercury Management

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 13282 – Mercury Management and Analysis, except as modified herein.

PART 1 GENERAL

1.01 SUMMARY:

Replace 1.01.A and 1.01.B in their entirety with the following:

A. This Section details the requirements for construction and demolition activities affecting materials containing mercury, as shown in the following report and in summary tables 1 through 29 attached to Specification 01355 – Hazardous Materials Control, specified herein, or required to complete the work. All work under this Section shall be performed using methods that have a demonstrated effectiveness in minimizing the quantity of hazardous waste generated; protect the health and safety of all site personnel and the welfare of the public; and avoid adverse environmental impacts.

1. Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC.

B. The Contractor shall perform the removal and recycling/disposal of additional materials containing mercury not included in the report listed in 1.01.A. Unless otherwise specified, the Work of this Section shall also be performed in accordance with the most current New York City Department of Environmental Protection (NYCDEP) Environmental Health and Safety (EHS) Policies and Procedures (including Mercury Management, Hazardous Waste Management, and Spill Prevention, Environmental Release Reporting and Investigation), and applicable federal, state, and local regulations.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 13283G
Lead Management

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 13283 – Lead Management, except as modified herein.

PART 1 GENERAL

1.01 SUMMARY

Replace 1.01.A and 1.01.D in their entirety with the following:

A. This Section details the requirements for construction and demolition activities affecting materials and structures containing lead or other heavy metals (i.e., arsenic, cadmium, or chromium), as shown in the following report and summary tables 1 through 29 attached to Section 01355 – Hazardous Materials Control, specified herein, or required to complete the work. All work under this Section shall be performed using methods, tools, and equipment that have demonstrated effectiveness in preventing airborne emissions from migrating outside of work areas.

1. Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC.

D. The Contractor shall perform the removal and recycling/disposal of additional materials and structure coated with or containing lead or other heavy metals (e.g., arsenic, cadmium, or chromium) not included in the report listed in 1.01.A. Unless otherwise specified, the work of this Section shall also be performed in accordance with the most current New York City Department of Environmental Protection (NYCDEP) Environmental Health and Safety (EHS) Policies and Procedures (including Lead Management, Hazardous Waste Management, and Spill Prevention, Environmental Release Reporting and Investigation), and applicable federal, state, and local regulations.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 13284G
PCB MANAGEMENT

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 13284 – PCB Management, except as modified herein.

PART 1 GENERAL

1.01 SUMMARY

Replace 1.01.A and 1.01.E in their entirety with the following:

A. This Section details the requirements for construction and demolition activities affecting materials and structures coated with or containing polychlorinated biphenyls (PCBs) or presumed PCB-containing, as shown in the following report and in summary tables 1 through 29 attached to Section 01355 – Hazardous Materials Control, specified herein, or required to complete the work. All work to be performed under this Section shall be performed using methods, tools, and equipment that have demonstrated effectiveness in preventing airborne emissions from migrating outside of work areas.

1. Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC.

E. The Contractor shall perform the removal, demolition, and disposal of additional materials and structures coated with or containing PCBs not included in the report listed in 1.01.A. Unless otherwise specified, the work of this Section shall also be performed in accordance with the most current New York City Department of Environmental Protection (NYCDEP) Environmental Health and Safety (EHS) Policies and Procedures (including PCB Management, Paint Management, Hazardous Waste Management, and Spill Prevention, Environmental Release Reporting and Investigation), and applicable federal, state, and local regulations.

1.08 SUBMITTALS

Replace 1.08.A.4.a.1.j in its entirety with the following:

j) SDSs: Provide SDSs for all chemical products (including chemical stripping products and PODFs) to be used for the Work;

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16121G
Low-Voltage Wires, Cables and Accessories

Note: The work of this Section shall be in accordance with the requirements of General Specification 16121 – Low-Voltage Wires, Cables and Accessories, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

Delete article 1.03.D in its entirety.

END OF SECTION

NO TEXT ON THIS PAGE

DETAILED SPECIFICATION 16126G – FIBER OPTIC CABLE AND ACCESSORIES
CONTRACT CRO-624G

SPECIFICATION 16126G
FIBER OPTIC CABLE AND ACCESSORIES

Note: Detailed Specification 16126 – Fiber Optic Cable and Accessories has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 16126.

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fiber Optic Cable
2. Fiber Optic Patch Cords
3. Fiber Optic Connectors
4. Fiber Optic Patch Panels
5. Fiber Optic Splices
6. Innerduct

B. An index of the Articles in this Detailed Specification is presented hereinafter for the convenience of the Contractor.

1.02 RELATED SECTIONS

A. Detailed Specification 01270 - Measurement and Payment

B. Detailed Specification 01330 - Shop Drawings Submittal and Approval

C. General Specification 16131E - Electric Conduit System

1.03 REFERENCES

A. Refer to latest version of all listed references.

B. American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA)/Electronics Industry Alliance (EIA):

1. EIA-455-21A Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components
2. ANSI/TIA/EIA-526-7 OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
3. ANSI/TIA/EIA-526-14A OFSTP-14A Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant
4. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Standard
5. ANSI/TIA/EIA-568-C.0 Generic Telecommunications Cabling for Customer Premises
6. ANSI/TIA/EIA-568-C.1 Commercial Building Telecommunications Cabling Standard – Part 1: General Requirements
7. ANSI/TIA/EIA-568-C.3 Optical Fiber Cabling Components Standard

8. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces
9. ANSI/TIA/EIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
10. ANSI/TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications

C. Telcordia

1. GR-326-CORE Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies
2. GR-1081-CORE Generic Requirements for Field-Mountable Optical Fiber Connectors

D. Institute of Electrical and Electronic Engineers (IEEE):

1. IEEE 383 Vertical Wire Flame Test

E. Insulated Cable Engineers Association (ICEA):

1. ICEA S-104-696 Standard for Indoor-Outdoor Optical Fiber Cable

F. National Fire Protection Association (NFPA):

1. NFPA 70 National Electrical Code (NEC)

G. Underwriters Laboratories (UL):

1. UL 13 Power Limited Circuit Cables
2. UL 444 Communications Cables
3. UL 467 Grounding and Bonding Equipment
4. UL 1277 Electrical Power and Control Tray Cables with Optional Optical Fiber Members
5. UL 1666 Test for Flame Propagation Height of Electrical and Optical Fiber Cables Installed Vertically in Shafts
6. UL 1685 Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cable
7. UL 1863 UL Standard for Safety for Communications-Circuit Accessories

1.04 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.05 SUBMITTALS

A. General

1. The Contractor shall submit working drawings, shop drawings and material specifications for all equipment and work provided, for the approval of the Engineer in accordance with the requirements of the General Conditions, Article 4 - Contractor's Working Drawings, Design and Shop Drawings and Detail Specification 01330 – Shop Drawings Submittal and Approval

B. Working Drawings

1. The Contractor shall submit to the Engineer for approval, working drawings to substantiate conformance with the requirements set forth on the Contract Drawings and in these specifications.
2. All working drawing shall include, but not be limited to:
    a. Equipment specifications and data sheets identifying all equipment and materials used and methods of fabrication
    b. Complete assembly and layout drawings with clearly marked dimensions
    c. Equipment cross sections and mounting details
    d. Weights of all component parts, assembled weight of units and approximate total shipping weights
    e. Interconnecting wiring diagrams
    f. List of spare parts
    g. List of special tools
    h. Storage instructions
    i. Installation instructions
    j. Preliminary operation and maintenance (O&M) manuals

1.06 GENERAL REQUIREMENTS

A. Where required Provide a completely cabled and terminated fiber optic cable system.

B. Installation shall comply with NFPA 70 Article 770.

C. Provide communications system cabling, raceways, pathways, and spaces in conformance with ANSI/TIA/EIA-568-C.1, -568-C.3, -569-A and -607.

D. Provide all multi-mode and single-mode fiber optic cables as industry rated components and of the best-performing design for the intended application as judged by the Engineer and the manufacturer recommendation.

E. Provide grounding and bonding systems in conformance with ANSI/TIA/EIA-607, NFPA 70 and UL 467.

F. It is the intent of this Detail Specification to provide a complete fiber optic cabling system which is compliant with the existing fiber optic and network system.

G. For the purposes of this Detail Specification, the term "network segment" shall be defined as the sum total of all cables and related passive hardware (patch panels, etc.) between two communicating transceivers.

1.07 QUALITY ASSURANCE

A. Provide products that are listed and labeled by Underwriters Laboratory, approved by Factory Mutual, or certified as meeting the standards of UL by the Electrical Testing Laboratory unless products meeting the requirements of these testing laboratories are not readily available or unless standards do not exist for the products.

1. Provide products that are listed and labeled or approved as stated above for the location they are to be installed in.

2. Provide products listed and labeled or approved as indicated and specified for the applications the items are intended for.

B. Provide products that have been third party performance tested by a Nationally Recognized Independent Testing Laboratory. Provide test results upon request of the Engineer.

C. Manufacturer Qualifications: Firm specializing in manufacturing products for work of this Detail Specification with minimum five years documented experience in production of similar products and equipment.

D. Installer Qualifications: Firm specializing in installing work of this Detail Specification with minimum three years documented experience constructing systems of similar size and type.

E. Install work under supervision of skilled and experienced installers.

1. Submit current qualifications of all installation employees who will work on the job.

2. Submit current qualifications of all supervisory personnel who will work on the job. Qualifications will consist of:

a. Summary history of employee showing projects recently completed

b. Copy of current employee certifications

PART 2 PRODUCTS

2.01 GENERAL

A. Consistency of Fiber Optic Cable Application: Manufacturer of fiber optic cable to be consistent across the project; multiple fiber optic cable manufacturers will not be permitted for different applications.

B. Except where indicated otherwise, provide multi-fiber cables with optical fiber counts as follows:

1. Cross Patch Cables: Provide single or duplex fiber cables as required
2. Greater than 50 feet: minimum 12 fibers

2.02 OPTICAL FIBERS

A. Provide all fibers for use on this job as part of a manufacturer's standard cable assembly. Do not provide bare fibers unless specifically shown on the drawings.

B. All fibers in the cable must be usable and meet required specifications.

C. Each optical fiber shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification.

D. Each optical fiber shall consist of a Germania-doped silica core surrounded by a concentric glass cladding.

E. Each optical fiber shall be proof tested by the fiber manufacturer at a minimum of 100 kpsi.

F. The fiber shall be coated with a dual layer acrylate protective coating. The coating shall be in physical contact with the cladding surface.

G. The attenuation specification shall not exceed the manufacturer's rated maximum value for the cable product at the design passband center frequency. Test each strand on each cable at 23°C ± 5°C on the original shipping reel and label reel with test results.

H. Single-mode (Dispersion Un-Shifted) OS2 Fibers

1. Standards: ITU G.652 (Tables A,B, C & D), IEC Specification 60793-2-50 Type B1.3, TIA/EIA 492-CAAB, Telcordia Generic Requirements GR-20-CORE.
2. ISO/IEC 11801 Nomenclature: OS2
3. Characteristics:

Mode Field Diameter @ 1310nm (μm)	9.2 ± 0.4	
Mode Field Diameter @ 1550nm (μm)	10.4 ± 0.5	
Cladding Diameter (μm)	125.0 ± 0.7	
Cladding Non-Circularity	0.7% max	
Core-to-Cladding Concentricity (μm)	0.5 max	
Coating Diameter (μm)	242 ± 5	
Wavelength (nm)	1310	1550
Maximum Attenuation (dB/km)	0.4	0.3
Serial 1 Gigabit Ethernet Distance (m)	5000	---
Serial 10 Gigabit Ethernet Distance (m)	10000	40000

2.03 INDOOR/OUTDOOR INDUSTRIAL GRADE GENERAL PURPOSE CABLE (TYPE OFN-LS)

A. Provide gel-free loose tube optical fiber cable, suitable for use in harsh industrial environments.

B. Fibers

1. Number and type of fibers: as indicated on drawings.
2. Fibers shall comply with the requirements given elsewhere in this specification.

C. Provide cables with the following Basic characteristics:

1. Low-Smoke/Zero-Halogen jacket
2. Suitable for outdoor installation (aerial and duct)
3. Suitable for indoor general purpose installation in accordance with NFPA 70 Article 770 requirements for Type OFN Optical Fiber Cable.
4. Approvals and Listings:
   a. NFPA 70 Type OFN-LS
   b. Sunlight Resistant
   c. Suitable for Direct Burial
   d. IEEE 383 Flame Test
   e. Tray Rated
5. Maximum Tensile Load
   a. Short Term (less than 1 hour): 600 pounds force
   b. Long Term (greater than 1 hour to 30 years): 180 pounds force
6. Temperature:
   a. Installation: -22°F to +140°F

b. Operation: -58°F to +167°F

7. Design and Test Criteria: ICEA S-104-696, UL 13, UL 444, and UL 1277

D. Cable Construction

1. Optical fibers shall be placed inside a loose buffer tube. The buffer tubes shall be made of polypropylene. The nominal outer diameter of the buffer tube shall be 2.5 mm. Each buffer tube shall contain up to 12 fibers. The fibers shall not adhere to the inside of the buffer tube.
2. Each fiber shall be distinguishable by means of color coding in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding."
    a. The fibers shall be colored with ultraviolet (UV) curable inks. The UV curable ink shall be applied to the outside of the optical fiber protective coating layer and not be an integral component of the coating layer itself in order to produce more distinguishable colored fiber.
    b. Buffer tubes containing fibers shall be color coded with distinct and recognizable colors in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding." Buffer tube colored stripes shall be inlaid in the tube by means of co-extrusion when required. The nominal stripe width shall be 1 mm.
    c. For dual layer buffer tube construction cables, standard colors shall be used for tubes 1 through 12 and stripes shall be used to denote tubes 13 through 24. The color sequence shall apply to tubes containing fibers only, and shall begin with the first tube. If fillers are required, they shall be placed in the inner layer of the cable. The tube color sequence shall start from the inside layer and progress outward.
    d. In buffer tubes containing multiple fibers, the colors shall be stable across the specified storage and operating temperature range and not subject to fading or smearing onto each other or into the gel filling material. Coloring material shall not cause fibers to stick together.
3. The buffer tubes shall be resistant to kinking.
4. Fillers may be included in the cable core to lend symmetry to the cable cross-section where needed.
    a. Fillers shall be placed so that they do not interrupt the consecutive positioning of the buffer tubes.
    b. In dual layer cables, any fillers shall be placed in the inner layer.
    c. Fillers shall be nominally 2.5 mm in outer diameter.
5. The central member shall consist of a dielectric, glass reinforced plastic (GRP) rod. The purpose of the central member is to prevent buckling of the

cable. The GRP rod shall be overcoated with a thermoplastic, when required, to achieve dimensional sizing to accommodate buffer tubes/fillers.

6. Provide all water blocking yarns or tapes as swellable materials for the intended use of preventing liquid water migration through cables.
7. Buffer tubes shall be stranded around the dielectric central member using the reverse oscillation, or "S-Z," stranding process. Water blocking yarn(s) shall be applied longitudinally along the central member during stranding.
8. Two polyester yarn binders shall be applied contrahelically and with sufficient tension to secure each buffer tube layer to the dielectric central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking and dielectric with low shrinkage.
9. For single layer cables, a water blocking tape shall be applied longitudinally around the outside of the stranded tubes/fillers. The tape shall be held in place by a single polyester binder yarn. The water blocking tape shall be non-nutritive to fungus and electrically non-conductive. It shall also be free from dirt and foreign matter.
10. For dual layer cables, a second (outer) layer of buffer tubes shall be stranded over the original core to form a two-layer core. A water blocking tape shall be applied longitudinally over both the inner and outer layer with each being held in place with a single polyester binder yarn. The water blocking tape shall be nonnutritive to fungus and electrically non-conductive. It shall also be free from dirt and foreign matter.
11. The cable shall contain at least one ripcord under the sheath for easy sheath removal.
12. Flame-retardant tape may be applied to provide resistance to flame propagation.
13. A water blocking tape shall be applied longitudinally around the outside of the flame retardant tape.
14. The tensile strength shall be provided by the central member, and additional dielectric yarns as required. The dielectric yarns shall be helically stranded evenly around the cable core.
15. Cables shall be sheathed with a flame retardant low-smoke zero halogen jacket. Jacketing material shall be applied directly over the tensile strength members and water blocking tape. The flame retardant low-smoke zero halogen outer jacket shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as is consistent with the best commercial practice. The jacket shall provide the cable with a tough,

flexible, protective coating, able to withstand the stresses expected in normal installation and service. The cable shall be a dual jacket design.

16. Cable jackets shall be marked with the manufacturer's name or file number, month and year of manufacture, sequential meter or foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code, fiber count, and fiber type, flame rating and listing marking. The actual length of the cable shall be within -0/+1% of the length markings. The print color shall be white, with the exception that cable jackets containing one or more coextruded white stripes, which shall be printed in light blue. The height of the marking shall be approximately 2.5 mm.

E. Cable Physical Performance

1. Tensile Loading and Fiber Strain

   a. When tested in accordance with FOTP-33, "Fiber Optic Cable Tensile Loading and Bending Test," and FOTP-38, “Measurement of Fiber Strain in Cables Under Tensile Load,” a length of cable shall be tested to the rated tensile load. The rated tensile load shall be 2670 N (600 lbf).

   b. While under the rated tensile load, the fiber shall not experience a measured fiber strain greater than 60% of the fiber proof test level.

   c. After being held at the residual load (30% of the rated tensile load) the fiber shall not experience a measured fiber strain greater than 20% of the fiber proof test level nor an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).

   d. After the tensile load is removed, the fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).

2. Compressive Loading Test

   a. When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber Optic Cables," the cable shall withstand a minimum compressive load of 220 N/cm (125 lbf/in) applied uniformly over the length of the sample. The 220 N/cm (125 lbf/in) load shall be applied at a rate of 2.5 mm (0.1 in) per minute. The load shall be maintained for a period of 1 minute. The load shall then be decreased to 110 N/cm (63 lbf/in).

   b. Alternatively, it is acceptable to remove the 220 N/cm (125 lbf/in) load entirely and apply the 110 N/cm (63 lbf/in) load within five minutes at a rate of 2.5 mm (0.1 in) per minute. The 110 N/cm (63 lbf/in) load shall be maintained for a period of 10 minutes.

c. Attenuation measurements shall be performed before release of the 110 N/cm (63 lbf/in) load. The change in attenuation shall not exceed 0.40 dB at 1550 nm for single-mode fibers and 0.60 dB at 1300 nm for multimode fiber.

3. Cyclic Flexing

   a. When tested in accordance with FOTP-104, "Fiber Optic Cable Cyclic Flexing Test," the cable shall withstand 25 mechanical flexing cycles at a rate of 30 ± 1 cycles per minute. The flexing arc shall be + 90 degrees from the reference position.

   b. The fiber shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).

   c. No cracks, splits, tears or other opening shall be present on the inner or outer surface of the jacket.

4. Twist Test

   a. When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test," a length of cable no greater than 2 meters will withstand 10 cycles of mechanical twisting.

   b. The fiber shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).

5. High and Low Temperature Bend

   a. When tested in accordance with FOTP-37, "Fiber Optic Cable Bend Test, Low and High Temperature," the cable shall withstand four full turns around a mandrel at test temperatures of -10°C and +60°C. The mandrel diameter shall be the larger of 20X cable diameter or 150 mm.

   b. The presence of visible cracks, splits, tears, or other openings on either the inner or outer surface of the jacket constitutes failure. None of the sheath components shall show visible cracking when removed successively and examined.

   c. For single-mode fibers, the increase in attenuation shall be ≤ 0.40 dB at 1550 nm. For multimode fibers, the increase in attenuation shall be ≤ 0.60 dB at 1300 nm.

6. Impact Resistance

   a. When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies," the cable shall withstand a minimum of 2 impact cycles at 3 locations spaced 150 mm. The impact energy shall be at least 4.4 N*m.

b. The fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).

c. The presence of visible cracks, splits, tears, or other openings on the outer surface of the jacket constitute a failure. The presence of broken fibers within the specimen constitutes a failure.

7. Temperature Cycling

a. When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components," the change in attenuation after 2 cycles at extreme operational temperatures (-40 °C to +70 °C) shall not exceed 0.40 dB/km at 1550 nm (single-mode) or 0.60 dB/km at 1300 nm (multimode). The change in attenuation is measured with respect to the baseline values measured at room temperature before temperature cycling and after the last low and last high temperature.

8. Water Penetration

a. When tested in accordance with FOTP-82, “Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable”, a one meter length of unaged cable shall withstand a one meter static head or equivalent continuous pressure of water for one hour without leakage through the open cable end.

9. Cold Impact Test

a. When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies," the cable shall withstand a minimum of 2 impact cycles at 3 locations separated by 150 mm. The impact energy shall be at least 2.94 N*m. The cable shall be conditioned for at least 4 hours at the minimum installation temperature (-10 °C).

b. The presence of visible cracks on either the inner or outer surface of the jacket constitutes a failure.

c. No optical measurements are required.

F. Manufacturer

1. Corning Cable Systems Industrial LSZH (Basis of Design)
2. Belden
3. Berk Tek
4. Commscope
5. Siemon
6. Superior Essex
7. Or approved equal

2.04 FIBER OPTIC PATCH CORDS

A. Plenum rated, two-fiber cable. Fiber type as indicated on the Drawings, and/or as required for the application.

B. Tight buffered fiber, surrounded by an all-dielectric strength member and continuous outer jacket. Suitable for operation from +32°F to +158°F.

C. With factory installed connectors on both ends. Connector type(s) as required for the application. Connectors shall comply with the requirements for connectors given elsewhere in this specification.

D. Length as indicated on the Drawings, or as required for the application.

E. Manufacturer

1. Corning Cable Systems Zipcord (Basis of Design)
2. Belden
3. Berk Tek
4. Commscope
5. Siemon
6. Superior Essex
7. Or Approved Equal

2.05 FIBER OPTIC CONNECTORS

A. Provide fiber optic cable connectors as indicated on the drawings, and/or as required.

B. Provide only type ST connectors, unless otherwise indicated or required for proper interface with equipment.

C. Connectors shall be splice-on, polished end type. Splice is to be protected with a heat-shrink protective sleeve and be located within the splice connector body. Splice is to be a fusion splice.

D. Connectors shall be simplex, unless indicated otherwise or otherwise required for proper interface with equipment.

E. Connector shall provide a strain relief mechanism for installation on a single fiber cable that contains strength elements. The fiber within the body of the connector shall be isolated mechanically from cable tension, bending and twisting. Provide fan-out kits for each cable to protect the un-jacketed fiber strands.

F. Connectors shall comply with EIA/TIA-455-A, as well as TIA/EIA-604-2 (FOCIS-2 for Type ST connectors), TIA/EIA-604-3 (FOCIS-3 for Type SC connectors), and TIA/EIA-604-10A (FOCIS-10 for Type LC connectors).

G. Operating temperature shall be from -40° to 75°C exceeding EIA/TIA 568-B.3.

H. Connectors shall be Telcordia GR-326-CORE and GR-1081-CORE compliant.

I. Connectors for multimode fibers shall be rated for OM1, OM2, OM3, or OM4 to match the fibers they are being applied with.

J. Connectors shall have a typical insertion loss of 0.10dB and a maximum insertion loss of 0.30dB.

K. Connectors shall have a reflectance of less than or equal to -55dB

L. When installed in strict accordance with the manufacturer's recommendations, the connectors shall be capable of achieving the following performance.

1. Corning Cable Systems FuseLite Single-Fiber Splice-On Conenctors (Basis of Design)
2. Fiber Instrument Sales Cheetah Splice-On Connector
3. Or Approved Equal

2.06 FIBER OPTIC PATCH PANELS - INDOOR INDUSTRIAL GRADE WALL MOUNTED

A. Industrial quality, wall mounted, fiber optic cable connector housing.

B. Steel, with baked on powder coat finish. IP64 / NEMA 12. Padlockable outer door.

C. Housing shall include provisions for strain relief of incoming cables, as well as slack fiber management.

D. Provide splice tray accessories with adequate capacity for the application.

E. Provide conduit adapter accessories and gastight annular sealing bushings on all conduits.

F. Unless noted otherwise, quantity and type of connectors shall be provided for proper termination of all incoming cable fibers, plus 100% spare. Where the drawings indicate two or more cables (not including cross connecting patch cords) entering a single patch panel, separate connectors shall be provided for every fiber from each cable to allow for cross-connecting between the cables via the use of patch cords.

G. Manufacturer

1. Corning Cable Systems ICH Industrial Connector Housing (Basis of Design)
2. Belden
3. Commscope
4. Hubbell
5. Levition
6. Panduit
7. Siemon
8. Or Approved Equal

2.07 FIBER OPTIC PATCH PANELS - INDOOR/OUTDOOR ENVIRONMENTAL WALL MOUNTED

A. Industrial quality, wall mounted, fiber optic cable connector housing.

B. Non-metallic. Sunlight resistant. IP66 / NEMA 12. Padlockable outer door.

C. Housing shall include provisions for strain relief of incoming cables, as well as slack fiber management.

D. Provide splice tray accessories with adequate capacity for the application.

E. Provide conduit adapter accessories and gastight annular sealing bushings on all conduits.

F. Unless noted otherwise, quantity and type of connectors shall be provided for proper termination of all incoming cable fibers, plus 100% spare. Where the drawings indicate two or more cables (not including cross connecting patch cords) entering a single patch panel, separate connectors shall be provided for every fiber from each cable to allow for cross-connecting between the cables via the use of patch cords.

G. Manufacturer

1. Corning Cable Systems EDC Environmental Distribution Center (Basis of Design)
2. Belden
3. Commscope
4. Hubbell
5. Levition

6. Panduit
7. Siemon
8. Or Approved Equal

2.08 FIBER OPTIC CABLE SPLICES

A. Only fusion splices are permitted; mechanical splices shall not be used.

B. Splice equipment shall be either by the cable manufacturer, or approved by the cable manufacturer for the fibers in question.

C. Splice equipment shall be capable of producing typical splice loss of not greater than 0.10 dB.

2.09 WALL MOUNTED SPLICE ENCLOSURE

A. Provide wall mounted, fiber optic cable splice housing.

B. Provide metallic enclosure.

C. Provide enclosure with provisions for strain relief of incoming cables, as well as slack fiber management.

D. Provide quantity of splice trays as required, plus 100% spare.

E. Manufacturer

1. Basis of Design: Corning Cable Systems WSH Wall-Mountable Splice Housing (Basis of Design)
2. Belden
3. Commscope
4. Hubbell
5. Levition
6. Panduit
7. Siemon
8. Or Approved Equal

2.10 SPLICE CLOSURE (AERIAL OR DIRECT BURIED)

A. Provide splice closure suitable for use in aerial and direct buried applications.

B. Provide closure with non-metallic outer housing with O-ring sealing system.

C. Provide closure with cable ports suitable to accept heat shrink tubing for sealing of incoming cables. Provide number and size of ports as required.

D. Provide closure with provisions for strain relief of incoming cables, as well as slack fiber management.

E. Provide quantity of splice trays as required, plus 100% spare.

F. Manufacturer

1. 3M (FDC-HS) Fiber Dome Closure Heat Shrink (Basis of Design)
2. Corning Cable Systems
3. Superior Essex
4. Or Approved Equal

2.11 INNERDUCT

A. Provide continuous innerduct runs from each conduit access point.

B. Plastic Innerduct (Indoor/Outdoor Applications)

1. UL Listed, Plenum Rated, flexible, non-metallic, corrugated, optical fiber/communication raceway.
2. Orange in color.
3. Outside marked with size and sequential length in feet.
4. Compatible fittings as required.
5. Provide innerducts in all conduits used for fiber optic cables. Unless noted otherwise, provide innerducts as follows:
   a. 2" conduit: two 3/4" innerducts
   b. 3" conduit: three 1" innerducts
   c. 4" conduit: three 1-1/4" innerducts
6. Provide 900 lb rated pull tape/string in all spare innerducts.
7. Provide gastight and watertight seal at outdoor points of cable entry to innerduct to preclude water vapor or liquid from entering interstitial space.
8. Manufacturer:
   a. Carlon Plenum-Gard (Basis of Design)
   b. Approved equal.

C. Fabric Innerduct (Indoor Applications Only)

1. UL 2024A compliant, Plenum Rated, fabric optical fiber/communication raceway.
2. Provide innerducts in all conduits used for fiber optic cables. Unless noted otherwise, provide innerducts as follows:
    a. 2" conduit: one innerduct pack with three "1-inch" cells
    b. 3" conduit: two innerduct packs with three "1.25-inch" cells each
    c. 4" conduit: two innerduct packs with three "1.5-inch" cells each
3. Provide 900 lb rated pull tape/string in all spare cells.
4. Manufacturer:
    a. MaxCell Fabric Innerduct (Basis of Design)
    b. Approved equal

PART 3 EXECUTION

3.01 PREPARATION

A. Ensure that painted surfaces that will be covered by items of this Detail Specification have a primer and finish coat of paint.

B. Ensure that all indoor areas are enclosed from the weather.

3.02 INSTALLATION

A. Installation of fiber optic cables and all related accessories and hardware shall strictly conform to the recommended installation procedures of their respective manufacturers.

B. Unless specifically indicated otherwise, each fiber optic cable run shall be installed as one continuous length between the indicated termination points, with no intermediate splices.

C. Provide sufficient strain relief (slack) in all cables, cable conductors, and wiring to avoid stress on all cables, wires, and wiring connections.

D. Conduits, Ducts, and Innerducts

1. Outside fiber optic cable shall be installed in ducts conforming to General Specification 16133E – Underground Ducts, Ducts in Concrete.
2. Inside fiber optic cable shall be installed in conduit conforming to Detailed Specification 16131E – Electric Conduit System.

3. Unless indicated otherwise, minimum conduit size for fiber optic cable shall be 2" for above-ground (indoor and outdoor) applications and 4" for underground applications.
4. Innerducts shall be provided in all conduits used for fiber optic cables. Provide pull string or tape in all spare innerducts.
5. Provide pull rope in all empty conduit runs with not less than 36 inches of slack at both ends. Tie rope off to prevent loss into conduit.
6. Conduits shall be restricted to no more than two 90-degree bends or equivalent without a pull box.
7. Maintain minimum bending radius of changes in direction as follows:
   a. 10 times diameter of 4” (100 mm) and larger conduits.
   b. 6 times diameter of smaller conduits.
8. Avoid bends in conduits from pull boxes.
9. At all transition points where a cable runs from inside a conduit into a cable trough, or onto a cable tray or plywood backboard, the end of the conduit shall be fitted with a plastic bushing to prevent abrasive damage to the cable.
10. .

E. Cable Dress Loops

1. Provide cable dress loops at each location as listed below.
   a. Manholes: 25 feet (or as specified on drawings)
   b. Handholes: 15 feet (or as specified on drawings)
   c. Floor-Mounted PMCS Cabinets: 10 feet (or as specified on drawings)
   d. Wall-Mounted PMCS Cabinets: 5 feet (or as specified on drawings)
   e. Equipment Racks: 10 feet. (or as specified on drawings)
   f. Wall Mounted Patch Panels & Splice Enclosures: Per the manufacturers installation instructions.
2. Refer to the Drawings for additional designed excess (spare) cable lengths.

F. Spare Fibers

1. All spare fibers shall be terminated, neatly coiled and tied with cable ties for future use.
2. Label all spare fibers as such.

G. Cable Pulling Tension

1. Calculate expected pulling tension based on the manufacturer's recommendations. If calculated tension exceeds 90% of the cable manufacturer's stated maximum short-term tension, take necessary steps to reduce the expected tension below 90%. Submit the tension calculations for approval prior to installation of the subject cable.
2. Monitor actual pulling tension throughout installation. Actual tension shall not exceed 90% of the cable manufacturer's stated maximum short-term tension at any time during pulling.
3. For pulls where the calculated expected tension exceeds 75% of the cable manufacturer's stated maximum short-term tension, utilize a tension monitoring device with recording capability throughout pulling. Submit the recorded tensions to the Engineer immediately after installation.

H. Ensure that the cable manufacturer's stated minimum bend radius of the cable is not exceeded during installation. Cables shall not be bent to a radius less than ten (10) times the diameter of the cable, or less than the manufacturer's recommended minimum bending radius, during installation or as finally installed.

I. Installation of aerial fiber optic cables shall be in accordance with the manufactures recommended installation methods and components. Do not use helical strand wrapping machines to attach cable to messenger wire unless the manufacturer’s installation instructions allow such use in writing.

J. Lengths of cables which are not installed in conduits and are run inside equipment rooms shall be run in and secured to cable trays or cable ladders using nylon cable ties and attached to walls and backboards using nylon cable clamps or hangers or using a plastic wiring system such as manufactured by Panduit, or Approved Equal. Cables shall be attached or otherwise supported at intervals not to exceed 18 inches. Mechanically fasten all cable accessories, i.e., do not rely only upon adhesive component fasteners.

K. All conduit and cable entrance openings into equipment rooms and huts shall be sealed with a pliable sealing compound after the cable is in place. Sealing compounds for rooms, huts, walls, or other partitions shall be fire retardant per ASTM E 814. Sealing compound shall be used to seal the area around the cable where the cable emerges from the end of a conduit, pipe, or ductbank. Seal all cables where they enter innerducts. All spare conduits shall be sealed or plugged in an approved manner.

1. Fire retardant pliable sealing compound shall be an intumescent firestop putty, reusable and repenetrable, conforming to ASTM E 814 and UL 1479, Nelson FSP Firestop Putty, or Approved Equal.
2. Seal all outdoor spare conduits with gastight mechanical expanding sealing plugs.

L. Provide appropriate special protection for cables in areas where the cables are unavoidably exposed to hazardous conditions, such as sharp corners on equipment. Cables damaged due to neglect by the Contractor, during installation, shall be replaced by the Contractor, at no additional cost to the City.

M. All cables shall be terminated in standard order, according to the EIA/TIA and ICEA color codes. Individual cables shall be identified at each cable termination with permanent, heat shrink labels. All spare fibers in each cable shall be terminated and identified. Identification of cables and conduits shall comply with General Specification 16076 – Labeling and Identification.

3.03 FIELD QUALITY CONTROL

A. Perform telecommunications cabling inspection, verification, and performance tests in accordance with ANSI/TIA/EIA-568-B.

B. Inspection

1. Prior to installation: visually inspect cable visible defects, as well as for UL or third party certification markings.
2. After installation: thoroughly visually inspect all accessible portions of the installation for visible defects.

C. Optical Fiber Testing

1. Perform all testing specified herein for each fiber, including spares, of each installed cable.
2. All instruments used to perform the testing specified herein shall be calibrated and certified by the prevailing standards body.
3. For all tests specified herein, submit results for each fiber tested as follows.
   a. Detailed (numerical) results.
   b. Pass/fail based on the requirements given herein and applicable industry standards (also clearly state the numerical pass/fail criteria).
4. Prior to installing optical fiber cable, perform end-to-end attenuation tests using an OTDR while cable is on the reel at the jobsite.
5. Perform tests in accordance with ANSI/TIA/EIA-568-C.3 and the cable manufacturer's recommendations, as well as ANSI/TIA/EIA-526-14A Method B (multimode) and ANSI/TIA/EIA-526-7 Method B (single-mode). Perform verification acceptance tests and factory reel tests.
6. Perform testing at both operational windows (850 and 1300 nm for multimode fibers, 1310 and 1550 nm for single-mode fibers).
7. Perform end-to-end optical attenuation testing, in both directions.

a. Testing is to include fiber connectors.

b. Calculate expected optical attenuation based on the manufacturers' stated worst-case attenuation values for the installed cable, connectors, and splices.

c. Actual measured attenuation shall not exceed the calculated expected attenuation by more than 20% or 1.0 dB, whichever is less.

d. Submit both calculated and actual measured attenuations.

8. Perform Optical Time Domain Reflectometer (OTDR) trace testing, in both directions.

a. Submit graphical results for each test, with all anomalies (connectors, splices, defects, etc.) identified by type, location (distance), and attenuation.

b. No single connector shall result in more than 0.75 dB attenuation. No single splice shall result in more 0.3 dB attenuation. No single anomaly, other than connectors and splices, shall result in more than 0.5 dB attenuation.

D. Correction of Deficiencies

1. Report all unacceptable values immediately. Correct all deficiencies found in work of this contract and separately report deficiencies in work of items of other contracts.

2. Retest items requiring correction. Correct or have corrected any remaining deficiencies and retest until work is acceptable.

3.04 PROTECTION

A. Protect all new and existing work.

B. During painting, mask all nameplates, all plastic parts, and all items not to be painted.

C. Protect all items during work of other trades including welding and cutting.

D. Schedule installation of fiber optic components to occur later in the construction activity to avoid periods of excessively wet or dirty construction.

E. If necessary, seal and cover cable, enclosures, boxes, openings, and other components to preclude contamination.

F. Leave protective caps in place on unconnected components. Replace caps after testing or other work.

G. Completely clean all system components of dust, dirt, and debris accumulations.

H. Replace components which cannot be cleaned or restored back to a new condition at not cost to the City.

- END OF DETAILED SPECIFICATION -

NO TEXT ON THIS PAGE

SECTION 16131G
Electric Conduit System

Note: The work of this Section shall be in accordance with the requirements of General Specification 16131 – Electric Conduit System, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.02 HANGERS, SUPPORTS AND INSERTS

Replace 2.02.E with the following:

E. Hangers and supports shall be in accordance with the requirements of General Specification 15060 - Hangers and Supports except beam clamps, hanger rods and hardware shall be steel with electro-plated zinc finish. This shall also include bolts, nuts and washers. In outdoor, hazardous, wet and corrosive locations, hangers and support hardware shall be type 316 stainless steel or factory applied 40 mil thick PVC coated.

2.05 CONDUIT ACCESSORIES

Replace 2.05.C.3 with the following:

3. For outdoor, hazardous, wet and corrosive locations, seal fittings shall include interior and exterior coatings equivalent to the PVC conduit coating specified under this Section.

END OF SECTION

NO TEXT ON THIS PAGE

SPECIFICATION 16852
CLOSED CIRCUIT TELEVISION

Note: Detailed Specification 16852 – Closed Circuit Television has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 16852.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section includes specifications for a Closed Circuit Television system (CCTV System) which shall provide video coverage as shown on Contract Drawings.

B. The Contractor shall provide all labor, materials, supervision, equipment and incidentals as shown, specified, and required to furnish, install, connect, test, startup, and place into satisfactory operation the CCTV System as described herein and as indicated on the Contract Drawings.

C. Description of Work

1. The Contractor, via the Systems Integrator, shall include all necessary labor, tools, equipment, and ancillary materials required to furnish and install a complete and operational CCTV monitoring system.
2. The extent of CCTV System work is defined on the Contract Drawings and shall include, but not limited to:
    a. Video management system, Internet Protocol (IP) network video transmission system, Ethernet switches, Media converters, transceivers and digital recording components.
    b. CCTV cameras, heaters, enclosures, lens, mounting equipment.
    c. CCTV monitors.
    d. Wiring, power supplies, switches and ancillary equipment.
    e. Actual quantities of all equipment required are detailed on the Contract Drawings.
3. Requirements are indicated elsewhere in these Specifications for work including, but not limited to, electrical boxes and fittings required for installation of control equipment. Conduit and wiring shall be furnished and installed by the Contractor.

4. To accommodate growth and to facilitate implementation of future technologies, system components shall be modular and expandable.
5. All connections by cables that originate or traverse outside a building shall be surge protected.

D. An index of the Articles in this Specification is presented hereinafter for the convenience of the Contractor.

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 01270 – Measurement and Payment

B. Detailed Specification 01330 – Shop Drawings Submittal and Approval

C. Detailed Specification 16121 DS - Low Voltage Wires, Cables and Accessories

D. Detailed Specification 16131 DS - Electric Conduit System

E. Detailed Specification 17403 G – Network Security and CCTV Site Monitoring and Control System – Start-Up and Field Testing

1.03 REFERENCES

A. The following organizations have generated standards that are to be used as guides in assuring quality and reliability of components and systems; govern nomenclature; define parameters of configuration and construction, in addition to specific details in this Specification and the Contract Drawings:

1. UL - Underwriter's Laboratories, Inc.
2. NEMA- National Electrical Manufacturers Association.
3. OSHA - Occupational Safety and Health Administration.
4. ANSI - American National Standards Institute.
5. NFPA - National Fire Protection Association.
6. JIC - Joint Industrial Council.
7. IEEE - Institute of Electrical and Electronics Engineers.
8. NEC - National Electrical Code.
9. FM - Factory Mutual.
10. FCC - Federal Communications Commission.

1.04 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.05 SUBMITTALS

A. The Contractor shall submit working drawings, shop drawings and material specifications for all equipment and work that the Contractor proposes to provide, for the review and approval of the Engineer in accordance with the requirements of the General Conditions and Section 01330 – Shop Drawings Submittal and Approval. The

Contractor shall submit working drawings for the routing of video signals. That Submittal shall be reviewed and approved by the Engineer and NYC-DEP OIT, BPS, and SEU prior to the installation of those signal cables and associated conduit or other hardware.

B. Working Drawings:

The Contractor shall submit to the Engineer for approval, working drawings to substantiate conformance with the requirements set forth on the Contract Drawings and in these Specifications.

All working drawings shall include, but not be limited to:

1. Equipment specifications and data sheets identifying all equipment and materials used and methods of fabrication.
2. Complete assembly and layout drawings with clearly marked dimensions.
3. Equipment cross sections and mounting details.
4. Weights of all component parts, assembled weight of units and approximate total shipping weights.
5. Interconnecting wiring diagrams.
6. List of spare parts.
7. List of special tools.
8. Storage instructions.
9. Installation instructions.
10. Operation and Maintenance manuals; manuals for programming and operating the CCTV System and its related components.
11. Manufacturer's data on CCTV System and components.
12. Dimensioned drawings of CCTV System components.
13. One-line diagram of the system configuration proposed for this Contract. Submittals indicating typical riser diagrams are not acceptable.
14. Accurate as-built drawings shall be furnished by the Contractor via The Systems Integrator. These should indicate the areas monitored by each CCTV camera and all accessories, mounting details, and wiring interconnections.

1.06 SPARE PARTS AND SPECIAL TOOLS

A. The Contractor shall provide all of the individual manufacturer's recommended spare parts and tools for all equipment specified herein. The Contractor shall include the manufacturer's recommended spare parts list with the initial submittal. Submittals without this information are considered incomplete and will be rejected. Spare parts and special tools shall be provided in accordance with the requirements of the General Conditions.

B. Furnish the following spare parts for each CCTV system, but not be limited to:

1. One (1) CCTV camera for each type furnished.
2. One (1) CCTV monitor for each type furnished.
3. All spare parts (minimum quantity one (1)) recommended by the manufacturer and listed as recommended spare parts in the Operations and Maintenance (O&M) Manual submitted by the manufacturer.

C. Where other Specifications may indicate a different count of spare parts, the greater number shall apply.

1.07 QUALITY ASSURANCE

A. All materials and equipment furnished shall be new, free from defects, and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of these products.

B. Where there is more than one item of similar equipment required under the Contract, all such similar equipment shall be the product of one manufacturer.

C. All material furnished under this Contract shall be determined safe by either Underwriter's Laboratories, Inc., or Factory Mutual Engineering Corporation and all material shall be labeled, certified, or listed by the testing agency.

D. Custom made equipment or related installations which are constructed specially for this Project will not be acceptable. Equipment furnished within this Contract shall be standard products furnished by a supplier regularly engaged in the manufacture of such products.

E. Manufacturer of products defined in this Section shall have:

1. Industry experience: Company must have at least five (5) years experience in manufacturing CCTV systems.
2. (International Organization for Standardization (ISO) 9001 Certification: Manufacturing process of Company must meet stringent standards of ISO 9001 Certification.

F. Systems Integrator:

1. System Integrator shall be a Company with a minimum of 5 (five) years system design, engineering supervision, and installation experience in the CCTV surveillance industry.
2. The System Integrator shall be a Company that is trained and authorized to install the manufacturer's products.

G. System warranty shall be as defined in Division 1 of the Specifications. In addition, the Contractor shall at no extra cost, provide an extended warranty of four (4) years for a total warranty period of five (5) years. Warranty shall include all parts and labor required to restore the CCTV system to operation in case of a fault.

PART 2 PRODUCTS

2.01 CCTV SYSTEM DESCRIPTION

A. General

1. CCTV System shall monitor the whole perimeter of the Kensico Lab Building.
2. System shall consist of components shown on Contract Drawings, but not be limited to:
   a. Color cameras
   b. Media converters
   c. Multimedia Transmission Virtual Interface Architecture (VIA) networks
   d. Ethernet CAT-6 (refer to Detailed Specification 17790G – Communications Networks and Equipment)
   e. Conduits (refer to Detailed Specification 16131G – Electrical Conduit System)

2.02 GENERAL

A. All equipment and materials used shall be standard components that are regularly manufactured and used in the manufacturer’s system.

B. All systems and components shall have been thoroughly tested and proven in comparable applications and actual use.

C. All systems and components shall be provided with the availability of a toll-free (U.S. and Canada), 24-hour technical assistance program (TAP) from the manufacturer. The TAP shall allow for immediate technical assistance for either the dealer/installer or the end user at no charge for as long as the product is installed.

D. All systems and components shall be provided with a one-day turnaround repair express and 24-hour parts replacement. The repair and parts express shall be guaranteed by the manufacturer on warranty and non-warranty items.

2.03 ACCEPTABLE CCTV SYSTEM MANUFACTURERS AND CAMERA MODELS SCHEDULE

TAG	Location	Type	Res	Light	Camera Model	Mount	Remarks
CAM 1 - CAM 2	Ceiling mounted at West and East entrances	Fixed	HD 2048 X 1536	N/A	Pelco- Sarix Multi Pro 180 degree, Environmental Pendant Model # IMD15118 (3x5MP,WDR,SuperVision, 180 degree max field of view, 4mm, Camera Base Module)	Ceiling Mounted	For use with ceiling mount adapter model # IMD1-INC (In-ceiling adapter, must order IMD1-INCD1)
CAM 3 - CAM 6	Light poles at the Site	Fixed	HD 2048 X 1536	N/A	Pelco- Sarix Multi Pro 180 degree, Environmental Pendant Model # - IMD15118 (3x5MP,WDR,SuperVision, 180 degree max field of view, 4mm, Camera Base Module)	Pole Mounted	For use with pole mount model # PLMT-1001 (aluminum pole mount for use with WLMT-1001 and IMD1-PMT)-

2.04 CCTV CAMERA POWER SUPPLY

A. All cameras shall be powered by a 24V power supply by camera manufacturer as shown on the Contract Drawings. Each camera shall be protected with an inline surge protector that is properly grounded.

2.05 CCTV CAMERA – FIXED

A. Camera Enclosure assembly shall be assembled at original equipment manufacturer's factory. All components, including camera and lens, must be installed by OEM.

1. Day/Night Capabilities: Auto IR illumination with automatic IR cut filter, automatic gain control, and auto iris
2. Horizontal Field of View: 180° angle
3. Effective resolution: 2048×1536
4. License Number:"VXP-1C-3Y"

   VideoXpert™ Professional 1CH LICENSE + 3YR SUP For 1CH.
5. Mounting Kit:
   a) Ceiling Mounted Cameras: IMD1-INC with IMD1-INCLD1
   b) Pole Mounted Cameras: PLMT-1001 with WLMT-1001 and IMD1-PMT

2.06 CCTV NETWORK VIDEO RECORDER AND STORAGE

A. The Network video recorder shall be VideoXpert Pro Power 2 Server consisting of a main video processing unit and an external storage unit manufactured by one original equipment manufacturer.

B.

1. Software: VideoXpert NVs version 3.7 or later
2. Licenses: Non-expiring licenses in the required quantity. Provide 20% spare licenses rounding up.

3. IP camera support: Up to 128 IP camera streams
4. Data Throughput: 350 Mbps for RAID6 and 300 Mbps for JBOD systems.
5. System Drive: Main system drive shall be SSD
6. Video encoding: H.264, MPEG-4, m128otion JPEG
7. Network: two 1GB network ports
8. Processor: Xeon E5-2620 v4
9. Ram: 4GB minimum
10. Video Outputs: Two (2) DVI-D ports
11. Operating System: Windows 10 or newer
12. License Expansion: Add additional IP video channel capacity through licensing without any hardware modification.
13. Archival: Must allow archival of video data to computers or SAN storage devices over a network connection. Archival schedule shall be automatic at user-defined intervals or manual and shall be configurable per connected camera. Archival to also be available through integrated DVD+/-RW.
14. System Monitoring: SNMP monitoring
15. Analytics: Shall optionally support on-board video analytics in quantities of two of four channels to include tracking and counting objects and people.
16. Storage (Internal): RAID5 minimum 24 TB
17. Storage (External): RAID5 external storage system. External storage unit to provide minimum 90 days storage for all cameras at 15 fps full resolution or a minimum of 18 terabytes of net storage, whichever is greater. External storage system must be of the same manufacturer as the Network Video Recorder. Provide all required controllers and interfaces to create a fully functional system.
18. Archival: Allow archiving to other computers, network-attached storage, and storage area network devices

19. LED display: Front-mounted LED display showing system health and storage use
20. Operating temperature: 10°C to 35°C
21. Operating humidity: 20% to 80%, non-condensing
22. Mfg. / Model No.: Pelco Video Xpert VXP-P2-96-5-D or approved Pelco product.

2.07 CCTV WORKSTATION

A. Provide workstation specifically optimized to view multiple CCTV feeds from the CCTV Network Video Recorder. The details provided here are based on current technology. Provide the latest technology available at the time of delivery.

1. Software: Provide Vixeoxpert version 3.7 or later software compatible with CCTV NVR and CCTV cameras
2. Operating System: Windows 7 Ultimate 64-bit (English) or latest version as recommended by manufacturer.
3. Processor: Intel Core i7-6700
4. Memory: 8 GB DDR4
5. Video Card: Intel HD Graphics 530
6. Hard Drive: m.2 256 GB
7. Optical Drive: DVD +/- RW
8. Accessories: Wired US QWERTY keyboard, wired mouse, power cord, DVI/DisplayPort cable, resource/recovery disc
9. Energy Efficiency: Energy Star rated
10. Mfg. / Model No.: Latest equivalent of Pelco Videoxpert VXP-WKS

2.08 LED MONITOR

A. Size: 65” Inch

B. Resolution: 1920x1080

C. Color Depth: 1.07 billion colors

D. Brightness: 450 cd/m^2

E. Contrast Ratio: 3000:1

F. Viewing Angle: 178°/178°

G. Response Time: 8ms

H. Digital Video Inputs: HDMI and DisplayPort up to 3840 x 2160

I. Power Management: VESA DPMS

J. Port Inputs: DP + HDMI (2) + VGA + Audio + RS-232 in (HDMI 1.2, HDMI 2.0)

K. Speakers: 8 ohm 5 W/channel

L. Power Supply: 100-240 VAC, 50/60 Hz

M. Mount: Wall Mount

N. Mfr. / Model: Pelco-PMCL665K

2.09 MANUFACTURER'S WARRANTY

A. Repair or Replacement

1. Defective parts for all cameras and components, including cameras in continuous motion modes, shall be repaired or replaced for a period of two (2) years from the date of shipment.

B. This article appears to the warranty provided by the equipment manufacturer and not the Contractor. The Contractor shall supply warranty as required elsewhere in these specifications.

2.10 CERTIFICATIONS

A. All devices provided under this specification and related specifications shall be UL and UL Listed and conform to CE Class B, NEMA 4X and IP66 standards.

2.11 REGULATORY REQUIREMENT

A. NEC Compliance: All electrical wiring work shall comply with NEC.

B. NEMA Compliance: Electrical equipment shall comply with applicable portions of NEMA.

C. FCC Emissions: All assemblies shall be in compliance with FCC emission standards.

D. All power supplies shall be in compliance with Underwriter's Laboratories standard 1012 for power supplies.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install each item in accordance with the manufacturer's recommendations and as indicated in the Contract Documents.

3.02 FIELD TESTS

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1 - General Requirements.

B. The units specified in this section shall be included as part of all testing required by Detailed Specification 17403 – Network Security and CCTV Site Monitoring and Control System - Start-Up and Field Testing.

C. On-site testing: The Contractor, via manufacturer trained and authorized Systems Integrator, shall functionally test each component in the system after installation to verify proper operation and confirm that the panel wiring and addressing conform to the wiring documentation.

D. Service facility: Systems Integrator shall have service facilities within seventy five miles of the installation.

E. Once installed and configured, and the associated equipment completely powered on, each unit shall be given a comprehensive field test. System Integrator shall simulate failure conditions and document that the unit responds properly.

3.03 MANUFACTURER'S FIELD SERVICES

A. Manufacturer’s field services shall be in accordance with Section 17403G – Network Security and CCTV Site Monitoring and Control System Start-up and Field Testing.

- END OF DETAILED SPECIFICATION -

NO TEXT ON THIS PAGE

SPECIFICATION 17403
NETWORK SECURITY AND CCTV SITE MONITORING AND CONTROL SYSTEMS - START-UP AND FIELD TESTING

Note: Detailed Specification 17403 – Network Security and CCTV Site Monitoring and Control Systems – Start-up and Field Testing has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 17403.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all equipment and coordinate all activities necessary to perform check-out and start-up of the equipment.

B. The Contractor shall retain the services of the system supplier to supervise and/or perform check-out and start-up of all system components. As part of these services, the system supplier shall include for those equipment items not manufactured by him the services of an authorized manufacturer's representative to check the equipment installation and place the equipment into operation. The manufacturer's representative shall be thoroughly knowledgeable about the installation, operation and maintenance of the equipment.

C. An index of the Articles in this Specification is presented hereinafter for the convenience of the Contractor.

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 17430G – Network Security and CCTV Panel Mounted Instruments and Devices

1.03 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.04 SYSTEM CHECKOUT AND START-UP

A. The Contractor, under the supervision of the Site Monitoring and Control System (SMCS) supplier, and other instrument suppliers as applicable, shall perform the following:

1. Check and approve the installation of all SMCS components and all cable and wiring connections between the various system components prior to placing the various processes and equipment into operation.

2. Conduct a complete system checkout and adjustment, including calibration of all instruments, tuning of control loops, checking of all operational functions, and testing of final control actions. When there are future operational functions included in this work, they should be included in the system checkout. All problems encountered shall be promptly corrected to prevent any delays in start-up of the various unit processes.

B. The Contractor shall provide all test equipment necessary to perform the testing during system checkout and start-up.

C. The Contractor and system supplier shall be responsible for initial operation of the monitoring and control system and shall make any required changes, adjustment or replacements for operation, monitoring and control of the various processes and equipment necessary to perform the functions intended.

D. The Contractor shall furnish to the Engineer certified calibration reports for panel mounted devices specified in Detailed Specification 17430G – Network Security and CCTV Mounted Instruments and Devices-soon as calibration is completed.

E. The Contractor shall furnish the Engineer an installation inspection report certifying that all equipment has been installed correctly and is operating properly. The report shall be signed by authorized representatives of both the Contractor and the system supplier.

F. Contractor shall provide up to five (5) days of integration services at East View Police Headquarters to coordinate the Kensico Lab building Security System. Coordinate with NYC-DEP BPS and SEU.

1.05 INTEGRATED SYSTEM FIELD TEST

A. Once installed and configured, the associated equipment completely powered, and the controls checkout and initial operation, the Contractor shall perform a Performance Verification Test (PVT) to verify that all equipment and programmed software is operating properly as a fully integrated system, and that the intended monitoring and control functions are fully implemented and operational. The Contractor must develop and submit a PVT test procedure for review and approval by the Engineer and NYC-DEP BPS and SEU at least 30 days prior to the start of the PVT. Any defects or problems found during the test shall be corrected by the Contractor and then re-tested to demonstrate proper operation.

B. Following demonstration of all system functions, the controls, including field sensors/transducers and instruments, shall be running and fully operational for a continuous forty eight (48)-hour period. The Operational Availability Demonstration specified below shall not begin until the continuous forty eight (48)-hour integrated system test has been successfully completed and the NYC-DEP and the Engineer agree that the Operation Availability Demonstration can begin.

1.06 OPERATIONAL AVAILABILITY DEMONSTRATION

A. Operational Availability Demonstration (OAD) shall begin following completion of the integrated system field test as specified above and shall continue until a time frame has been achieved wherein the system (both hardware and software) availability meets or exceeds 99.9 percent for sixty (60) consecutive days and no system failures have occurred which result in starting the OAD over again. During the OAD the system shall be operated by the Contractor.

B. For the purpose of the OAD the system will be defined as consisting of the following systems and components:

1. All Local Control Panels, and the connected security Controller(s).

C. The conditions listed below shall constitute system failures which are considered critical to the operability and maintainability of the system. The OAD shall be terminated if one (1) or more of these conditions occur. Following correction of the problem, a new sixty (60) consecutive day OAD shall begin

1. Failure to repair a hardware or software problem within one hundred twenty (120) consecutive hours from the time of notification of a system failure.
2. Recurrent hardware or software problems: if the same type of problem occurs three (3) times or more.
3. Software problem causing a processor to halt execution.
4. The following conditions shall constitute a system failure in determining the system availability based on the equation specified in Article 1.04.E:
   a. Failure of any non-redundant operator interface.
   b. Loss of communications between devices on the communications network.
   c. Failure of any security controller.
   d. Failures of any type affecting ten or more input/output points simultaneously.
   e. Failure of any type affecting one (1) or more regulatory control loops or sequential control strategies thereby causing a loss of the automatic control of the process variable or process sequence operation.
   f. Failure of power supply. Where redundant power supplies are provided, failure of one (1) power supply shall not constitute a system failure

provided the backup power supply operates properly and maintains supply power. Failure of the backup supply to operate properly and maintain supply power shall constitute a system failure.

D. The system availability shall be calculated based on the following equation:

$$A = \frac{TTO}{(TTO + TTR)} \times 100\%$$

where:

A = system availability in percent
TTO = total time in operation
TTR = total time to repair

B. Time to repair shall be the period between the time that Contractor is notified of a system failure and the time that the system has been restored to proper operation in terms of hours with an allowance for the following dead times which shall not be counted as part of the time to repair period.

1. Actual travel time for service personnel to get to the site up to six (6) hours per incident from the time the Contractor is notified of a system failure.
2. Time for receipt of spare parts to the site once requested up to twenty four (24) hours per incident. No work shall be done on the system while waiting for delivery of spare parts.
3. Dead time shall not be counted as part of the system available period. The dead time shall be logged and the duration of the OAD extended for an amount of time equal to the total dead time.

E. All parts and maintenance materials required to repair the system prior to completion of the OAD shall be supplied by the Contractor at no additional cost to the City. If parts are obtained from the required spare parts inventory, they shall be replaced to provide a full complement of spare parts as specified.

F. A Site Monitoring and Control System Malfunction/Repair Reporting Form shall be completed by the site personnel and the Engineer to document system failures, to record the Contractor notification, arrival and repair times and the Contractor repair actions. Format of the form shall be developed and agreed upon prior to the start of the OAD.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

-END OF DETAILED SPECIFICATION-

SPECIFICATION 17420
NETWORK SECURITY AND CCTV CONTROL PANELS AND ENCLOSURES

Note: Detailed Specification 17420 – Network Security and CCTV Control Panels and Enclosures has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 17420.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate, test, start-up and place into satisfactory operation all security control panels and/or enclosures.

B. An index of the Articles in this Detailed Specification is presented herein for the convenience of the Contractor.

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 01330G - Shop Drawings Submittal and Approval

B. Detailed Specification 05092G - Metal Fastening

C. Detailed Specification 17403G - Network Security and CCTV Site Monitoring and Control System – Start-Up and Field Testing

1.03 REFERENCES

A. ISA – International Society of Automation, previously known as The Instrument Society of America

B. JIC - Joint Industrial Council Standards.

C. NEC - National Electrical Code.

D. NEMA- National Electrical Manufacturer's Association Standards.

E. ASTM - American Society for Testing and Materials.

F. OSHA - Occupational Safety and Health Administration Regulations.

G. ANSI – American National Standards Institute

H. NFPA – National Fire Protection Association

I. IEEE – Institute of Electrical and Electronics Engineers

J. ISO – International Organization for Standardization

K. UL – Underwriters' Laboratories, Inc.

L. State and Local code requirements.

M. Where any conflict arises between codes or standards, the more stringent requirement shall apply.

1.04 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.05 QUALITY ASSURANCE

A. General

1. Panels shall be furnished by a single Supplier who shall assume responsibility for providing a complete and integrated system including fabrication, installation, factory and field testing, and training.

2. All equipment, components, and material required shall be furnished by a single Supplier for each system who shall assume the responsibility for adequacy and performance of all items.
3. The Supplier shall identify those system components which are not of his manufacture.
4. The Supplier shall submit his company's quality assurance plan, in accordance with ISO 9001 Standards and for components which are not of his manufacture, the component manufacturer's quality assurance plan. The plans shall include but not necessarily be limited to: method of testing, raw material criteria, methods of documentation, station control, "Burn-In", final tests, and serialization coding and packaging.

B. Operating Experience

1. The Kensico Lab building has been designed to meet stringent quality standards. The City and the Engineer have selected a designed panel building requirements necessary to meet these stringent quality criteria limitations. The criteria for selection of this system includes, but is not limited to, the following:
   a. The use of standard, "non-custom" equipment and application software.
   b. The use of standard non-proprietary network protocols
   c. The ability of the City's personnel to make modifications and adjustments in the field to react to actual field conditions.
   d. The ability of the City to obtain training of the City's personnel in well-established equipment training program.
   e. The availability of factory service and a well-stocked spare parts inventory which could be drawn upon by the City in an emergency situation.

C. Standards, Codes and Regulations:

1. Construction of panels and the installation and interconnection of all equipment and devices mounted within shall comply with all applicable provisions of the following standards, codes and regulations:
   a. ISA – International Society of Automation, previously known as The Instrument Society of America
   b. JIC – Joint Industrial Council Standards.
   c. NEC – National Electrical Code.
   d. NEMA – National Electrical Manufacturer's Association Standards.
   e. ASTM – American Society for Testing and Materials.
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k. UL – Underwriters' Laboratories, Inc.

l. State and Local code requirements.

m. Where any conflict arises between codes or standards, the more stringent requirement shall apply.

n. All materials and equipment shall be new and all panels shall be built in an Underwriters Laboratory (UL), Inc. approved panel shop and bear the UL label.

D. Acceptable Manufacturers:

1. The Contractor shall furnish instruments and devices by the named manufacturers or equal equipment by other manufacturers.

2. The named manufacturers have been specified to establish the standard of quality and performance of the equipment to be supplied.

3. The Contractor shall obtain all instruments or devices of a given type from the same manufacturer.

E. Manufacturers' Responsibilities and Services shall include:

1. The Contractor shall retain the supplier to assume the responsibilities specified below. However, execution of these specified duties by the system supplier shall not relieve the Contractor of the ultimate responsibility for the Kensico Lab building.

a. Design, fabrication, implementation, and application programming for the system in accordance with the Contract Documents and all referenced standards and codes.

b. Preparation, assembly, and correction of all submittals in accordance with Contract Documents.

c. Proper interfacing of hardware, software, field devices, and panels, including required interfacing with packaged control systems furnished by other equipment suppliers, and with the Kensico Lab building.

d. Supervision of the installation of the panels, consoles, cabinets, wiring, and other components required.

e. Calibration, testing, and startup of each system.

f. Training of the City personnel in operation and maintenance of the system.

g. Handling of all warranty obligations for the system components.

2. Field supervision, inspection, start-up and training in accordance with the requirements of Detailed Specification 17403G – Network Security and CCTV Site Monitoring and Control System - Start-Up and Field Testing.

F. Devices shall not be assembled in the panels until all product information and system shop drawings for respective components have been approved.

1.06 SUBMITTALS

A. The Contractor shall submit working drawings, shop drawings and material specifications for all equipment and work Contractor shall provide for the review and approval of the Engineer in accordance with the requirements of the General Conditions and Detailed Specification 01330 – Shop Drawings Submittal and Approval.

B. All Working Drawings shall include, but not be limited to:

1. Equipment specifications and data sheets identifying all equipment and materials used and methods of fabrication.
2. Complete assembly and layout drawings with clearly marked dimensions, including final architecture drawings.
3. Equipment cross-sections and mounting details.
4. Weights of all component parts, assembled weight of units and approximate total shipping weights.
5. Interconnecting wiring diagrams.
6. List of spare parts.
7. List of special tools.
8. Storage instructions.
9. Installation instructions.
10. Operation and maintenance manuals; manuals for programming and operating the systems, panels, and related components.
11. Configuration data, operating system to be used, and listing of software to be loaded.
12. Manufacturer's data on the components.
13. Heating and cooling calculations.
14. One-line diagram of the panel configuration proposed for this Contract. Submittals indicating typical riser diagrams are not acceptable.
15. Accurate as-built drawings shall be furnished by the Contractor to aid the City.

16. Sequence of operation shall be clearly indicated.

C. Contractor Qualifications

1. Submit the qualifications of the System Integrator demonstrating required qualifications.

1.07 SPARE PARTS AND SPECIAL TOOLS

A. The Contractor shall provide all of the individual manufacturer's recommended tools for all equipment specified herein. The Contractor shall include a concise list detailing the manufacturer recommended tools with the initial submittal and include the manufacturer literature where tooling is recommended.

B. The Contractor shall provide a minimum of 10% spare parts (rounded up) or the individual manufacturer's recommended spare parts, whichever is greater, for all components used in conjunction with the panel or enclosure. The Contractor shall include a concise list of the spare parts with the initial submittal and include manufacturer literature where spare parts are recommended.

C. Spare enclosures and spare back panels are not required.

D. Where other Specifications may indicate a different count of spare parts, the greater number shall apply.

E. Spare parts and special tools shall be provided in accordance with the requirements of the General Conditions.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION REQUIREMENTS

A. The Contractor shall provide all electrical devices, support hardware, fasteners, interconnecting wiring required to make the control panels and/or enclosures complete and operational.

B. The Contractor shall locate and install all devices and components so that connections can be easily made and so that there is ample room for servicing each item.

C. Components for installation on panel exterior shall be located generally as shown on the Contract Drawings. Layouts shall be submitted for approval.

D. Panels shall have full front access doors.

E. The Contractor shall adequately support and restrain all devices and components mounted on or within the panel to prevent any movement.

F. The Contractor shall provide sub-panels for installation of all relays and other internally mounted component if required.

G. All wiring from field instruments, devices, and other panels to panel connections shall be terminated at master numbered terminal strips, unless otherwise specified.

H. The Contractor shall provide two copper grounding bus bars: an isolated ground bus for termination of all DC powered devices and a non-isolated ground bus for termination of all AC power grounds.

I. The Contractor shall provide the following convenience accessories inside of each control panel:

1. One (1) 120 volts AC (VAC,) 15 amps (A) duplex, GFCI-type receptacle as indicated on the Contract Drawings.
2. One (1) 120 VAC fluorescent or LED light fixture and protective plastic shield for enclosures greater than or equal to 24 inches in width. Where the sub-panel is less than 24 inches in width the light fixture is to be a minimum of 18 inches long, otherwise the light fixture is to be a minimum of 24 inches long.
3. One (1) 120 VAC, 20 A, door switch to both turn on the light when the access door is opened and to provide a digital input "Intrusion Alarm" to the security system. Two separate switches are acceptable, one for each function.
4. One (1) breather vent on the underside of the enclosure. The breather vent shall come complete with an external insect screen and internal air filter and be made of corrosion resistant material. Provide Norgren MV008A breather vent, or approved equal.

2.02 IDENTIFICATION

A. The Contractor shall provide laminated plastic nameplates for identification of panels and components mounted thereon as follows:

1. Nameplates shall be of 3/32-inch thick laminated phenolic type with white matte finish surface and black letter engraving.
2. Panel identification nameplates shall include 1/2-inch high letter engravings.
3. Panel mounted component (i.e., control devices, indicating lights, selector switches, etc.) identification nameplates shall include 1/4-inch high letter engravings.
4. Nameplates shall be attached to the panel face with two stainless steel self-tapping screws.

5. Nameplate engravings shall include the instrument or equipment tag number and descriptive title as shown and specified.

B. Tag all internally mounted instruments in accordance with the following requirements:

1. Tag numbers shall be as listed in the Instrument Index.
2. The identifying tag number shall be permanently etched or embossed onto a stainless steel tag which shall be fastened to the device housing with stainless steel rivets or self tapping screws of appropriate size.
3. Where neither of the above fastenings can be accomplished, tags shall be permanently attached to the device by a circlet of 1/16-inch diameter stainless steel wire rope.
4. Identification tag shall be installed so that the numbers are easily visible to service personnel.
5. Front of panel-mounted instruments shall have the tag attached to rear of device.

C. Tagging of the following items shall be accomplished with the use of machine printed adhesive plastic Brady USA, Inc., labels or equal approved by the Engineer.

1. Tag all electrical devices (i.e., relays, timers, power supplies) mounted within control panels and enclosures.
2. Color code and numerically tag wiring at each end.

D. Tagging of the following items shall be accomplished with the use of manufacturer provided plastic machine printed tags or if plastic machine printed tags are not available with the use of adhesive plastic Brady USA, Inc., labels, or equal approved by the engineer.

1. Numerically tag all terminal blocks.

2.03 PANELS AND ENCLOSURES

A. General:

1. Panels and enclosures shall meet the NEMA requirements for the type specified.
2. Sizes shown are estimates and should be considered minimums. The Contractor shall furnish panels and enclosures amply sized to house all equipment, instruments, front panel mounted devices, power supplies, power distribution panels, wiring, tubing and other components installed within.

3. Where panels do not have an integral lock, provide a padlock that is compatible with NYC-DEP locking standards. Coordinate with NYC-DEP and the Engineer prior to purchasing locks.
4. Provide a minimum of three (3) keys for each enclosure lock. Label the keys with the system and panel identifier. Keys shall be grouped by system and turned over to NYC-DEP.

B. Construction Features:

1. General features. Enclosures shall have the following common characteristics. More specific requirements for a specific application override these requirements.
    a. Enclosures shall be rated NEMA 12 unless otherwise specified. All modifications to the enclosure shall maintain the enclosure rating.
    b. Enclosures shall be fabricated using minimum 14 gauge stainless steel for wall or frame mounted enclosures and minimum 12 gauge for free standing enclosures. Steel shall have a smooth brushed finish and be free of pitting and surface blemishes.
    c. All exterior seams are to be welded and ground smooth. The Contractor shall surface grind for complete removal of corrosion, burrs, sharp edges, and mill scale.
    d. Reinforce sheet steel with stainless steel angles where necessary to adequately support equipment and ensure rigidity and to preclude resonant vibrations.
    e. Enclosure surfaces shall be flat within 1/16 inch over a 24 inch by 24 inch area of flat within 1/8 inch for a larger surface. Flatness shall be checked by using a 72 inch long straight edge. Out-of-flatness shall be gradual, in one direction only, and shall not consist of obvious depressions or a series of wavy sections.
    f. Enclosure shall use pan type construction for doors. Door widths shall not exceed 36 inches.
    g. Doors shall be mounted with full length continuous heavy duty stainless steel continuous hinge with stainless steel hinge pins.
    h. Doors shall be sealed with an oil resistant gasket to seal completely around each door or opening.
    i. The Contractor shall use stainless steel fasteners throughout.
    j. The Contractor shall provide interior mounting panels and shelves constructed of minimum 12 gauge carbon steel.
    k. Interior mounting panels and shelves are to be painted white.

l. The Contractor shall provide steel print pocket. Pocket must be affixed to threaded mounting studs welded to the enclosure. Adhesive is not to be used. Paint pocket white.

m. The Contractor shall provide enclosure mounting supports as required for floor, frame, or wall mounting.

n. The Contractor shall provide all holes and cutouts for installation of conduit and equipment. Cable and piping to enter the enclosure only through the bottom unless otherwise noted. All conduit openings and all conduits shall be sealed water-tight.

o. The Contractor shall completely clean all interior and exterior surfaces so they are free of residue, oil, grease, and dirt. Provide Zinc phosphatize for corrosion protection on any exposed metal.

p. Heavy duty lifting eyes shall be provided with enclosures that have such provision.

2. In addition to the general features enclosures located inside control or electrical room areas shall meet the following requirements.

a. Enclosures shall be Type 304 or 316L stainless steel construction.

b. Enclosures shall have handle-operated, oil-tight, key-lockable three point stainless steel latching system with rollers on latch-rods for easy door closing.

c. Mfr. Model: Hoffman A48H3612SS6LP3PT (size as required), or approved equal

3. In addition to the general features enclosures located in non-climate controlled spaces shall meet the following requirements.

a. Panels shall be Type 316L stainless steel construction with a minimum thickness of 12 gauge for all surfaces (except those areas requiring reinforcement).

b. Panel shall be furnished with stainless steel screw clamp assemblies on three sides of each door.

c. Panels shall be furnished with rolled lip around three (3) sides of door and along top of enclosure opening.

d. Panels shall be furnished with hasp and staple for padlocking.

e. Panels shall be provided with a clear plastic, gasketed, lockable hinged cover to encompass all non-NEMA front of panel instruments.

f. Floor mounted enclosures shall be provided with a 3-inch high channel base assembly, with solid bottom, drilled to mate the enclosure to its floor pad.

g. Mfr. / Model: Hoffman A48H3612SS6LP (size as required), or approved equal

4. In addition to the general features, Rack enclosures for security equipment located indoors shall have the following requirements.
   a. Enclosures shall be Type 304 stainless steel
   b. Handle-operated, oil-tight, key-lockable three point stainless steel latching system with rollers on latch rods for easy door closing.
   c. Body flange through collar
   d. Horizontal mounting channels welded along interior sides at top, bottom, and center.
   e. Provide rack angle accessories so that entire interior space can be used for rack mount equipment.
   f. Bonding provision on door.
   g. Top accessory mounting channel.
   h. Provide stainless steel floor stand kit
   i. Provide clamping nut package
   j. Provide shelving and other accessories as required to securely mount all required components.
   k. Mfr. / Model: Hoffman A722424SSFSN4 with accessories, or approved equal.
5. In addition to the general features, Rack enclosures for general network equipment located indoors shall have the following requirements.
   a. Shall be industry standard, EIA-301-D rack
   b. Enclosures shall have 80% perforation on front and rear doors to maximize airflow
   c. Integrated Locks
   d. Toolless door removal
   e. Split rear doors
   f. Front door can be adjusted to swing right or left
   g. 2 piece side panels that are easy to remove
   h. Ventilated top panel
   i. Sidewall mounting spaces for PDUs
   j. UL 60950.1 and RoHS compliant
   k. Mfr. / Model: Cisco R Series, or approved equal.

C. Electrical Systems:

1. For all panels and enclosures submit heating and cooling calculations that demonstrate that the internal enclosure temperature will be maintained within required ranges.
2. Control of Environment:
    a. Indoor Panels:
        1) Shall be provided with automatically controlled closed loop ventilation fans or closed loop air conditioners with filtered air louvers if required to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the enclosure.
3. Power Source and Internal Power Distribution:
    a. General: Control panel power supply source, type, voltage, number of circuits and circuit ratings shall be as shown.
    b. Panels shall be provided with an internal 120 VAC power distribution panel with number of circuits and separate circuit breakers sized as required to distribute power to the panel components. Distribution panel shall contain two (2) spare breakers minimum.
    c. All power distribution components shall be provided with “touch safe” covers such that a technician is isolated from the risk of accidental electrical shock when working on the interior of the enclosure.
4. Wiring:
    a. Internal wiring shall be Type XHHW-2 stranded copper wire with thermoplastic insulation rated for 600 volts (V) at 185 degrees Fahrenheit (F) (85 degrees Celsius (C)) for single conductors, color coded and labeled with wire identification.
    b. For dc panel signal wiring, use No. 16 minimum AWG shielded.
    c. For ac power wiring, the Contractor shall use No. 12 minimum AWG. For ac signal and control wiring, the Contractor shall use No. 16 minimum AWG. For wiring carrying more than 15 amps, the Contractor shall use sizes required by NEC and JIC standards.
    d. Low voltage signal wiring and shielded wiring shall be separated from power and control wiring by a minimum of 6 inches.
    e. Parallel runs of wire shall be grouped or bundled using covered troughs. Maximum bundle size shall be 1 inch. Troughs shall have 40 percent spare capacity.
    f. Wire troughs along horizontal or vertical routes shall be installed to present a neat appearance. Angled runs are not acceptable.

g. The Contractor shall adequately support and restrain all wiring runs to prevent sagging or other movement.

h. The Contractor shall terminate all field wiring using forked, insulated, soldered-on connectors (crimp-on type not acceptable) at 600 V rated barrier type terminal strips with screwed connections and permanently affixed numeric identifiers beside each connection. Identifiers to be self-stick plastic tape strips with permanent type, machine printed numbers. For dc field signal wiring, terminal strips shall be capable of handling No. 12 wiring (minimum). Provide Phoenix Contact, Entrelec, or Allen Bradley terminal strips and connectors, or approved equal.

i. All wiring shall be installed such that if wires are removed from any one device, power will not be disrupted to any other device.

j. All alarms generated external to the panel, spare alarms, spare I/O and repeat contacts shall be wired out to terminal blocks.

k. For internal component-to-component wiring only, compression type terminal blocks are acceptable.

l. The Contractor shall provide spare terminals equal in number to 20 percent of the terminals used for each type of wiring (i.e., dc signal and ac power).

m. The Contractor shall provide a separate terminal for grounding each shielded cable.

n. The Contractor shall use an isolated copper ground bus bar for instrument signal cable shields or DC power grounds and a separate non-isolated cooper ground bus bar for AC power grounds. The isolated bus bar shall be connected to the non-isolated bus bar by a single #6 AWG stranded wire.

o. Where wires pass through panel walls, provide suitable bushings to prevent cutting or abrading of insulation.

p. When dc power and/or low voltage a-c power is required, the Contractor shall furnish and install the necessary power supplies and transformers in the panel.

q. The Contractor shall provide circuit breakers or fuses to protect each circuit. No more than one piece of equipment shall be powered through each breaker or fuse.

r. The Contractor shall provide complete wiring diagram showing "as built" circuitry. Diagram shall be enclosed in transparent plastic and placed in easily accessible pocket built into panel door.

s. The contractor shall NOT use any “wire nuts” or “crimp sleeves” for the purpose of creating a splice/connection in the wiring inside the control panels. No wire splices/connections of any type shall be hidden within the wire duct inside the control panels.

t. The contractor shall NOT land more than two wires upon any single termination point (wire terminal). When terminating two wires upon a terminal with a center screw and compression plate, as typically found on a relay base or an I/O module, one wire shall be placed on each side of the center screw.

u. Wire Color Coding

v. Wires shall be color coded as follows:

Line Power (120 VAC)	Black
Control Power (120 VAC)	Red
Low Voltage AC	Orange
Neutral (AC)	White
Ground	Green
Signal (DC)	Blue
Signal Common (DC)	Blue/White or gray
Signal DC Twisted Shielded Pair	Black (common) and white/red (positive signal)
Externally powered Interlocks or circuits	Yellow

w. The protection systems shall be such that the protection level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level, and be maintenance free and self-restoring.

x. Instruments shall be installed in suitable metallic cases, properly grounded. Ground wires for all surge protectors shall be connected to a good earth ground and where practical each ground wire run individually and insulated from each other. These protectors shall be mounted within the instrument enclosure or a separate junction box (compatible with the area designation) coupled to the enclosure.

y. Indicating Lights shall be color coded as follows:

1) GROUND OK = GREEN

2) LOSS OF PROTECTION = RED

3) L-N REVERSE = RED

5. Grounding:

a. Each panel mounted device shall be grounded to the AC or DC ground bus bar as appropriate by means of a #10 AWG standard wire unless otherwise noted. Grounding through the backplane is not sufficient.

b. DC power or instrumentation ground shall be isolated from the backplane prior to termination on the isolated bus bar.

c. Surge protection devices shall be independently grounded to the non-isolated bus bar by one #6 AWG stranded wire. All power devices shall be independently grounded to the non-isolated bus bar by #10 AWG stranded wire. Daisy chaining ground wires is not acceptable. Grounding to the backplane is not sufficient.

d. Each panel shall be provided with at least two (2) copper ground busses, one (1) for AC instrument power (normally 115 VAC, 60 hertz (Hz)) grounds and one (1) for DC signal grounds and cable shields. The DC ground bus must be electrically isolated from the panel board, its ground, AC power supply grounds, and incoming conduit or troughs.

e. The DC power or isolated ground bus shall be connected to the AC ground bus by means of a single #6 AWG stranded conductor. The AC ground bus for indoor panels shall be connected to the buildings grounding system by means of an independently run #2 AWG cooper ground wire. The AC ground bus for outdoor panels shall be connected to a ground rod installed within twenty (20) feet of the panel by means of an independently run #2 AWG copper ground wire.

f. Ground buses shall be minimum 1/4 inch x 1 inch x 8 inches minimum with (#2/0) AWG lugs for connection to the site's grounding system. These grounding buses shall be predrilled for connection of instrument, panelboard, or cable shield connection.

g. When panel or field wiring for electronic instruments is specified shielded, a shield terminal shall be provided for each control loop at the terminal strip connection to and from field instruments. Each shield shall be grounded at one (1) point only, and this ground connected to the DC ground bus in the panels.

h. Ground wiring for surge protection must be kept as short as possible and sharp bends must be kept to a minimum.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall install equipment in conformance with NEC.

B. Unless otherwise noted, the Contractor shall install indoor panels on 4-inch concrete pad. Extend pad 4 inches beyond outside dimensions of base, all sides. Lay grout after panel sills have been securely fastened down.

C. The Contractor shall install anchor bolts and anchor in accordance with Specification 05092 – Metal Fastening. The Contractor shall install and interconnect all equipment, devices, electrical hardware, instrumentation and

controls and process controller components into, out of, and among the enclosures as indicated on the Contract Drawings.

3.02 TESTING AND ADJUSTMENTS

A. The Contractor shall perform system testing and make any adjustments necessary in accordance with this Section and Detailed Specification 17403G – Network Security and CCTV Site Monitoring and Control System – Start-Up and Field Testing.

B. The Contractor shall perform power supply, voltage adjustments to tolerances required by the appurtenant equipment.

END OF DETAILED SPECIFICATION

SPECIFICATION 17430
NETWORK SECURITY AND SECURITY PANEL MOUNTED INSTRUMENTS AND DEVICES

Note: Detailed Specification 17430 – Network Security and Security Panel Mounted Instruments and Devices has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 17430.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Scope:

1. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate, test, adjust and place into satisfactory operation security panel instruments and devices.
2. The Contract Drawings and Specifications illustrate and specify functional and general construction requirements of the panel components and do not necessarily show or specify all components, wiring and accessories required to make a completely integrated system. The Contractor shall provide all wiring, accessories and labor required for a complete, workable and integrated system.
3. Coordination: The Contractor shall coordinate the installation of all items specified herein and required to ensure the complete and proper interfacing of all the components and systems.
4. An index of the Articles in this Specification is presented herein for the convenience of the Contractor.

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 01330 – Shop Drawings Submittal and Approval.

B. Detailed Specification 17403G – Network Security and CCTV Site Monitoring and Control System – Start-Up and Field Testing

C. Detailed Specification 17420G – Network Security and CCTV Control Panels and Enclosures

1.03 REFERENCES

A. ISA – International Society of Automation, previously known as The Instrument Society of America

B. JIC – Joint Industrial Council Standards.

C. NEC – National Electrical Code.

D. NEMA – National Electrical Manufacturer's Association Standards.

E. ASTM – American Society for Testing and Materials.

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K. UL – Underwriters' Laboratories, Inc.

L. State and Local code requirements.

M. Where any conflict arises between codes or standards, the more stringent requirement shall apply.

1.04 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.05 QUALITY ASSURANCE

A. General

1. Panels shall be furnished by a single Supplier who shall assume responsibility for providing a complete and integrated system including fabrication, installation, factory and field testing, and training.
2. All equipment, components, and material required shall be furnished by a single Supplier for each system who shall assume the responsibility for adequacy and performance of all items.
3. The Supplier shall identify those system components which are not of his manufacture.
4. The Supplier shall submit his company's quality assurance plan, in accordance with ISO 9001 Standards and for components which are not of his manufacture, the component manufacturer's quality assurance plan. The plans shall include but not necessarily be limited to: method of testing, raw

material criteria, methods of documentation, station control, "Burn-In", final tests, and serialization coding and packaging.

B. Operating Experience

1. Contract Documents included herein have been designed to meet stringent quality standards. The City and the Engineer have selected a designed panel building requirements necessary to meet these stringent quality criteria limitations. The criteria for selection of this system includes, but is not limited to, the following:
   a. The use of standard, "non-custom" equipment and application software.
   b. The use of standard non-proprietary network protocols
   c. The ability of the City's personnel to make modifications and adjustments in the field to react to actual field conditions.
   d. The ability of the City to obtain training of the City's personnel in well-established equipment training program.
   e. The availability of factory service and a well-stocked spare parts inventory which could be drawn upon by the City in an emergency situation.

C. Standards, Codes and Regulations:

1. Construction of panels and the installation and interconnection of all equipment and devices mounted within shall comply with applicable provisions of the following standards, codes and regulations:
   a. ISA – International Society of Automation, previously known as The Instrument Society of America
   b. JIC – Joint Industrial Council Standards.
   c. NEC – National Electrical Code.
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l. State and Local code requirements.

m. Where any conflict arises between codes or standards, the more stringent requirement shall apply.

2. All materials and equipment shall be new and all panels shall be built in an Underwriters Laboratory (UL), Inc. approved panel shop and bear the UL label.

D. Acceptable Manufacturers:

1. The Contractor shall furnish instruments and devices by the named manufacturers or equal equipment by other manufacturers.

2. The named manufacturers have been specified to establish the standard of quality and performance of the equipment to be supplied.

3. The Contractor shall obtain all instruments or devices of a given type from the same manufacturer.

E. Manufacturers' Responsibilities and Services shall include:

1. The Contractor shall retain the supplier to assume the responsibilities specified below. However, execution of these specified duties by the system supplier shall not relieve the Contractor of the ultimate responsibility for the Kensico Lab Building systems.

a. Design, fabrication, implementation, and application programming for the system in accordance with the Contract Documents and all referenced standards and codes.

b. Preparation, assembly, and correction of all submittals in accordance with Contract Documents.

c. Proper interfacing of hardware, software, field devices, and panels, including required interfacing with packaged control systems furnished by other equipment suppliers, and with the Kensico Lab Building and associated facilities' electrical system.

d. Supervision of the installation of the panels, consoles, cabinets, wiring, and other components required.

e. Calibration, testing, and startup of each system.

f. Training of the City personnel in operation and maintenance of the system.

g. Handling of all warranty obligations for the system components.

2. Field supervision, inspection, start-up and training in accordance with the requirements of Detailed Specifications 17403G – Network Security & CCTV Site Monitoring and Control System - Start-Up and Field Testing.

F. Instruments and devices shall not be assembled in the panels until all product information and system shop drawings for respective components have been approved.

1.06 SUBMITTALS

A. The Contractor shall submit working drawings, shop drawings and material specifications for all equipment and work Contractor shall provide for the review and approval of the Engineer in accordance with the requirements of the General Conditions, Article 4 - Contractor's Working Drawings, Design and Shop Drawings and Detailed Specification 01330 – Shop Drawings Submittal and Approval.

B. All Working Drawings shall include, but not be limited to:

1. Equipment specifications and data sheets identifying all equipment and materials used and methods of fabrication.
2. Complete assembly and layout drawings with clearly marked dimensions, including final architecture drawings.
3. Equipment cross-sections and mounting details.
4. Weights of all component parts, assembled weight of units and approximate total shipping weights.
5. Interconnecting wiring diagrams.
6. List of spare parts.
7. List of special tools.
8. Storage instructions.
9. Installation instructions.
10. Operation and maintenance manuals; manuals for programming and operating the systems, panels, and related components.
11. Configuration data, operating system to be used, and listing of software to be loaded.
12. Manufacturer's data on the components.
13. One-line diagram of the panel configuration proposed for this Contract. Submittals indicating typical riser diagrams are not acceptable.
14. Accurate as-built drawings shall be furnished by the Contractor to aid the City.
15. Sequence of operation shall be clearly indicated.

C. Contractor Qualifications

1. Submit the qualifications of the System Integrator demonstrating required qualifications.

1.07 ENCLOSURES

A. Panel enclosures shall be in accordance with Detailed Specification 17420G – Control Panels and Enclosures.

1.08 IDENTIFICATION TAGS

A. All panel instruments and devices shall have an identification tag meeting the following requirements:

1. Tag numbers shall be as listed in the Instrument Index.
2. Identifying tag number shall be permanently etched or embossed onto a stainless steel tag which shall be fastened to the device housing with stainless steel rivets or self-tapping screws of appropriate size.
3. Where neither of the above fastenings can be accomplished, tags shall be permanently attached to the device by a circlet of 1/16-inch diameter stainless steel wire rope.
4. All instruments and devices mounted within panels shall have the stainless steel identification tag installed so that the numbers are easily visible to service personnel. Front of panel mounted components shall have the tag attached to the rear of the device.
5. Front of panel mounted components shall have nameplates which comply with the requirements specified in Detailed Specification 17420G – Control Panels and Enclosures.

1.09 DEVICE MOUNTING

A. All panel mounted instruments and devices shall be mounted to the back panel using machine screws that are threaded into tapped holes.

1. No machine screw nuts shall be treaded onto the screws from the back of the panel.
2. No plastic rivets shall be used to mount devices to the back panel.
3. No adhesive backed wire ties or mounts shall be used to secure wiring or mount devices.

B. Exposed circuit boards shall be installed with protective covers.

1. Exposed circuit boards shall be mounted above other equipment and as near to the top of the panel as is practical. The goal is to minimize potential contact with the boards.

2. Boards shall be mounted on standoffs and electrically separated from the standoffs by rubber or nylon spacers. Boards that are designed to use the mounting points for electrical grounding shall be grounded by an appropriately sized grounding wire from the mounting points to the panel bus bar.
3. Boards shall be covered such that they are protected from accidental impacts from all sides (for example, from a dropped tool). Protective covers shall allow for heat dissipation and quick removal for access to wire terminals.
4. Where exposed circuit boards are the only components in an enclosure the enclosure itself shall be deemed sufficient to provide protection.
5. Protective covers shall not be required where there are no components above, beside, or within 6 inches below the exposed circuit boards.

C. Where more than one system is serviced by a single panel, equipment servicing the same system shall be grouped and mounted near each other in the panel. Intermixing components from different systems within the panel is not acceptable. Indicate in the submittal the areas designated for each system.

1.10 TAMPER DETECTION

A. All enclosures shall have a tamper switch mounted as to detect when the enclosure door is opened. Signals shall generally be routed to the Security and Access Control System.

PART 2 PRODUCTS

2.01 POWER SUPPLY - LENEL SYSTEM ONLY

A. Type: Regulated DC power supply.

B. Current rating: Power supply sizing by panel supplier; load calculations shall be submitted to the Engineer for approval. More than one power supply may be required per panel.

C. Input voltage: 120 VAC, 60 Hz single phase.

D. Output voltage: 12 VDC

E. Mounting: Wall-mount style (for mounting inside control panel).

F. Load protection: Overvoltage protection.

G. Overload/Short Circuit Protection

H. Operating temperature: 0°C to 49°C

I. Mfr. / Model: Altronix AL400ULXB2, or approved equal.

2.02 POWER SUPPLY – OTHER THAN LENEL

A. Type: Redundant Linear regulated DC power supply

B. Current rating: Power supply sizing by panel supplier; load calculations shall be submitted to the Engineer for approval.

C. Input voltage: 120 VAC, 60 Hz single phase.

D. Output voltage: 12 or 24 VDC normal mode as required; second backup power supply will be set to 0.2 volts less than the main power supply

E. Integration module to include diode module, ac input switches, output LEDs, and failure alarm circuits

F. Mounting: Wall or DIN rail mount (for mounting inside control panel).

G. Load protection: Overvoltage protection.

H. Overload/Short Circuit Protection

I. Operating temperature: -20°C to 71°C

J. Mfr. / Model: Acopian Modular Redundant System RM12M13 (12VDC) or RM24M13 (24VDC), or approved equal. Size power output as required to provide minimum 50% headroom.

2.03 RELAYS - POWER

A. Function: Control power to external devices

B. Coil voltage: 120VAC or 24VDC

C. Contact rating: 16 A non-inductive

D. Interrupting Rating: Minimum 10 A at rated voltage

E. Contact type & quantity: 1PDT

F. Mounting: DIN rail relay base

G. Features: Coil energized indicator light

H. Service Life: $1x10^7$ cycles

I. Approvals: UL.

J. Mfr. / Model: IDEC RH series, Phoenix Contact REL-MR HC series, or approved equal

2.04 RELAYS – INTERPOSING OR SIGNAL

A. Function: Control or Isolation

B. Coil Voltage: 120VAC or 24VDC

C. Contact Rating: 6A

D. Interrupting Rating: Minimum 5A at rated voltage

E. Contact type & quantity: DPDT

F. Mounting: DIN rail relay base

G. Features: Coil energized indicator light

H. Service Life: $2x10^7$ cycles

I. Approvals: UL

J. Mfr. / Model: IDEC RH series, Phoenix Contact REL-MR series, or approved equal

2.05 ENCLOSURE LIGHTING

A. Provide LED lighting kits for all control enclosures as required in Detailed Specification 17420G – Control Panels and Enclosures. Lighting kit supply voltage shall be 115 VAC, 60 hertz with terminal block for electrical connections. Lighting kits shall use remote mounted door activated switch. LED strip length shall be two foot long where practical. Provide rigid metal construction with heavy duty mounting bracket and lens protector for bulb.

B. Manufacturers: Hoffman Engineering Company, or approved equal.

2.06 GROUND FAULT INTERRUPT (GFI) RECEPTACLE

A. 15 Amp duplex GFI receptacle.

B. Protect with max 5 Amp breaker.

C. Manufacturers:

1. Grace Engineered Products Inc.
2. Phoenix Contact
3. Hubble –Wiring Device Kellems
4. Or approved equal

2.07 CIRCUIT BREAKERS

A. Type: In general, provide circuit breakers for control panel circuit protection where possible in lieu of fuses and fuse holders.

B. Rating: Provide UL listed supplementary protectors for general control enclosure circuit protection applications up to 30 Amperes.

C. Provide circuit breakers as indicated on the project drawings and as required to make a complete project. The main power circuit breaker shall be able to be used as a disconnecting means.

D. Identification: Identify each circuit breaker with a permanent machine printed marking in accordance with the wiring diagrams shown on the project drawings or as submitted to uniquely identify all components.

E. Spares: Provide 10% (rounded up) installed spare circuit breakers in each enclosure for each type used on the panel.

F. Manufacturer: Square-D Series QOU, Allen Bradley, or approved equal.

2.08 FUSES

A. Type: All fuses shall be sized per NEC Code, in accordance with equipment manufacturer's recommendations, and as required for the application.

B. Rating: Provide midget fuses, rated 300 VAC or higher.

C. Spares: Provide 10% (rounded up, minimum one full box) installed spare fuses in each enclosure for each type used on the panel.

D. Manufacturer: Bussman, Littlefuse, or approved equal.

2.09 FUSE HOLDERS

A. Type: Provide DIN rail mount fuse holders with blown fuse indication.

B. Rating: Provide midget enclosed fuse holders for general control enclosure fuse applications up to 30 Amperes.

C. Provide fuse holders as indicated on the project drawings and as required to make a complete project. The fuse holders shall be able to be used as a disconnecting means.

D. Identification: Identify each fuse holder with a permanent machine printed marking in accordance with the terminal fuse block number shown on the project drawings.

E. Spares: Provide 10% (rounded up) installed spare fuse holders in each enclosure for each type used on the panel.

F. Manufacturer: Marathon, Phoenix Contact, Weidmuller, Square-D, Allen Bradley, Siemens, or equal.

2.10 TERMINAL BLOCKS

A. Type: Terminal blocks shall be provided for all external connections. The spare points shall be so arranged that each series of blocks in a given area shall have a reasonable proportion of the spare points. Each spare input/output point shall be wired to identified terminal blocks for connections.

B. Rating: Terminal blocks shall be rated for 600 volts, 30 amperes, barrier-type screw terminals. No more than two wires shall be connected to any one terminal. Electrical power, control and alarm wiring shall be terminated in terminal block assemblies separate and apart from terminal blocks used for analog signal wiring. Splices are NOT permitted in control panels, all wiring shall terminate on terminal blocks.

C. Terminal blocks shall be furnished with compression terminals. Where possible, solderless spade tongue connectors with insulating sleeves shall be used for connecting wires to terminal blocks. Terminal blocks shall be furnished with barrier end blocks so that no metal (conducting) portion of the terminal block is exposed at the end of each series of terminal blocks. Terminal blocks shall be furnished with terminal strip end clamps so that each series of terminal block is held tightly on the DIN rail.

D. Identification: Each terminal shall be identified by a suitable engraved or painted wire number on the marking strip attached to the block.

E. Spares: Provide 20% (rounded up) installed spare terminal blocks in each control panel for each type of terminal block provided on the panel.

F. Manufacturer: Marathon, Phoenix Contact, Weidmuller, Square-D, Allen Bradley, or approved equal.

2.11 WIRE DUCT

A. Type: Wires shall be run in open slot vinyl wire duct with covers.

B. Rating: AC wire duct shall be gray and labeled with "AC" and DC wire duct shall be white and labeled with "DC".

C. Wire duct shall be held to the back plate with round head machine screws and washers. Wire duct shall be filled no more than 75%. Where it is not practical to use wire duct, wire ties shall be used to bundle the wires together in a neat and professional manner. Wires must be affixed to fixed points within the panel at intervals of no more six (6) inches such as to limit the movement and shifting. Adhesive backed wire mounting points are not permitted.

D. Manufacturer: Panduit, Thomas & Betts, or approved equal.

2.12 ANALOG SIGNAL AND DATALINE SURGE PROTECTOR

A. Construction:

1. All RS-485 standard interface data communication surge protectors are to be ANSI/IEEE C62.41 category A3 rated and series connected.
2. Performance Specifications @ 28V L-G and 25 degrees C:
    a. Provide heavy-duty, multi-staged protection.
    b. Surge Life (10/1000 micro-Second): >100 operations with 200 Amps.
    c. Surge Life (8/20 micro-Second): >10 operations with 10,000 Amps.
    d. DC Leakage Current at Rated L-G Voltage: >10 micro-Amps.
    e. Signal/Data Attenuation at Maximum Data Rate : 3dB with 600 Ohm termination.
    f. Operating Temperature Range: -40 to 60 Degrees C.
    g. Response Time: 50 pico-Seconds.
    h. Maximum Data Rate: 4 MHz.
    i. Peak Clamping Voltage (8/20 micro-Second, 5000 Amps): L-L 55 Volts.
    j. Peak Clamping Voltage (8/20 micro-Second, 1000 Amps): L-L 45 Volts.
    k. Load Current: 150 mA.
    l. Series Resistance: 22 Ohms.

B. Manufacturers:

1. Phoenix Contact: PT 1x2-24VDC-ST or PT 2x2-24VDC-ST
2. Bourns, 1800 Series
3. Ditek
4. Or approved equal

2.13 NAMEPLATES

A. All nameplates shall conform to ISA Recommended Practice publication ISA-RP60.6

B. Construction

1. Nameplates shall be used to display basic information including function.
2. Letters shall be gothic upper case (capital letters), minimum height shall be 1/8 inch with a 3/64 inch space between lines.
3. Nameplates shall be made of laminated engraving stock having a black core with a white surface.
4. The characters shall be engraved using an industry standard engraving machine.
5. Nameplates shall be attached to the enclosure using double-faced pressure-sensitive tape. Where the environment is not conducive to tape i.e. outdoors, NEMA 4, 4X, and 3R environments stainless steel screws shall be used in place of the tape.
6. Enclosure identification nameplates shall be larger sized letters, 3/16 inch minimum.
7. Abbreviations shall conform to appendix B of ISA Recommended Practice publication ISA-RP60.6.
8. Margins shall conform to the following:
   a. With holes
      1) Top/bottom - 1/16" min
      2) Sides left/right - 5/16" min
   b. Without holes
      1) Top/bottom - 1/16" min
      2) Sides left/right - 1/8" min

2.14 LEGEND PLATES

A. All legend plates shall conform to ISA Recommended Practice publication ISA-RP60.6

B. Construction

1. Legend plates shall be used to display basic functions of push buttons, selector switches and pilot lights.
2. Letters shall be gothic upper case (capital letters), minimum height shall be 1/8 inch with a 3/64 inch space between lines.
3. Legend plates shall be made of laminated engraving stock having a black core with a white surface.
4. The characters shall be engraved using an industry standard engraving machine.
5. Legend plates shall be held to the enclosure by the ring nuts used to hold the operator in place.
6. All legend plates for a particular panel shall be of the same size and shape.
7. Standard Selector Switch legends shall include: (1) Local/Off/Remote; (2) Close/Hold/Open; (3) Normal/Override.
8. Standard Push Button legends shall include: (1) Emergency Stop/Lock Out

2.15 WIRE MARKERS

A. All wire markers & tags shall conform to ISA Recommended Practice publication ISA-RP60.6

B. Construction

1. Each wire shall be identified on both ends of the wire with heat shrink, thermal transfer tube type wire markers. Do not heat-shrink to cable, leave loose for accessing cable ID number.
2. Adhesive labels are not acceptable.
3. The wire markers shall be white with black lettering. Hand marking of the label is not acceptable.
4. The wire marker number shall be a unique number, incorporates the instrument / equipment tag number if applicable, shall be easily cross referenced with schematic drawings, and shall have the same number on both sides of the wire.

C. Manufacturers

1. Brady
2. Or approved equal

2.16 ADHESIVE LABELS

A. All labels shall conform to ISA Recommended Practice publication ISA-RP60.6

B. Construction:

1. Adhesive labels shall be used inside the panel to identify equipment.
2. The labels shall be smudge proof and shall have an adhesive back. The printing on the labels shall be done by mechanical means only.

2.17 SPARE PARTS AND TEST EQUIPMENT

A. The Contractor shall furnish and deliver the spare parts and test equipment as outlined below, all of which shall be identical and interchangeable with similar parts furnished under this Detailed Specification.

B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.

C. The following shall constitute the minimum spare parts:

1. One (1) of each type of input-output relay.
2. One (1) replacement power supply for each type and size furnished for this Contract.
3. Ten percent (10%) rounded up, but no fewer than two, of each type of panel mounted instrument including lights, pushbuttons. Round spare to the nearest whole number (e.g., 2.5 spares becomes 3 spares, 2.4 spares becomes 2 spares).
4. One dozen (12) of each type and size of fuse used in panels and instruments.

D. All spare parts shall have been operated and tested in the factory as part of factory testing prior to shipment of the control system.

E. The Contractor shall provide all of the individual manufacturer's recommended tools for all equipment specified herein. The Contractor shall include a concise list detailing the manufacturer recommended tools with the initial submittal and include the manufacturer literature where tooling is recommended.

F. The Contractor shall provide a minimum of 10% spare parts (rounded up) or the individual manufacturer's recommended spare parts, whichever is greater, for all

equipment specified herein. The Contractor shall include a concise list of the spare parts with the initial submittal and include manufacturer literature where spare parts are recommended.

G. The Contractor shall provide a minimum of 20% spare parts (rounded up) or the individual manufacturer's recommended spare parts, whichever is greater, for all patch cables required for installation. The minimum number of spare patch cables to be provided is three (3). The manufacturer shall include a concise list of the spare cables with the initial submittal and include manufacturer literature where spare cabling is recommended.

H. Where other Specifications may indicate a different count of spare parts, the greater number shall apply.

I. Spare parts for panels and enclosures shall be according to Detailed Specification 17420G – Control Panels and Enclosures.

J. Spare parts and special tools shall be provided in accordance with the requirements of the General Conditions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install each item in accordance with manufacturer's recommendations and in accordance with the Contract Documents.

B. All items shall be mounted and anchored in compliance with Detailed Specification 17420G – Control Panels and Enclosures.

3.02 Start-Up, Calibration, and Testing and Training

A. Comply with the requirements of Detailed Specification 17403G – Site Monitoring And Control System – Start-Up And Field Testing.

- END OF DETAILED SPECIFICATION -

NO TEXT ON THIS PAGE

SPECIFICATION 17440
NETWORK SECURITY AND CCTV ACCESS CONTROL AND INTRUSION ALARM SYSTEM

Note: Detailed Specification 17440 – Network Security and CCTV Access Control and Intrusion Alarm System has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 17440.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Section includes specifications for an integrated security access control and intrusion alarm system, which shall perform the following general services:

1. Activate the system
2. Authenticate users
3. Control access
4. Identify intrusion
5. Notification of alarms
6. Interface with other security related equipment as indicated in the Specifications and Contract Drawings.

B. The Section includes specifications for an integrated security access control and intrusion alarm system, which Provides all labor, materials, supervision, equipment, and incidentals as shown, specified, and required to furnish, configure, install, test, startup, and place in to satisfactory operation the Security Access Control and Intrusion Alarm System as described herein and as indicated on the Contract Drawings. Contractor shall provide services of a Security Systems Integrator who shall:

1. Produce a fully functional access control security system.

C. An index of the Articles in this Specification is presented hereinafter for the convenience of the Contractor.

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 01270 - Measurement and Payment

B. Detailed Specification 01330 - Shop Drawing Submittal and Approval

C. Detailed Specification 01821 - Equipment Start-Up and Training

D. Detailed Specification 01831 - Operation and Maintenance Manuals

E. Detailed Specification 17403G – Network Security and CCTV Site Monitoring and Control System – Start-Up and Field Testing

F. Detailed Specification 17420G – Network Security and CCTV Control Panels and Enclosures

G. Detailed Specification 17430G – Network Security and CCTV Panel Mounted Instruments and Devices

1.03 REFERENCES

A. The following organizations have generated standards that are to be used as guides in assuring quality and reliability of components and systems; govern nomenclature; define parameters of configuration and construction, in addition to specific details in this Specification and the Contract Drawings:

1. UL - Underwriters' Laboratories, Inc.
2. NEMA - National Electrical Manufacturers Association.
3. OSHA - Occupational Safety and Health Administration.
4. ANSI - American National Standards Institute.
5. NFPA - National Fire Protection Association.
6. JIC - Joint Industrial Council.
7. IEEE - Institute of Electrical and Electronics Engineers.
8. NEC - National Electrical Code.
9. FM - Factory Mutual.
10. FCC - Federal Communications Commission.

1.04 PAYMENT

A. There shall be no separate payment for the work under this Section.

1.05 SYSTEM DESCRIPTION

A. The System shall be integrated with the existing NYC-DEP access control and security system. NYC-DEP Bureau of Police and Security (BPS) has standardized DEP's security equipment and controllers on brand specific components (LENEL Brand) for compatibility among the multitude of DEP sites secured by BPS. Unless explicitly stated in the Contract Documents, Lenel Brand Components have been specified with no equal.

B. The Security Access Control and Intrusion Alarm System shall be designed and developed to International Standards ISO 9001 for Quality Assurance. It shall be comprised of the following systems:

1. Access Control System
2. Intrusion Detection System

C. The Security Access Control and Intrusion Alarm System Installation for each area shall consist of a security system controller, proximity card readers/keypads, magnetic door contacts, request-to-exit sensors, electric door strikes, and all related power supplies, wiring and accessories as well as any and all network equipment to provide a complete and functional system. The Installation must be integrated with the existing Lenel-based access control and security system currently in use by the NYC-DEP.

1. Provide a complete installation for the Kensico Lab Building.
2. All enclosures and panels must met the requirements of Detailed Specification 17420G – Security Control Panels and Enclosures and Detailed Specification 17430G – Security Panel Mounted Instruments and Devices.
3. The system shall monitor access to all entrances. Provide switches for all of the doors that serve as entrances to the interior spaces. Provide a switch for each door/hatch as shown on the Contract Drawings.
4. The system shall provide for card reader access to open the Entrance Doors to the Kensico Lab Building.
5. The system shall provide a command keypad inside the Kensico Lab Building to activate and deactivate the intrusion alarm system. An indicator shall be provided to alert the user to the status of the system as described in the Sequence of Operation.

6. The Installation shall be capable of supporting multiple alarm inputs and control outputs.
7. The system shall include dry contact output points to communicate the following status to DEP's existing Lenel Server system:
   a. Authorized Entry
   b. Unauthorized Entry
8. When an alarm occurs the system shall:
   a. Communicate the alarm back to the Lenel server via Ethernet and two(2) backup plain old telephone system (POTS) lines.
      1) One POTS line to connect to dial-up backup modem
   b. Other POTS line to be RJ-11 terminated and left disconnected next to the dial-up backup modem. Send an alarm to DEP's Lenel server as shown on the Contract Drawings. Interposing relays must be used.
9. The Installation shall be connected to a ethernet and 2 POT lines from the utility and shall be programmed to communicate with the existing Lenel security system. In the event of an Ethernet communications failure, each security controller shall communicate over two redundant POTS lines.
10. All components must be supervised with end-of-line resistors.
11. All equipment shall receive backup power from an uninterruptable power supply (UPS). The UPS shall be able to communicate with the security system both via Ethernet and by a contact point hardwired to the security system. The Ethernet communications must allow for SNMP remote monitoring of the UPS unit. The hardwired contact shall provide indication of an AC power loss to the Security Access Control and Intrusion Alarm System. The UPS should provide no less than (6) hours of battery operation for each Installation.

1.06 DESCRIPTION OF WORK

A. The Contractor shall include all necessary labor, tools, equipment, and ancillary materials required to furnish and install and program a complete and operational Security Access Control and Intrusion Alarm System.

B. The extent of the Security Access Control and Intrusion Alarm Installation work is defined to include, but not by way of limitation:

1. Enclosure, system controller, input cards, output cards, door contacts, card readers/keypads, door strikes, etc. with all accessories, hardware, and software.

2. Conduits, wiring, raceway supports, power supplies, switches, transformer, relays, and ancillary equipment.

C. All required elements for a complete fully operational intrusion access control and intrusion detection system integrated into the DEP's existing Lenel based system to the satisfaction of owner.

1. Requirements are indicated elsewhere in these Specifications for work including, but not limited to, raceways, electrical boxes, and fittings required for installation of control equipment and wiring that shall be furnished and installed by the Contractor.
2. System configuration and operation for a complete system is detailed in the Contract Drawings and Specifications.

D. All panels are to have tamper switches that are connected back to the Lenel system. This includes, but is not limited to, all electrical and control panels that power or interconnect with the security system.

1.07 SUBMITTALS

A. The Contractor shall submit working drawings, shop drawings and material specifications for all equipment and work Contractor shall provide for the review and approval of the Engineer in accordance with the requirements of the General Conditions and Section 01330 – Shop Drawings Submittal and Approval.

B. All Working Drawings shall include, but not be limited to:

1. Equipment specifications and data sheets identifying all equipment and materials used and methods of fabrication.
2. Complete assembly and layout drawings with clearly marked dimensions, including final security system network architecture drawing.
3. Equipment cross-sections and mounting details.
4. Weights of all component parts, assembled weight of units and approximate total shipping weights.
5. Interconnecting wiring diagrams.
6. List of spare parts.
7. List of special tools.
8. Storage instructions.
9. Installation instructions.

10. Operation and maintenance manuals; manuals for programming and operating the Security Access Control and Intrusion Alarm System and its related components.
11. Configuration data, operating system to be used, and listing of software to be loaded.
12. Manufacturer's data on the Security Access Control and Intrusion Alarm System and components.
13. Dimensioned floor plan drawings of the Security Access Control and Intrusion Alarm System and all associated accessories including the autodialer and magnetic reed switches for door, clearly indicating location, direction, and model number for each element of the system.
14. One-line diagram of the system configuration proposed for this Contract. Submittals indicating typical riser diagrams are not acceptable.
15. Accurate as-built drawings shall be furnished by the Contractor to aid the City. These shall indicate the door(s) each controlled by a magnetic reed switch and any relay outputs or special inputs into the system.
16. Sequence of operation shall be clearly indicated.

C. Contractor Qualifications

1. Submit the qualifications of the System Integrator demonstrating required qualifications.

1.08 SPARE PARTS AND SPECIAL TOOLS

A. The Contractor shall provide all of the individual manufacturer's recommended tools for all equipment specified herein. The Contractor shall include a concise list detailing the manufacturer recommended tools with the initial submittal and include the manufacturer literature where tooling is recommended.

B. The Contractor shall provide a minimum of 10% spare parts (rounded up) or the individual manufacturer's recommended spare parts, whichever is greater, for all equipment specified herein. The Contractor shall include a concise list of the spare parts with the initial submittal and include manufacturer literature where spare parts are recommended.

C. Provide 20% spare I/O (rounded up, minimum 2) for each I/O type in each of the security system panels.

D. Where other Specifications may indicate a different count of spare parts, the greater number shall apply.

E. Spare parts for panels and enclosures shall be according to Detailed Specification 17420G– Control Panels and Enclosures and Detailed Specification 17430G – Panel Mounted Instruments and Devices.

F. Spare parts and special tools shall be provided in accordance with the requirements of the General Conditions.

1.09 QUALITY ASSURANCE

A. All materials and equipment furnished shall be new, free from defects, and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of these products.

B. Where there is more than one item of similar equipment required under the Contract, all such similar equipment shall be the product of one manufacturer.

C. All material furnished under this Contract shall be determined safe by either Underwriter's Laboratories, Inc. or Factory Mutual Engineering Corporation and all material shall be labeled, certified or listed by the testing agency.

D. Custom made equipment or related installation, which is constructed specially for this Project, will not be acceptable. Equipment furnished within this Contract shall be a standard product furnished by a supplier regularly engaged in the manufacture of such products.

E. Manufacturer of products defined in this Section shall have:

1. Industry experience: Company must have at least 5 years experience in manufacturing and serving access management systems.

F. Security System Integrator shall have the following qualifications.

1. Lenel Enterprise Value Added Reseller
2. Over ten years of relevant experience
3. Financially stable with over $15,000,000 in business over the past 5 years
4. Maintains a 24 hours-a-day, seven days-a-week support department
5. Retains in-house certified technicians

1.10 WARRANTY

A. The Contractor shall provide standard manufacturer's warranty for all devices for a period of one (1) year after start-up and City acceptance.

1.11 O&M MANUAL

A. Submit Operations and Maintenance manuals in accordance with section 01831 – Operation and Maintenance Manuals.

PART 2 PRODUCTS

2.01 NETWORK

A. The LAN shall use standard network cables, see Detailed Specification 17430G – Panel Mounted Instruments and Devices for networking equipment. Acceptable cable types are as shown in the Specification and Contract Drawings and include CAT6, and fiber optic cables.

2.02 SYSTEM CONTROLLER

A.	Main Power Input:	12VDC ± 15%
B.	Card reader/keypad support:	Wiegand Data1/Data0 readers/keypads
C.	Event buffer:	50,000 events
D.	Number of Cardholders:	500,000
E.	Inputs:	4-State each programmable as normally open or normally closed, supervised or unsupervised circuits
F.	Support:	Bioscrypt RS-485, two 1-Form-C relays (5A at 24 VDC), three 1-Form-A relays (1A at 24 VDC)
G.	Encryption:	AES 128-bit
H.	Communications:	10/100Base-T Ethernet, support for POTS modem

I.	Operating temperature:	0°C to 70°C
J.	Operating Humidity:	10% to 95% non-condensing
K.	Mfg. / Model No.:	Lenel LNL-3300 Security Series Panels

2.03 DUAL READER

A.	Main Power Input:	12 or 24 VDC ±15%, 500 mA
B.	Main Power Input:	12 or 24 VDC ±15%, 500 mA
C.	Formats:	Support for up to 16 different formats (8 card formats and 8 asset formats)
D.	Operating temperature:	0°C to +70°C
E.	Encryption:	Advanced Encryption Standard (AES) 128-bit algorithm for communications
F.	Support:	Data1 / Data0, Clock/Data, and Lenel OSDP-compatible RS-485 readers and keypads
G.	Wiring:	a. Reader – 6 wire, #22 b. Monitor Switch – 2 Wire, #18 c. Request-to-Exit – 2 Wire, #18 d. Lock Set – 3 Wire, #22 e. Module Mfg. / Model No.: Belden 558AFJ or approved equal.
H.	Outputs:	4 Form-C relay outputs, 5A at 28VDC
I.	Module Mfg. / Model No.:	Lenel LNL-1320 Series 2, or approved equal Lenel Brand Product.

2.04 INPUT CONTROL MODULE

A.	Communication:	RS-485 multidropped

B.	Line supervision:	Grade B, A, and AA line supervision, variable resistor values
C.	Input voltage:	12 or 24 VDC ±10%
D.	Input contacts:	16 programmable supervised or non-supervised contacts
E.	Terminations:	On-board termination jumpers
F.	Status indication:	Status LED for host communications and heartbeat
G.	Operating temperature:	0°C to 70°C
H.	Operating humidity:	10% to 95% non-condensing
I.	Operating temperature:	0°C to 70°C
J.	Wiring:	a. Monitor Switch– 2 wire, #18 b. Tamper Switch– 2 wire, #18 c. Module Mfg. / Model No.: Belden 8208 or approved equal.
K.	Mfg. / Model No.:	Lenel LNL-1100 Series 2, or approved equal

2.05 OUTPUT CONTROL MODULE

A.	Communication:	RS-485 multidropped
B.	Input voltage:	24 VDC
C.	Output contacts:	16 Form-C 5A, 30 VDC relay contacts for load switching
D.	Terminations:	On-board termination jumpers
E.	Status indication:	Status LED for host communications and heartbeat
F.	Operating temperature:	0°C to 70°C

G.	Operating humidity:	10% to 95% non-condensing
H.	Mfg. / Model No.:	Lenel LNL-1200 Series 2, or approved equal Lenal Brand product

2.06 CARD READER INTERFACE

A.	Communication:	RS-485 multidropped
B.	Card support:	Wiegand Data1/Data0 readers/keypads, bicolor reader status LED support, offline reader access mode
C.	Door monitoring:	Door contact supervision, request-to-exit push-button monitor, strike control output
D.	Input voltage:	24 VDC
E.	Output contacts:	6 Form-C 5A, 30 VDC relay contacts
F.	Terminations:	On-board termination jumpers
G.	Status indication:	Status LED for host communications and heartbeat
H.	Operating temperature:	14° to 158°F
I.	Operating humidity:	10% to 93% non-condensing
J.	Mfg. / Model No.:	Lenel LNL-1320 Series 2, or approved equal Lenal Brand product

2.07 SURFACE MOUNT DOOR CONTACTS

A. Epoxy Sealed

B. Armored cable

C. Gap up to 1”

D. Form A contact 110V AC/DC

E. Supervision end of line resistor

F. Mfg. / Model No.: 1-Honeywell 7939-2, or approved equal

2- End of line resistor : LNL-1k-32

2.08 DOOR STRIKE / REQUEST TO EXIT

A. Night latch (NL):	A key must be able to unlock/open the door both during normal operation and in the event of a power failure.
B. Request to Exit (REX):	Turning the handle from inside the building must provide a request to exit signal to be processed by the Access Control System.
C. Electric Latch Retraction:	The latch must be able to be opened with an electrical signal from the Access Control System on a valid card read.
D. Mfg. / Model No.:	Von Duprin ELRX 99 NL, or approved equal.

2.09 CARD READER

A. Communication:	Wiegand Data0/Data1
B. Read Range:	Up to 7”
C. Input voltage:	10-28.5 VDC
D. Operating temperature:	-22° to 150°F
E. Operating humidity:	0% to 95% non-condensing
F. Housing:	Polycarbonate UL 94
G. License	64 Access Readers upgrade for all PRO systems, no maximum on number of readers
H. Mfg. / Model No.:	1. Multiclass card reader (HID RPK40)
	2. Card Reader License: Lenel PRO-64UP

2.10 SERIAL MODEM

A. DTE Interface:	DB-25 RS-232 Serial
B. Power supply:	9 VAC at 1 A

C.	Phone line interface:	Dual RJ-11
D.	Operating temperature:	0° to 50°C
E.	Operating humidity:	20% to 80% non-condensing
F.	Mfg. / Model No.:	US Robotics 56K V.92 5686G, or approved equal.

2.11 STAND ALONE UNINTERRUPTABLE POWER SUPPLY

A.	UPS Technology:	Online double-conversion
B.	Batteries:	12V 9Ah
C.	Capacity:	Provide capacity as necessary for required runtime of 6hrs at full load. Utilize External Battery Module for additional capacity.
D.	Input:	90-208 VAC, 40-70Hz
E.	Harmonic distortion:	4680-6000 VA: <3% THDV on Linear loads 4680-6000 VA: <6% THDV on non-Linear loads
F.	Inrush current:	700-3000 VA <45 A peak
G.	Output:	120 VAC, 60 Hz true sine wave
H.	Communication:	10/100 Ethernet, 2-opto-coupled relay outputs
I.	Degree of protection:	IP20
J.	Operating temperature:	0° to 40°C (25°C batteries)
K.	Compatible connectivity card:	Power Xpert Gateway Card
L.	Operating humidity:	0% to 95% non-condensing
M.	Mfg. / Model No.:	1. Eaton 9155, 8-15kVA UPS 3 High Site Plan / K4081203S000000 or approved equal 2. Eaton 9155, 8-15kVA Battery Cabinet 3 High Site Plan - External Battery Module or approved equal

3. Eaton BPM125ER – Rack Mounted Bypass Switch or approved equal

4. Eaton Power Xpert Gateway Card

5. Eaton EBA201-1 – Rack Mounted PDU Unit or approved equal.

2.12 ALARM ARM/DISARM STATUS INDICATOR

A. Driven from the Lenel Access Control and Intrusion Alarm system

B.	Labeling:	Engraved as shown on Contract Drawings
C.	Size:	2 Gang 4.5” x 4.5”
D.	Layout:	See Contract Drawings for required layout.
E.	Mfg. / Model No.:	Lenel Command Keypad , LNL-CK or approved equal Lenal Brand product

2.13 MOTION DETECTORS

A.	Voltage:	9-15 VDC
B.	Current:	26 mA (fully active) 18mA (standby)
C.	Outputs:	Normally Closed contacts with tamper protection
D.	Trouble:	Solid state relay normally closed
E.	Alarm Indicators:	Blue LED – TriTech+ alarms Yellow LED – microwave detection Red LED – PIR detection
F.	Focal Lengths:	Three (3) , long, middle, and short range
G.	Radar:	Range Adaptive with integration detection to reduce false alarms
H.	Anti-Mask:	Multi-point Anti-mask with Integrated Spray detection
I.	Coverage:	18x25m or 8x10m selectable

J. Immunity: Draft, small insect, and small animal (10lb) immunity

K. Active White light suppression

L. Dynamic temperature compensation

M. LED brightness adjusts automatically

N. Remote walk test LED

O. Remote Self-Test

P. Input power supervision

Q. DIP switch programming

R. Certification: ANSR: Intrusion-detection Units (UL 639); WA18G and GB: ANSR7: Intrusion-detection Units Certified for Canada (ULC-S306)

S. Mount: Gimbal mount bracket

T. Mfr. / Model: Bosch ISC-PDL1-WA18G with B328 mount, or approved equal

2.14 MOUNT DOOR SWITCHES FOR LIGHTING AND TAMPER

A. Voltage: 125/250 VAC

B. Current: 10A

C. Operation Cycles: 6,000 - UL rating

D. Circuit: Momentary SPDT

E. UL Listed

F. Mfr. / Model: Cherry E69-30A, or approved equal.

2.15 INTERCOMM SYSTEM

A. Master Station:

1. Power Source: 24V DC or 802.3af PoE
2. Bandwidth: 320k ~ 8Mbps
3. Communication:
   Handset Simultaneous Communication
   Hands-free Auto-voice actuation or PTT
4. Monitor: 3.5 inch color LCD
5. Paging capacity: Simultaneous to max. 5 zones and/or stations
6. Mounting: Desktop w/ stand or wall mount
7. Temperature: 32-104°F (0-40°C)
8. Dimensions: 7-½" H x 9-⅞" W x 2-⅜" D
9. Weight: Approx. 1.81 lbs (820g)
10. Mfr. / Model: Airphone Corporation / IS-IPMV or approved equal

B. Door Station:

1. Power Source: 24V DC or 802.3af PoE
2. Bandwidth: 320k ~ 8Mbps
3. Communication: Open voice hands-free
4. Camera: 1/4-inch color CMOS
5. Min. Illumination: 5 Lux
6. Camera angle: Wide: approx. 170° horizontal
7. Mounting: Flush mount (back box included)
8. Front Panel Housing: Stainless steel
9. Temperature: -40-140°F (-40-60°C)
10. Mfr. / Model: Aiphone IS-DV/IS-IPDV or approved equal.
11. Mounting: Flush mount (back box included)
12. Front Panel Housing: Stainless steel
13. Temperature: -40-140°F (-40-60°C)

PART 3 EXECUTION

3.01 SEQUENCE OF OPERATION

A. The system is to operate in a manner similar to systems existing at other existing DEP facilities. Final sequence of operation must be approved by NYC-DEP BPS/SEU. This sequence of operation is presented as an ideal. If the Contractor, NYC-DEP BPS/SEU, and the Engineer agree that any portion of this sequence of operation is not possible, the Contractor shall submit a proposed sequence of operation to be approved by the NYC-DEP BPS/SEU and the Engineer.

B. References to the Lenel server indicates the NYC-DEP BSP/SEU main Lenel server located off site.

C. Normal Operation

1. Valid card read: Card reader shall provide indication of a valid read and electric latch shall retract for five seconds. The system controller should turn on a digital output to the Lenel Server.
2. Invalid card read: Card reader shall provide indication of an invalid read.
3. Intrusion: The system controller shall provide an alert to the Lenel server indicating the location of the intrusion.
4. The LNL-CK Lenel Command Keypad integrates a 32-character backlit LCD display with a 16-position keypad and a reader port. The command keypad serves as a command reader,a reader from which user commands can be issued to execute local I/O functions. Reader command programming is accomplished using the OnGuard System Administration application.
5. The LNL-CK display indicates time in either 12 or 24-hour clock format. The format is automatically chosen based on the regional settings of the computer on which the Communication Server is running. The LNL-CK display also provides command status and other text feedback during reader operations. For example, when performing the Extended Held Open command, the LNL-CK displays the countdown time before the Held Open time is reached, as well as basic intrusion arm/disarm functions.
6. The LNL-CK communicates with the Lenel Intelligent System Controller (ISC) either through direct, multidrop, 2-wire RS-485 communication to the ISC, or through a reader port of a Lenel Dual Reader Interface Module (LNL-1320).
7. The LNL-CK may be configured in one of three ways: as a stand-alone RS-485 device, as an alternate reader to a primary reader, or as a reader device connected to the Wiegand input of a LNL-1320. In any of these modes, an

optional reader with a Data1/Data0 or clock/data output may be connected to the LNL-CK to provide Card Only, Card or PIN, or Card and PIN capability.

D. Power Loss Operation

1. In the event of power loss, the UPS shall provide indication to the system controller by means of the hardwired relay output that AC power has been lost. The Lenel server should provide an alert indicating that the system is on battery power. The UPS is to run the Security Access Control and Intrusion Alarm System for a minimum of (6) hours on battery power in the event of an extended power outage.
2. While UPS power is available, the Lenel system should follow the normal sequence of operation.
3. In the event of a UPS failure or total power loss, the Lenel system shall provide notification to the Lenel server.
4. In the event of a UPS failure & transferring to bypass mode, the Lenel system shall provide notification to the Lenel server.

E. Communications Failure

1. If the system controller loses network communications with the Lenel server, the system shall establish communication using the backup dial-up modem.
2. If the system controller loses all communication with the Lenel server, the system shall operate in offline mode, authorizing access to valid cards stored in the controller's local memory.
3. The Lenel server should provide an alert that it has lost communication with the system controller.

F. System Malfunction

1. In the event of a system malfunction, no access cards shall be granted authorized entry. Entry may only be gained by physically unlocking the door with a key.

3.02 EQUIPMENT INSTALLATION AND DOCUMENTATION

A. The Contractor shall install each item in accordance with the manufacturer's recommendations and as indicated in the Contract Drawings.

B. The Contractor shall provide rigid structural support for the auto dialers and shall allow all necessary access and working space to permit maintenance of the units while installed. The Contractor shall provide additional strengthening and/or bracing required for a sound installation as part of the Contract. The Contractor shall provide

all supports, bracing, wiring, and incidental hardware required for a complete and sound installation.

C. The Security Access Control and Intrusion Alarm System shall be installed and wired completely for the intended operation as recommended by the manufacturer and as per all applicable codes.

D. The Contractor shall make all necessary wiring connections to external devices and equipment.

E. The wire gauge shall be as recommended by the manufacturer for the distances and power requirements.

F. All inputs and outputs capable of end of line supervision shall have an end of line resistor installed as per the security system manufacturer recommendations. The resistor shall be installed such that all devices on the connection are monitored

G. Telephone lines: The Contractor shall arrange for two (2) dial-up telephone lines for the telecommunications equipment when shown on the Contract Drawings.

1. Each phone line shall be surge protected.
2. Each phone line shall be terminated with an RJ-11 telephone jack.
3. Any connections by the Contractor to the public telephone system shall require notification of the local telephone company and shall be done in coordination with NYC-DEP.

H. The Contractor shall be responsible for all programming of the system. All programming is to be coordinated with and at the direction of NYC-DEP BPS/SEU.

I. All control panels and enclosures located in the Electrical & IT room must be NEMA 12, see Detailed Specification 17420G – Control Panels and Enclosures. Equipment used within control panels and enclosures shall meet the requirements of Detailed Specification 17430G – Panel Mounted Instruments and Devices.

J. A door switch shall be provided with each panel and shall be wired to the intrusion contact on the Lenel system controller. The system shall be programmed to provide an alert (consistent with the current security system) when the panel door is open. Each panel with a width greater or equal to eighteen (18) inches shall have a convenience light mounted at the top of the enclosure controlled by an additional door switch.

3.03 REGULATORY REQUIREMENT

A. NEC Compliance: All electrical wiring work shall comply with the NEC.

B. NEMA Compliance: Electrical equipment shall comply with applicable portions of NEMA.

C. FCC Emissions: All assemblies shall be in compliance with FCC emission standards.

D. All power supplies shall be in compliance with Underwriters Laboratories standard 1012 for power supplies.

3.04 FIELD TESTS

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1 - General Requirements.

B. The units specified in this Section shall be included as part of all testing required by the various sections of Division 16 under the Electrical contract as they apply to both field and factory testing.

C. Perform on-site testing in accordance with Detailed Specification 17403G – Security Equipment Site Monitoring and Control System Start-Up and Field Testing. The system shall be tested during both normal operation and power loss operation.

D. During the Operational Availability Demonstration (OAD) period any deficiencies noted by the Engineer, NYC-DEP BPS, SEU, BEDC, or BWS shall be corrected by the Contractor at no extra cost to the City.

1. The Contractor shall make all necessary changes and adjustments necessary to correct noted deficiencies so that the system meets all Contract requirements at no extra cost to the City.
2. In addition, the Contractor shall make provision for a minimum of one (1) trip of two (2) days for each Contractor or sub-contractor involved with the Security Access Control System, Intrusion Alarm System, at no extra cost to the City to make programming and minor hardware adjustments necessary to address noted deficiencies that may not otherwise be covered by this Contract.
3. Successful completion of the OAD and satisfactory resolution of any noted deficiencies will constitute acceptance of the system by the City.

3.05 MANUFACTURER'S FIELD SERVICES

A. Installation and start up:

1. After the system has been installed, the documentation delivered to the City, and the telephone lines operational in compliance with all system requirements as specified, the Contractor shall verify correct operation of all system components.
2. The Contractor shall guarantee all material and workmanship involving the system for up to one year after system acceptance by the City.
3. After system startup, the Contractor shall instruct City's personnel on how to program and operate the system if the City deems that necessary.
4. The services of the supplier's representative shall be provided for as follows:
   a. One (1) trip of five (5) days duration for installation.
   b. One (1) trip of five (5) days duration for field testing.
   c. One (1) trip of two (2) days for startup, initial operating, and training.
   d. One (1) trip of two (2) days, as previously described, for correcting deficiencies noted during the OAD
5. Should additional services be required to achieve the proper installation or operation, such services shall be arranged for by the Contractor at no additional cost to the City.
6. Startup and training services shall conform to the requirements set forth in section 01821 – Equipment Start-up and Training.

B. Warranty Support:

1. The Contractor shall be available during the warranty period to answer programming and application questions to support City's personnel during this period.
2. The Contractor shall provide additional support services during the warranty period (1-year from Substantial Completion) at no extra cost to the City including:
   a. Regular testing and inspection of all system components and to submit to the City reports on the results. A minimum of six (6) visits total shall be included in the Contract
   b. Emergency Service for repairs and adjustments to the system and part replacement if necessary.

- END OF DETAILED SPECIFICATION -

SPECIFICTION 17790
COMMUNICATIONS NETWORKS AND EQUIPMENT

Note: Detailed Specification 17790 – Communications Network and Equipment has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 17790.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate, test, adjust, and place into satisfactory operation the communications network.

B. The Contract Drawings and Specifications illustrate and specify functional and general construction requirements of the communications network and do not necessarily show or specify all components, wiring, piping and accessories required to make a completely integrated system. The Contractor shall provide all wiring, accessories and labor required for a complete, functional and integrated system.

C. Coordination: The Contractor shall coordinate the installation of all items specified herein and required to ensure the complete and proper interfacing of all the components and systems.

D. An index of the Articles in this Specification is presented hereinafter for the convenience of the Contractor.

1.02 RELATED SPECIFICATIONS

A. Detailed Specification 01270 – Measurement and Payment

B. Detailed Specification 01330 - Submittal Procedures.

C. Detailed Specification 01831 – Operation and Maintenance Manuals

D. Detailed Specification 16131G – Electric Conduit System

E. Detailed Specification 16852G – Closed Circuit Television

F. . Detailed Specification 17403G – Site Monitoring and Control System Start-Up and Field Testing.

G. Detailed Specification 17420G – Security Control Panels and Enclosures

H. Detailed Specification 17430G – Security Panel Mounted Instruments

I. Detailed Specification 17440G – Security Access Control and Intrusion Alarm System

1.03 REFERENCES

A. American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA)/Electronics Industry Alliance (EIA):

1.	EIA-455-21A	FOTP-21 Mating Durability of Fiber Optic Interconnecting Devices
2.	ANSI/TIA/EIA-526-7	OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
3.	ANSI/TIA/EIA-526-14A	OFSTP-14A Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant
4.	ANSI/TIA/EIA-568-B.1	Commercial Building Telecommunications Cabling Standard – Part 1: General Requirements
5.	ANSI/TIA/EIA-568-B.2	Commercial Building Telecommunications Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components
6.	ANSI/TIA/EIA-568-B.3	Optical Fiber Cabling Components Standard
7.	ANSI/TIA/EIA-568-C.2	Balanced Twisted-Pair Telecommunication Cabling and Components Standard
8.	ANSI/TIA/EIA-569-A	Commercial Building Standard for Telecommunications Pathways and Spaces
9.	ANSI/TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
10.	ANSI/TIA/EIA-607	Commercial Building Grounding and Bonding Requirements for Telecommunications

B. Institute of Electrical and Electronic Engineers (IEEE):

1.	IEEE 802.3ab	Physical Layer Parameters and Specifications for 1000 Mb/s Operation over 4 pair of Category 5 Balanced Copper Cabling, Type 1000BASE-T

2.	IEEE 802.3af	Power over Ethernet
3.	IEEE 802.3at	Power over Ethernet Enhancements
4.	IEEE 802.11	Wireless LAN Medium Access Control and Physical Layer Specifications

C. Insulated Cable Engineers Association (ICEA):

1.	ANSI/ICEA S-80-576	Communication Wire and Cable for Wiring of Premises

D. National Electrical Manufacturers Association (NEMA):

1.	NEMA WC 63.1	Telecommunications Cables
2.	ANSI/NEMA WD-6	Wiring Devices

E. National Fire Protection Association (NFPA):

1.	NFPA 70	National Electrical Code (NEC)

F. Underwriters Laboratories (UL):

1.	UL 444	Communications Cables
2.	UL 467	Grounding and Bonding Equipment
3.	UL 1479	Standard for Fire Tests of Penetration Firestops
4.	UL 1863	UL Standard for Safety for Communications-Circuit Accessories

G. ASTM International

1.	ASTM E814	Standard Test Method for Fire Tests of Through-Penetration Fire Stops

H. National Electrical Code (NEC)

1.	NEC 250	Grounding and Bonding
2.	NEC 800	Communications Circuits

I. Cisco

1.	Cisco CCIE	Cisco Certified Internetwork Expert

1.04 PAYMENT

A. There shall be no separate payment for the work of this Section.

1.05 SCOPE OF WORK

A. Abbreviations used throughout this Specification

1. NYC-DEP OIT – New York City Department of Environmental Protection Office of Information and Technology
2. NYC-DEP BPS/SEU – New York City Department of Environmental Protection Bureau of Police and Security / Security Engineering Unit

B. Special Notice on Network Security

1. All connections between the Internet and the Kensico Lab building networks are to take place through NYC-DEP OIT provided services. At no time is the Contractor permitted to make such a connection without the express written consent of NYC-DEP OIT and the Engineer. If such a connection is granted by NYC-DEP OIT and the Engineer, the Contractor shall follow all security measures, restrictions and instructions as directed by NYC-DEP OIT and the Engineer.
2. All Contractor computers, laptops, or other systems that are to be connected to any of the Kensico Lab building network shall be subject to all security measures, restrictions, and instructions as directed by NYC-DEP OIT and the Engineer prior to being connected to any of the Kensico Lab building network or other networked equipment.
3. All Contractor removable media, including, but not limited to, floppy disks, USB thumb drives, and portable hard drives, are subject to all security measures, restrictions, and instructions as directed by NYC-DEP OIT and the Engineer.
4. All computer systems and other network hardware supplied by the Contractor under this Contract or otherwise shall be subject to the security measures, restrictions, and instructions as directed by NYC-DEP OIT and the Engineer. The security measures implements by NYC-DEP OIT are continuously evolving. The Contractor is to abide by the measures that NYC-DEP OIT sets forth throughout the duration of the Contract.
5. At no time is the Contractor to establish a remote connection to any computers or other equipment on the Kensico Lab building networks without express written permission from NYC-DEP OIT and the Engineer. If such a connection

is granted by NYC-DEP OIT and the Engineer, the Contractor shall follow all security measures, restrictions, and instructions as directed by NYC-DEP OIT and the Engineer.

C. General

1. Provide each system as a completely cabled and terminated communication system (voice/data/fiber) in a star topology.
2. System cabling, raceways, pathways, and spaces shall at a minimum comply with ANSI/TIA/EIA-568-B.1, -586-B.2, 569-A, and -607.
3. All fibers shall be industry rated, best performing design.
4. Provide grounding and bonding per, at minimum, ANSI/TIA/EIA-607, NFPA 70, and UL 467.
5. This section covers the furnishing, installation, and configuration of the entire Kensico Lab building network. The Contractor is responsible to configure all network equipment in coordination with NYC-DEP Office of Information Technology (OIT) and the Engineer.
6. Contractor is responsible for proposing configurations and then coordinating with NYC-DEP OIT and BPS\SEU as noted in the Specifications. Contractor is responsible for configuring all equipment in coordination with and at the direction of NYC-DEP OIT and BPS\SEU. This is indicated by "configure in coordination with and at the direction of NYC-DEP…." or similar language. NYC-DEP OIT or BPS\SEU may elect to take delivery of a piece of equipment and configure it themselves. This does not absolve the Contractor from providing all equipment and labor necessary to fully install and connect the equipment as required by NYC-DEP OIT and BPS\SEU. Where NYC-DEP OIT or BPS\SEU chooses to configure a piece of equipment themselves, the Contractor is not liable for the configuration of said equipment. The Contractor shall remain liable for warranty services for the hardware.
7. References made to the "NYC-DEP network" are in relation to the domain and IP addressing pertaining to the existing NYC-DEP local and wide area networks. Kensico Lab building networks that are connected to this network and properly IP addressed will be available from remote locations that offices that are a part of the wider NYC-DEP network. The Contractor is not responsible for configuration or programming changes to existing NYC-DEP network offsite equipment except as expressly noted in the Contract Documents.

8. Route all Kensico Lab building network connections back to the Network rack located in the Electrical room at the second floor. All terminations are to be labeled. Provide CAT-6 patch cords to jumper from the patch panel to the networking equipment.

9. Terminate all network cables and wiring according to manufacturer recommendations. All cabling and wires shall be neatly bundled and secured.

10. Unless otherwise specified, provide cabling as recommended by the manufacturer.

11. All network connections coming from or traversing outside a lightning protected structure shall be surge protected.

12. All fiber optic connectors are to be of the ST type. Equipment that has an option for ST connectors must be provided with ST connectors. Where equipment does not provide an option for ST connectors, LC connectors shall be used.

13. Specific equipment is called out for rack installation. Where equipment is to be installed in a network rack the equipment shall be natively rack mountable. Where equipment is to be installed in a control panel, the equipment shall be natively panel mountable.

14. The network configuration at the Kensico Lab building is complicated and is to be completed by a single Contractor for the duration of the Contract – referred to as the Contractor's Network Integrator. The Contractor's Network Integrator is to coordinate and work in conjunction with NYC-DEP OIT, BPS/SEU and the Engineer. The use of multiple sub-contractors for different phases of the Contract is not acceptable. System specific hardware, such as cameras, I/O devices, ring switches, and other equipment can be configured by sub-contractors responsible for such systems as directed by the Contractor's Network Integrator, NYC-DEP OIT, and the Engineer. Configuration of any and all hardware by anyone other than the Contractor's Network Integrator is subject to preapproval by the Engineer.

15. The Contractor shall retain the services of a Network Integrator to assume the responsibilities specified. However, execution of these specified duties by the system supplier shall not relieve the Contractor of the ultimate responsibility for the Kensico Lab building and associated facilities network systems.

    a. Design, fabrication, implementation, and configuration of the networks in accordance with Contract Documents and all applicable or referenced standards and codes.

b. Preparation, assembly, and updating of all networking submittals in accordance with the Contract Documents.

c. Proper interfacing of the network hardware, including required interfacing with equipment furnished by other suppliers.

d. Coordination of all network configuration details with NYC-DEP OIT, BPS\SEU and the Engineer.

e. Programming of all configuration details, including but not limited to, IP addresses.

f. Testing and start-up of the various networks.

g. Training of the City personnel on operation and maintenance of the various Kensico Lab building networks.

h. Handling of all warranty obligations for the network components.

i. Development of O&M documentation for the system.

j. Modification of existing O&M manuals as required.

16. Contractor's Network Integrator to be available throughout the duration of the Contract to provide consultation, installation, configuration, and general support for the network as it is put into service during the Contract at no additional cost to the City.

17. Contractor to provide and configure new hardware where required to provide support for the fiber optic system. Provide enclosures, equipment, and other ancillary equipment as necessary in accordance with Detailed Specifications 17420G – Control Panels and Enclosures and 17430G - Panel Mounted Instruments and Devices.

18. All managed switches are to be configured to limit network traffic such that interconnection between the networks at any location will not cause network outages or problems.

19. Various systems at the Kensico Lab building will be brought online at various times. The Contractor must be prepared to configure and support the Kensico Lab building network as systems are completed and brought online.

20. Provide Surge Protection Devices (SPD) for each conductor that originates or traverses from inside to outside of a building or outside to inside of a building.

21. IP Addresses

    a. All equipment IP addresses are to be static unless otherwise noted herein or directed by DEP OIT, BPS\SEU, or the Engineer.

b. Contractor to propose and program IP ranges for each network as well as individual IP addresses for each piece of equipment at the Kensico Lab building to be commented on and approved by NYC-DEP OIT and the Engineer.

22. All Cisco equipment provided under this Contract is to have a Cisco SmartNet agreement according to the following at no extra cost to the City:

    a. Cisco SmartNet contract to be under the existing DEP Cisco SmartNet agreement. SmartNet purchase to be coordinated with NYC-DEP OIT and the Cisco representative.

    b. Initial SmartNet coverage term must be a minimum of two (2) years.

    c. At time of NYC-DEP acceptance of a piece of equipment a minimum of one (1) year of SmartNet coverage must remain on all of the Cisco equipment. Contractor to purchase additional SmartNet coverage if necessary at no extra cost to the City. NYC-DEP receiving a piece of equipment to configure or program themselves does not constitute acceptance of said piece of equipment.

23. Uninterruptable Power Supply (UPS)

    a. Provide rack mounted UPS to power all network rack equipment for six (2) hours minimum.

    b. Provide all cabling, accessories, and connections necessary to provide fully functional system.

24. Network Diagnostic Virtual Local Area Network (VLAN)

    a. Configure a separate network diagnostic VLAN. All network switches are to be addressed on this VLAN to provide ease of monitoring and configuring the network. This VLAN is to exist on all networks and systems. Coordinate with NYC-DEP OIT and the Engineer for configuration of all devices.

    b.

25. Network Architecture

    a. Each network is to separate and individual network as shown on the Contract Drawings.

    b. Provide new managed switches and all other necessary hardware to create new networks as shown on the Network Architecture Drawings.

    c. Contractor to coordinate the IP addressing for each network with NYC-DEP OIT and the Engineer.

d. Contractor is to configure all equipment in coordination with NYC-DEP OIT and the Engineer.

26. Local Network Specifics

a. Provide, program, and configure network switches and all other hardware required to create a local network as indicated on the Contract Drawings.

b. The local network is to provide IP addressing compatible with the DEP network. Program and configure IP addresses in coordination with and at the direction of NYC-DEP OIT and the Engineer.

c. Configure the managed switch to provide DHCP service to assign IP addresses and other network information to Security& CCTV equipment or other equipment that may be connected to this network. Configuration to be done in coordination with and at the direction of NYC-DEP OIT and the Engineer.

d. Configure the managed switch to route network traffic to the other networks interconnected at the Kensico Lab building in coordination and at the direction of NYC-DEP OIT and the Engineer.

e. Test the configuration by connecting a laptop and network pinging at least three pieces of equipment on each of the other network rings.

f. Workstations, laptops, or other equipment connected to the Local Network shall be able to connect to and view network video feeds from the Security CCTV NVR.

g. This network will require access to the NYC-DEP network.

27. Security Access Control Network

a. Provide, program, and configure all network switches and other equipment to provide a fully functional network as indicated on the Contract Drawings.

b. Program and configure IP addressing in coordination with and at the direction of NYC-DEP OIT, BPS\SEU, and the Engineer.

c. Provide (2) VLANs for network traffic:

1. Access control and intrusion detection system
SNMP device monitoring.

d. This network will require access to the NYC-DEP network.

e. Monitor all UPS systems with SNMP. Configure in coordination with and at the direction of NYC-DEP OIT and the Engineer.

f. See Detailed Specification 17440G – Security Access Control and Intrusion Alarm System and Contract Drawings for more details.

28. Wireless Networking

a. Mount wireless access points as directed by NYC-DEP OIT.

b. Configure devices in coordination with and at the direction of NYC-DEP OIT.

29. Testing

a. Testing to be according to Detailed Specification 17403G – Site Monitoring and Control System Start-Up and Field Testing.

b. Contractor is responsible to derive testing procedures specific to each network system in coordination with NYC-DEP OIT, BPS/SEU, and the Engineer.

c. One test procedure per network system is to be submitted for review and approval by NYC-DEP OIT, BPS/SEU, and the Engineer. Due to the unique requirements of each system, combining more than one system on a test procedure is not permitted. Each test procedure is to be individually tailored to the system to be tested.

d. Contractor to perform all testing in coordination with NYC-DEP OIT, BPS/SEU, and the Engineer. Testing to be witnessed by NYC-DEP and the Engineer.

e. Testing to be scheduled and be performed on only one system at a time. Combining tests on multiple network or systems at the same time is not permitted.

f. Test scheduling to be in coordination with NYC-DEP OIT, BPS/.SEU, and the Engineer availability.

1.06 QUALITY ASSURANCE

A. Qualification

1. The Contractor’s Network Integrator must have a minimum of five (5) years industrial routing and switching experience.

2. The Contractor’s Network Integrator must have successfully completed at least three (3) or more projects, similar to the work described in this Section and related Sections, in the last three (3) years.

3. The Contractor's Network Integrator must have successfully completed five (5) or more projects, similar to the work described in this Section and related Sections.
4. The Contractor's Network Integrator must be Cisco CCIE Routing and Switching certified.
5. The City reserves the right to reject any sub-contractor deemed to be insufficiently qualified.
6. The following Contractors are pre-approved for this project:
   a. none

B. Acceptable Manufacturers:

1. The Contractor shall furnish instruments and devices by the named manufacturers.
2. The named manufacturers have been specified to establish the standard of quality and performance of the equipment to be supplied and to maintain a consistency with equipment already in use by the City.
3. The Contractor shall obtain all instruments or devices of a given type from the same manufacturer.

1.07 SUBMITTALS

A. Contractor's Network Integrator Qualifications:

1. Submit for approval certificates showing Contractor's Network Integrator has the required certifications.
2. Submit for approval documentation showing contractor has the experience required. Include details of the projects referenced that show the contractor has similar experience with configurations similar to what is required by the Contract Documents. Provide contact information, names, phone numbers, and email addresses for the clients of each of the referenced projects.
3. No work on this Contract is to be started prior to the City's and the Engineer's approval of the Contractor's Network Integrator.

B. Shop Drawings:

1. Shop Drawing submittals are to be in accordance with the requirements of the General Conditions, Article 4 and Section 01331 – Shop Drawings Submittal and Approval.

2. Shop Drawing preparation shall not commence until after the pre-submittal conference specified below.
    a. A meeting shall be scheduled and attended within sixty (60) days after the award of the Contract to coordinate all aspects of the design, fabrication, delivery, installation, and startup of the network systems. In attendance will be representatives of the Contractor, the Contractor's Network Integrator, the City, and the Engineer. Subsequent meetings shall be scheduled, as required, to assure timely integration of systems as they are brought online. Meetings will be held at the office of the City.
3. Network equipment shall not be provided or configured until related submittals have been approved by the Engineer.
4. Shop Drawings shall be submitted in complete packages grouped to permit review of related items.
5. Review of Shop Drawings will be for conformance with Contract Documents and with regard to functions specified to be provided.

C. Submittal Requirements:
1. Product information for all hardware, including the following:
    a. Manufacturer's product name and model number
    b. Manufacturer's standard catalog product data
    c. Performance and operation data
    d. Installation and mounting details, instructions, and recommendations
    e. Service requirements
    f. Dimensions
    g. Manufacturer recommended tools
    h. Manufacturer recommended spare parts
2. Network Design:
    a. Drawings showing the network layout and interconnections
    b. Network routing plan
    c. Equipment locations
    d. Equipment installation details, where and how equipment is to be installed

D. Testing:

1. Test plans and procedures.
2. Test Results

E. Network Operation and Maintenance Manuals

1. The Contractor shall furnish Operations and Maintenance (O&M) Manuals for the network in accordance with Detailed Specification 01831 – Operation and Maintenance Manuals and the supplemental requirements below. Provide a comprehensive guide to the complicated network at the Kensico Lab building and how it interacts with various DEP systems at other locations. Configurations are to be provided as a part of the O&M Manuals. Systems at locations other than the Kensico Lab building do not need to be covered in detail, but should be summarized to provide the user with basic information.
    a. Complete list of system hardware parts with full model numbers and quantity. List to include the full system, including new and existing equipment. Include all Ethernet switches, but do not include system specific hardware beyond the switches.
    b. Copy of all approved submittal information and system shop drawings as specified herein with corrections made to reflect actual system as tested.
    c. Complete up-to-date configuration information for all network switches.
    d. Manufacturer's installation documentation.
    e. Manufacturer's operations manuals for both new and existing equipment.
    f. A plan view of the Kensico Lab building showing the as-built approximate location of all enclosures. Enclosures must be clearly identified and labeled.
    g. Drawings clearly showing the as-built layout of the Kensico Lab building networks and their interconnections and network traffic routing. Drawings must show all devices on the network and identify the IP addresses assigned to each device. Clearly identify the IP Address range of each ring network. Clearly identify the Virtual Local Area Network (VLAN) IP addresses assigned for network monitoring.
    h. Include Test procedures and results.
    i. Maintenance procedures specific to the Kensico Lab building and configuration.
    j. Login and access information for all pieces of equipment.
2. Label all network switches.

a. Adhesive labels and wire labels to be in accordance with Detailed Specification 17430G – Panel Mounted Instruments and Devices.

b. Label each network switch with the VLAN networking monitoring IP address.

c. Update any existing labeling that is no longer accurate due to Contract Work.

1.08 DEVICE MOUNTING

A. All network equipment is to be mounted in network equipment enclosures or racks as approved by DEP OIT and the Engineer. No equipment is to be left outside of an enclosure without the express written consent of DEP OIT and the Engineer. Provide enclosures, equipment, and other ancillary equipment as required in accordance with Detailed Specifications 17420G – Control Panels and Enclosures and 17430G – Panel Mounted Instruments and Devices.

1.09 OPERATIONAL TESTING

A. The system testing is to demonstrate the functionality and design of the network performs as specified.

B. Testing to include inter network connectivity and routing via pinging or other approved means. The testing shall include accessing at least three (3) devices from each network.

C. Testing to include verifying DHCP services are operational as specified.

D. Testing to include verifying NYC-DEP network access by following test procedures developed by NYC-DEP OIT.

PART 2 PRODUCTS

2.01 GENERAL

A. The network system shall provide networking for all networked devices as described in the Detailed Specifications and as shown on the Contract Drawings.

B. System shall consist of components described in the Detailed Specifications and shown on Contract Drawings

C. All equipment and materials used shall be standard components that are regularly manufactured and used in the manufacturer’s system.

D. All systems and components shall have been thoroughly tested and proven in comparable applications and actual use.

E. All systems and components shall be provided with the availability of a toll-free (U.S. and Canada), 24-hour technical assistance program (TAP) from the manufacturer. The TAP shall allow for immediate technical assistance for either the dealer/installer or the end user at no charge for as long as the product in installed.

2.02 RACK MOUNT MANAGED SWITCH

A. Rack mount switches are to be used in each of the Security Network Rack & Network Rack.

B. Fully managed Ethernet switch

C. Ports: (48) 10/100/1000 PoE+ IEEE 802.3at ports

D. PoE Power Budget: 437W

E. Switching Capacity: 256 Gbps

F. Routing: IPv4 and IPv6

G. Spanning Tree Protocol

H. DHCP Server

I. SNMP management and monitoring

J. Remote Monitoring (RMON)

K. Port Mirroring

L. VLAN support

M. Mfr. / Model: Cisco Catalyst 9300-48P-E with redundant power supply, or approved equal

2.03 PANEL MOUNT MANAGED SWITCH

A. Panel mount switches are to be used in the equipment panels.

B. Fully managed Ethernet switch

C. Mounting:	DIN rail
D. Ports:	eight (8) 10/100 PoE+ IEEE 802.3at ports two (2) 10/100/1000 BASE-TX/FX Combo Ports Populate the two (2) 1000 BASE-FX single mode transceivers as required
E. Fiber Connectors:	Provide ST connectors for any fiber connections Where ST connectors are not available, provide LC connectors
F. GBIC/SFP Ports:	two (2) combo mini-GBIC ports
G. GBIC/SFP Modules:	two (2) 1000 Mbps 1310nm SFP transceiver modules as required
H. PoE Power Budget:	240W
I. Power Consumption:	9W
J. Power Supply:	must provide full power for switch and all PoE+ devices (minimum 249W at 48VDC)
K. Switching Capacity:	5.6 Gbps
L. Routing:	IPv4 and IPv6
M. Power:	48 to 57 VDC
N. Spanning Tree Protocol	
O. DHCP Server	
P. SNMP management and monitoring	
Q. Port Mirroring	
R. VLAN support	
S. Mfr. / Model:	ComNet CNGE2FE8MSPOE+ with ComNet 48VDC 10A PS-DRA480-48A power supply with two (2) SFP-6 modules as required, or approved equal

2.04 ETHERNET CABLE

A. Shall conform to performance requirements of ANSI/TIA-568-C.2 for Category 6 and be 1000BASE-T compliant.

B. Terminated with appropriate connectors – RJ-45 port unless otherwise specified or to suit connected device wired in TIA/EIA T568B or T586A configuration as appropriate.

C. Minimum 23 AWG solid bare copper conductors

D. Operating temperature rating: -20°C to 60°C

E. Blue color

F. UL Listed

G. One inch bend radius

H. Mfr. / Model: Siemon 9C6P4-E2-06-RXA for plenum applications, and Siemon 9C6P4-A5-06AR1A for non-plenum applications, or approved equal

2.05 ETHERNET PATCH CABLE

Shall conform to performance requirements of ANSI/TIA-568-C.2 for Category 6 and be 1000BASE-T compliant.

Terminated with appropriate connectors – RJ-45 port unless otherwise specified or to suit connected device wired in TIA/EIA T568B or T586A configuration as appropriate.

Minimum 26 AWG 7x34 stranded tinned copper conductors

Operating temperature rating: -20°C to 60°C

Strain relief boots over connectors

White color

UL Listed

One inch bend radius

Mfr. / Model: Siemon MC6-(XX)-(02) where XX specifies length as required, or approved equal.

2.06 ETHERNET PATCH PANEL

Rack mounted

CAT6 Performance rating

24 port

1U rack height

Mfr. / Model: Ortronics TechChoice 24 Port, or approved equal.

2.07 PLAIN OLD TELEPHONE

A. Lines: Two (2) lines minimum with auto line selection.

B. Wireless: No

C. Color: Black

D. Caller ID: 99 name/number history

E. Dialing: Minimum ten (10) programmable speed dial buttons

F. Speakerphone: Hands-free speakerphone with volume control

G. Ring Indicator: Selectable ring tone

H. Power: Capable of operating solely on power derived from the telephone line. Provide batteries and power supply for normal operation.

I. Mfr. / Model: AT&T ML17939, or approved equal.

2.08 SPARE PARTS AND SPECIAL TOOLS

A. The Contractor shall provide all of the individual manufacturer's recommended tools for all equipment specified herein. The Contractor shall include a concise list detailing the manufacturer recommended tools with the initial submittal and include the manufacturer literature where tooling is recommended.

B. The Contractor shall provide a minimum of 10% spare parts (rounded up) or the individual manufacturer's recommended spare parts, whichever is greater, for all equipment specified herein. The Contractor shall include a concise list of the spare parts with the initial submittal and include manufacturer literature where spare parts are recommended.

C. Where other Specifications may indicate a different count of spare parts, the greater number shall apply.

D. Spare parts for panels and enclosures shall be according to Detailed Specification 17420G – Control Panels and Enclosures and Detailed Specification 17430G – Panel Mounted Instruments and Devices.

E. Spare parts and special tools shall be provided in accordance with the requirements of the General Conditions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Outside wire and cable shall be installed in ducts conforming to Detailed Specification 16133G – Underground Ducts, Ducts in Concrete. Inside wire and cable shall be installed in conduit conforming to Detailed Specification 16131G – Electric Conduit System.

B. Cable Installation in Conduits and Ducts: During the installation of cables in conduits and ducts, the cable manufacturer's recommended pulling tension shall not be exceeded. A suitable lubricating medium, harmless to the cable jacket, shall be used when pulling cables into conduits, pipes or duct banks. No oil or grease substances not specifically manufactured for cable installation will be permitted for such use on this project.

C. Cable Attachment and Support: Lengths of cables which are not installed in conduits and are run inside equipment rooms shall be secured to cable trays or cable ladders using nylon cable ties and attached to walls and backboards using nylon cable clamps or hangers or using a plastic wiring system such as manufactured by Panduit, or Approved Equal. Cables shall be attached or otherwise supported at intervals not to exceed 457 mm [18 in].

D. Strain Relief: Provide sufficient strain relief (slack) in all cables, cable conductors, and wiring to avoid stress on all cables, wires, and wiring connections.

E. Bends: Cables shall not be bent to a radius less than ten (10) times the diameter of the cable, or less than the manufacturer's recommended minimum bending radius, during installation or as finally installed.

F. Continuous Cable Sections: All cable runs shall be continuous without splices between cable terminating locations.

G. Conduit/Cable Entrances to Facilities: All conduit and cable entrance openings into equipment rooms and huts shall be sealed with a pliable sealing compound after the cable is in place. Sealing compounds for rooms, huts, walls, or other partitions shall be fire retardant per ASTM E 814. Sealing compound shall be used to seal the area around the cable where the cable emerges from the end of a conduit, pipe, or ductbank. All spare conduits shall be sealed or plugged in an approved manner.

H. Fire retardant pliable sealing compound shall be an intumescent firestop putty, reusable and repenetrable, conforming to ASTM E 814 and UL 1479, Nelson FSP Firestop Putty, or Approved Equal.

I. Conduit Bushings: At all transition points where a cable runs from inside a conduit into a cable trough; or onto a cable tray or plywood backboard, the end of the conduit shall be fitted with a plastic bushing to prevent abrasive damage to the cable.

J. Cable Dress: Cable installed in trays or troughs shall be laid therein and not pulled in place. Cables installed in trays and troughs shall have a minimum amount of crossover and shall not be pulled tightly around bends.

K. Protection of Cables: Provide appropriate special protection for cables in areas where the cables are unavoidably exposed to hazardous conditions, such as sharp corners on equipment. Cables damaged due to neglect by the Contractor, during installation, shall be replaced by the Contractor, at no additional cost to the City.

L. Cable Continuity and Integrity: All cables shall be continuous and without splices between the specified termination locations. The cable termination points shall be located within communication interface cabinets, equipment enclosures, splice cases, and equipment termination boxes as shown on the Drawings and as described in the Specifications.

M. Cable Shield Continuity and Integrity: The shield of each section of communication cable shall be electrically continuous for the entire cable length.

N. Cable and Wiring Identification: All cables shall be terminated in standard order, according to the EIA/TIA and ICEA color codes. Individual cables shall be

identified at each cable termination with self-adhesive labels. All spare pairs in each cable shall be terminated and identified.

O. Fiber-Optic Cable Installation:

1. General: Install fiber-optic cables and associated equipment and devices in accordance with industry standards and manufacturer's written instructions.

2. Provide pull wire in the conduit for future use. Install fiber-optic cable in rigid conduit in walls and floors. Install cable in a manner, which avoids heat sources and sharp materials.

3. Install fiber-optic cable to prevent damage to fibers, cladding, or jacket. Ensure that media manufacturer's recommended pulling tensions are not exceeded. Do not at any time bend cables to smaller radii than minimum recommended by manufacturer, but in no case less than 20 times cable diameter. Whenever it is necessary to cut the cable, the ends shall immediately be capped and sealed. The cable shall not be pulled off and laid on the ground prior to installation. All cable shall be pulled from the top of the reel. No cable shall be pulled with open ends. A rubber tape seal shall be maintained at all times. The cable shall be continuously inspected during installation and any cuts, abrasions or other damaged portions shall be brought to the attention of the [Contracting Officer] [Owner] and repaired or replaced as directed

4. Install fiber-optic cables simultaneously where more than one cable is being installed in same raceway. Use pulling lubricant where necessary; compound used must not deteriorate cable materials. Do not use soap. Use a pulling means, including fish tape, rope, and basket-weave grips that will not damage media or raceway.

5. No splices are permitted.

6. Terminate all fibers in the patch panel. Where there are not enough positions to install all fiber terminations neatly coil the unused fibers in the cabinet as spares. All fibers, including the spares, are to be terminated with the specified connector.

P. All voice/data and cables shall be installed in conduit specified Detailed Specification 16131G – Electric Conduit System.

Q. Provide pull rope in all empty conduit runs with not less than 12 inches (30 cm) of slack both ends.

R. Conduits shall be restricted to no more than two 90-degree bends or equivalent without a pull box.

S. Maintain minimum bending radius of changes in direction as follows:

1. 10 times diameter of 4” (100 mm) and larger conduits.
2. 6 times diameter of smaller conduits.

T. Avoid bends in conduits from pull boxes.

U. Except as noted hereinafter for telecommunications cabling and pathways with copper media, keep conduit and cable tray minimum 6 inches (150 mm) away from parallel runs of electrical power equipment, flues, steam, and hot water pipes.

V. Install voice, data and fiber telecommunications cabling and pathway system as detailed in ANSI/TIA/EIA-568-B and -569-A. Screw terminals shall not be used except where specifically indicated on plans. Use an approved insulation displacement connection (IDC) tool kit for copper cable terminations. Do not untwist Category 6 UTP cables more than one half inch (12 mm) from the point of termination to maintain cable geometry. Provide service loop on each end of the cable, 10 ft (3 m) in the telecommunications closet, 12 inches (30 cm) for UTP. Do not exceed manufacturers' cable pull tensions for copper. Provide a device to monitor cable pull tensions. Do not exceed 25 pounds (110 N) pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples. For UTP cable bend radii shall not be less than four times the cable diameter.

W. Provide identification and labeling of communications cables, outlets and equipment per ANSI/TIA/EIA-606.

1. All cables shall be labeled at least at each end of each cable section, using cable tags or labels. Inside plant cables shall be labeled using self adhesive waterproof labels; outside plant cables shall be labeled using approved waterproof cable tags.
2. Cable Tags
    a. Attach to cable using two nylon cable ties through holes in the tag.
    b. Use pre-printed plastic tags marked with a durable, abrasion resistant, waterproof ink

3.02 START-UP

A. The duration of the networking portion of the Contract spans the life of the project. Provide support services to work with DEP OIT to bring each system on line as it is completed and ready.

B. Provide a visit of two (2) days duration for each of the six (6) separate network systems to be brought online for a total of six (6) visits (12 days).

3.03 TESTING

A. Contractor to develop test procedures for each system in coordination with NYC-DEP OIT, BPS/SEU, and the Engineer. Test procedures to be submitted by the Contractor for review by NYC-DEP OIT, BPS/SEU, and the Engineer. Prior to use, test procedures must be approved by NYC-DEP and the Engineer.

B. Test each system as it is brought online by using approved test procedures.

C. Tests to include pinging from respective Local Access Network and DEP Network as available.

3.04 TRAINING

A. After system startup, the Contractor (via the Contractor's Network Integrator) shall instruct the City's personnel on how to operate the system.

B. The Contractor shall provide on-site training from the manufacturer for a total period of two (2) working days. Training dates to be coordinated with the City.

3.05 WARRANTY SUPPORT

A. The Contractor (via the Contractor's Network Integrator) shall be available during the warranty period to answer application questions and to support the City's personnel during this period. Warranty period shall be as the period between Substantial Completion until Final Acceptance of Work.

- END OF DETAILED SPECIFICATION -

SECTION 15053H
Aluminum, Copper and Brass Pipe

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15053 – Aluminum, Copper and Brass Pipe, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.05 DESIGN REQUIREMENTS

Replace 1.05.A with the following:

A. Aluminum, copper and brass pipe and fittings shall conform to the latest Building Code of the State of New York in respect to plumbing and other applications covered by these laws.

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15060H
Hangers and Supports

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15060 – Hangers and Supports, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.04 REFERENCES

Replace 1.04.J with the following:

J. Latest Edition of the New York State Building Code.

1.05 DESIGN REQUIREMENTS

Replace 1.05.B.2.e with the following:

e. Seismic forces, as required by the latest edition of the New York State Building Code

PART 3 EXECUTION

3.02 SPACING OF HANGERS AND SUPPORTS

3.02.C shall be deleted

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15081H
Piping Insulation

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15081 – Piping Insulation, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A and B with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.04 REFERENCES

Replace 1.04.A.10 with the following:

10. New York State Building Code

PART 2 PRODUCTS

2.03 BUILDING CODE COMPLIANCE

Replace 2.03.A with the following:

A. Piping insulation products shall comply with the New York State Building Code and with the New York State Energy Conservation Code

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15112H
Valves Smaller Than 4 Inches

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15112 – Valves Smaller Than 4 Inches, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

1.03.C shall be deleted

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15130
Piping Specialties

NOTE: Detailed Specification 15130 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15130.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish, install, test and place into satisfactory operation all specialties as shown on the Contract Drawings and as specified herein. All piping specialties shall be connected and placed in proper working order in accordance with the manufacturer's instructions and details.

B. The following index of this Specification is presented for convenience.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SPECIFICATIONS

A. Detailed Specification 09900H - Painting

B. Detailed Specification 15951H - Testing, Adjusting and Balancing

C. Detailed Specification 15076H - Piping and Equipment Identification

D. Detailed Specification 15112H - Valves Smaller Than 4 Inches

E. Detailed Specification 15081H - Piping Insulations

1.04 REFERENCES

A. Products and construction shall be in accordance with the following standards and specifications unless otherwise noted in this document. In case of conflict, the standard with more stringent requirements shall apply.

1. American National Standard Institute (ANSI).
2. American Society of Mechanical Engineers (ASME).
3. American Society of Testing and Materials (ASTM).
4. American Water Works Association (AWWA).
5. American Welding Society (AWS).

1.05 SUBMITTALS

A. General:

1. In accordance with the procedures and requirements set forth in the General Conditions and Division 1 the Contractor shall obtain from the equipment manufacturer and submit the following data:

    a. Shop Drawings.

    b. Results of Certified Shop Tests.

    c. Certified Letters of Compliance.

    d. Samples.

    e. Operation and Maintenance Manuals.

    f. Spare Parts List.

    g. Special Tools List.

2. No material furnished under this specification shall be shipped to the job site until all submittals have been approved.

3. Each submittal shall be identified as specified in the General Conditions and Division 1.

B. Shop Drawings:

1. Each submittal shall be complete in all aspects incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions shall be returned to the Contractor disapproved without review.

2. Data to be submitted shall include but not be limited to:

    a. Catalog Data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used for the various piping components and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.

    b. Complete layout and installation drawings with clearly marked dimensions. Scale and size of the drawings shall conform to the specifications in the General Conditions and Division 1.

    c. Listing of all lubricants required for the equipment with a minimum of four equivalent and compatible natural and/or synthetic lubricants produced by different manufacturers. The listing shall include the estimated quantity of lubricant required for one year of operation.

d. Sample data sheet of equipment nameplate(s) including information contained thereon.

e. Spare parts list.

f. Special tools list.

C. Certified Shop Test Results:

1. The Contractor shall obtain from the manufacturer and submit to the City copies of the certified shop tests in accordance with the General Conditions and Division 1.

D. Certified Letters of Compliance:

1. The Contractor shall obtain from the manufacturer and submit to the City copies of certified letters of compliance in accordance with the General Conditions and Division 1.

E. Operation and Maintenance Manuals:

1. The Contractor shall submit operation and maintenance manual in accordance the procedures and requirements set forth in the General Conditions and Division 1.

F. Spare Parts List:

1. 1. The Contractor shall obtain from the equipment manufacturer and submit to the City the following spare parts lists in accordance with the procedures and requirements set forth in the General Conditions and Division 1.

a. A complete list of parts and supplies with current unit prices and source of supply.

b. A list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment or specified herein to be furnished as part of the Contract. (This list shall be submitted as part of the shop drawing submission).

c. A list of additional item recommended by the manufacturer to assure efficient operation for a period of 120 days at the particular installation.

2. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

3. Lists 1 and 3 shall be submitted with the operation and maintenance manual.

G. Special Tools:

1. The Contractor shall compile based on the shop drawing submittals, and furnish a comprehensive list of all special tools required for the equipment specified herein.

H. Comprehensive Lubrication Survey:

1. The Contractor shall submit a comprehensive lubrication survey in accordance with the General Conditions and Division 1.

1.06 QUALITY ASSURANCE AND QUALIFICATIONS

A. The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and as shown on the Contract Drawings.

PART 2 PRODUCTS

2.01 PIPING SPECIALTIES

A. General

1. Raised Face Flanges:

a. All raised face flanges in conformance with ANSI B16.5 Class 150 shall be milled flat. The only exceptions to this rule are ANSI B16.5 Class 300-lb flanges where specified and the lap joint flanges for the stainless steel pipe for low pressure air service and light wall stainless steel pipe.

2. Anchor Bolts:

a. All anchor bolts shall be 316 stainless steel.

b. An approved thread locking compound shall be applied to the stainless steel anchor bolt threads prior to threading on the nut.

2.02 STRAINERS

A. Strainers for all water systems shall be Y-type with cast iron body, ASTM A126, and monel screen. Screens shall be 20 mesh type 316 stainless steel. Strainers shall be the same size as the piping in which they are installed.

2.03 PRESSURE AND COMPOUND GAUGES

A. Gauges shall be Liquid filled 4-1/2-inch dial type with stainless steel case, bayonet type ring, with stainless steel tubing. The gauges shall be accurate within 1% of total scale range in the middle half of the scale and 1-1/2% elsewhere. Gauges shall be provided with a stainless steel tee handle cock and snubbers to damp out pulsations in the piping. In general, gauges shall be selected so that the normal reading is near the midpoint of the scale.

2.04 THERMOMETERS

A. Thermometers shall be adjustable angle dial type, 5" diameter, bezel faced. Thermometers shall have a 304 stainless steel case, removable slip ring, socket and stem. Head shall turn a full 360º and tilt thru a full 180º arc. Accuracy shall be within 2% of the full scale. Install in stainless steel separable well with graphite mixture. All thermometers and/or their bulbs shall be of the swivel nut design. NPT threaded designs are not acceptable.

2.05 AUTOMATIC AIR VENTS - FOR COILS AND PIPING

A. Air vents shall be Bell and Gossett No. 87, or approved equal automatic hot water air vents. Air vents shall be suitable for 150 psig working pressure and 240 ºF maximum operating temperature. Automatic air vents shall be installed at all high points in the piping systems and at coils. On piping larger than 6", air vents shall be Bell and Gossett No. 107, or approved equal, and shall be direct-piped to the nearest floor drain. A manual valve shall be provided to allow isolation of air vents.

2.06 FLEXIBLE CONNECTORS IN PIPES

A. Flexible connectors in steel piping shall be of the flexible hose type complete with stainless steel hose and braiding, and carbon steel ends. End connections shall be threaded, welded or flanged in accordance with the piping specifications. The connectors shall be suitable for use with water at 250 ºF and 125 psig.

2.07 FLEXIBLE CONNECTORS AT PUMPS

A. Flexible connectors at base mounted hot water pumps shall consist of a stainless steel bellows assembly complete with flanged carbon steel fittings, heavy duty restraining rods and spacers. The connectors shall be suitable for use with water at 250 ºF and 125 psig. Flexible connectors at pumps shall be as manufactured by Flexonics Products, or approved equal.

2.08 EXPANSION COUPLINGS

A. Expansion couplings (joints) as manufactured by Flexonics Products, or approved equal, in steel piping 3 inches and larger shall be of the controlled flexing type complete with hydraulically formed, stainless steel corrugated pressure carrier with 150 lb. forged steel flanged ends and nickel iron control rings. After the pressure carrier has been formed, it shall be annealed, pickled and passivated to provide maximum corrosion resistance. The joints shall be suitable for use with water at 250 ºF and 125 psig.

B. Expansion joints in steel piping smaller than 3 inches shall be of the compensator type complete with two ply, seamless stainless steel pressure carrier, steel shroud and threaded steel ends. The joints shall be suitable for use with water at 250 ºF and 125 psig.

C. All piping in which expansion joints are installed shall be securely anchored and guided in accordance with the manufacturer's recommendations.

2.09 EXPANSION TANKS

A. Furnish and install as shown on the Drawings, Pressurized Diaphragm Type Expansion Tanks. Tank shall be air pre-charged to the initial fill pressure of the system. It shall be suitable for a maximum working pressure of 125 psi and shall be furnished with ASME stamp and certification papers. It shall have a sealed-in elastomer diaphragm suitable for an operating temperature of 240º F.

B. Tanks shall be constructed in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code.

2.10 VENTURI FLOW METER

A. Venturi Flow Meter shall be complete with brass nipples, brass safety shut-off and quick disconnect coupling ends. Venturi Station shall be installed at all end suction base mounted pumps. Venturi Station shall be provided with permanently mounted pressure gauge calibrated in gallons per minute.

B. Each Venturi Station shall be equipped with two (2) precession located pressure taps. The static pressure differential sensed between the inlet and throat taps shall determine the flow rate.

C. Venturi Stations shall have an accuracy of 1% over their entire operating range of up to 250 ºF at 250 psig. Venturis shall have a permanent head loss no greater than 8.3% of their meter rating.

D. Venturi Stations less than 10" diameter shall be plate steel with 150 lb flange ends and flanges steel for 10" diameter and larger.

E. Venturis shall be installed at a minimum distance of five pipe diameters upstream and two pipe diameters downstream.

F. Venturi flow meters shall be as manufactured by Gerand Engineering or approved equal.

2.11 AIR SEPARATOR

A. Furnish and install the horizontal in-line air separators for water system where indicated on the Drawings. The air separators shall be IAS In-Line, as manufactured by Bell and Gossett or approved equal.

B. Furnish and install as shown on plans a horizontal in-line air separator designed to effectively separate free air in hydronic heating systems. The air separator shall be heavy duty cast iron designed to function satisfactorily at working pressures up to 175 psi (12.1 bar) and liquid temperatures up to 300°F. The air separator shall have an integral weir designed to decelerate system flow to maximize air separation.

C. The in-line air separator shall also assist in eliminating free air from the system by directing the air to an air vent attached to the separator while reduced oxygenated water is circulated to the system. The in-line air separator shall allow expansion of the system fluid to be directed to a pre-charged diaphragm expansion tank.

D. The units shall be installed in strict accordance with the manufacturer's recommendations.

2.12 CHEMICAL SHOT FEEDER

A. Furnish and install chemical shot feeder for water system where indicated on the Drawings. The chemical shot feeder shall be manufactured by Wessels or approved equal.

B. The units shall be constructed of carbon steel and shall be suitable for a maximum design temperature of 450 °F and a maximum design pressure of 200 PSIG.

C. The units shall be installed in strict accordance with the manufacturer’s recommendations.

2.13 GLYCOL FEEDER

A. Provide fully automated and autonomous glycol make-up package complete with:

1. Low level cut-off and alarm arrangement including an 120V signal remote alarm.

2. Isolation valves.

3. Strainer.

4. Pressurization assembly consisting of a pressurization pump with pressure controls, pressure reducing valve, and a pressure gauge to continuously monitor the pressure reducing valve outlet pressure

5. Translucent polyethylene solution container with lid designed to accommodate relief valve piping.

6. Magnetic starter.

7. 120V, 60Hz motor and controls.

8. All mounted on a steel frame with 1/2 inch system connection and factory preset 125 psig (field adjustable) discharge.

9. Make-up capacity: 1.8 GPM @ 50 psig (pressure range 1-050 psig)

10. Solution Container Volume: 18 gallons.

B. Product and Manufacturer:

1. Wessels Company.

2. Or Approved Equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. All miscellaneous pipe line equipment and appurtenances shall be installed in accordance with the Specifications, manufacturer's recommendations and as shown on the Contract Drawings.

B. Install equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

C. Equipment Pads:

1. Install equipment on concrete pads at locations shown on the Contract Drawings. Provide steel channels for support of equipment. Secure equipment to mounting surface with anchor bolts. Provide anchor bolts meeting manufacturer's recommendations and of sufficient size and number to secure equipment. Equipment pads provided by General Contractor.

D. Seismic Requirements:

1. Equipment shall be secured or anchored to withstand seismic forces as prescribed by the New York State Building Code and as indicated in specification 01415.

3.02 IDENTIFICATION

A. Each unit of equipment shall be identified with the equipment item numbers given on the Contract Drawings and in Division 1. A corrosion resistant tag or nameplate, securely affixed in a conspicuous place on each unit shall give the equipment item number, manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, to complete identification.

3.03 TESTING

A. Shop Tests:

The pipe and fittings covered by these specifications shall be tested in accordance with the ASTM, ANSI, and/or AWWA Standards specified herein. At least one sample per lot shall be subjected to the standard tests and the optional tests listed in the specifications and their appendices. Copies of the certified test results shall be provided by the manufacturer to the Contractor and submitted in accordance with paragraph 1.04 Submittals, contained herein.

B. Field Tests:

Shall be performed as specified herein and in accordance with the General Conditions and Division 1.

C. Witnessed Shop Tests:

None Required.

D. Letters of Compliance:

In accordance the submittals paragraph, the Contractor shall obtain and submit certified statements that the equipment as applicable complies with the requirements of the standards specified herein.

3.04 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall provide the services of a qualified manufacturer's technical representative who shall adequately supervise the installation and testing of all equipment furnished under this Contract. The services of the manufacturer's representative shall be provided for a period of not less than three (3) days as follows:

1. At least one (1) trip of up to one (1) day during installation of the equipment.

2. One trip of up to one (1) day after acceptance of the equipment.

3. One trip of one (1) day during the guarantee period.

B. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor. The manufacturer's representative shall sign in and out the office of the Resident representative on each day he is at the project.

C. Training

1. The Contractor shall provide training for City personnel in accordance with Section 01821 - Equipment Start-Up Services and Training of Division 1 - General Requirements.

2. The Contractor shall include in his request for manufacturer approval a certification that the manufacturer has been advised of the requirements of Section 01821, paragraph 1.06 - Training, and that the costs associated with said training submittals and training have been included in the manufacturer's pricing.

D. Lubricants

1. The manufacturer shall submit a list with a minimum of four manufacturers' standard lubricants which may be used interchangeably for each type of lubricant required.

2. The Contractor shall utilize this list in preparing his comprehensive lubrication survey as specified in Division 1.

- END OF DETAILED SPECIFICATION -

NO TEXT ON THIS PAGE

SECTION 15500
Basic HVAC Requirements

NOTE: Detailed Specification 15500 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15500.

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all labor, equipment and material for the complete installation of the heating, ventilation, air conditioning, piping, etc. as indicated on the drawings and specified herein.

B. Air conditioning systems shall be furnished and installed to operate as a system. The Contractor shall coordinate all requirements between manufacturers to insure unit responsibility and compatibility of the systems.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 SUBMITTALS

A. The Contractor shall submit shop drawings on all equipment, accessories and appurtenances and all fabrication work or other mechanical and air conditioning work required, all in accordance with the requirements of Section 01300, Submittals.

B. Data to be submitted shall include but not be limited to:

1. Catalog data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used for the various parts and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.

2. Complete assembly, and installation drawings with clearly marked dimensions. This information shall be in sufficient detail to serve as a guide for assembly and disassembly and for ordering parts.

3. Weight of all component parts and assembled weight.

4. Electrical characteristics, wiring, diagrams, etc.

5. Sample data sheet of equipment nameplate(s) including information contained thereon.

6. Insulation materials, coating, jackets, detail density, thermal conductivity and thickness of all insulation materials to be furnished.

7. Details of special fasteners and accessories.

8. Type of adhesives, binders, joint cement, mastics.

9. Proposed insulation procedures and installation methods.

10. Spare parts list

11. Special tools list

C. The Contractor shall obtain from the manufacturer and submit to the engineer copies of the results of all certified shop tests.

D. The Contractor shall obtain from the manufacturer and submit to the engineer copies of certified letters of compliance in accordance with the Specifications.

1.04 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manual in accordance with the procedures and requirements set forth in the General Conditions and Division 1.

B. Operation and Maintenance Manuals shall be submitted for all equipment.

1.05 MANUFACTURER'S INSTRUCTIONS

A. Installation of all equipment shall be in accordance with manufacturer's data.

B. All changes from the installation procedures in manufacturers' data shall be submitted for approval in accordance with the requirements for shop drawings.

C. Keep all manufacturers' data provided in a secure manner at the job site at all times. Catalog and index this data for convenient reference.

D. Manufacturers' data shall be available for the information of DEP, Engineer, and the use of other trades.

E. Turn over all data to the DEP through DEP's representative at completion of the Work and final testing.

F. Furnish DEP, indexed and bound in loose leaf binders, three (3) complete sets of Operating and Maintenance Instructions and pertinent manufacturers' literature and information on all of the apparatus and equipment under this Division of the Specifications.

G. Submit all instruction books and manuals in accordance with Division 1.

1.06 CODES, PERMITS AND STANDARDS

A. The Contractor shall obtain and pay for all permits and shall comply with all laws and codes that apply to the Work.

B. The Contractor shall be responsible for all added expense due to his choice of equipment, materials or construction methods.

C. All work and materials shall be in full accordance with the latest State rules and regulations or publications including those of the State Fire Marshall, the Uniform Plumbing Code, and all local codes. Nothing in the Plans and/or Specifications shall be construed to permit work not conforming to the above codes, rules and regulations.

D. All equipment, materials and installations shall conform to the requirements of the most recent edition with latest revisions, supplements and amendments of the following, as applicable:

Air Conditioning and Refrigeration Institute (ARI)
Air Diffusion Council (ADC)
Air Moving and Conditioning Association (AMCA)
American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE)
American National Standards Institute (ANSI)
American Society for Testing and Materials (ASTM)
American Society of Mechanical Engineers (ASME)
Factory Mutual (FM)
National Electric Code (NEC)
NFPA 90A - Air Conditioning and Ventilation Systems
Occupational Safety and Health Standards (OSHA)
Sheet Metal & Air Conditioning Contractors National Association (SMACNA)
Standard Building Code – 2017 edition
Standard Mechanical Code – 2017 edition
Standard Plumbing Code – 2017 edition
State and local codes, ordinances and statutes
Underwriters Laboratories (UL)

Others as designated in the specifications.

1.07 QUALITY ASSURANCE

A. All material and equipment shall be the latest design, new, undeteriorated, and the first quality standard product of manufacturers regularly engaged in the production of such material and equipment.

A. When two or more units of the same class of material or equipment are required, they shall be products of a single manufacturer.

B. All work shall be performed in a neat and workmanlike manner by workers skilled in their respective trades, and all materials and equipment shall be installed as recommended by the manufacturers and in accordance with specified codes and standards.

C. Touch up and/or repaint to match original finishes all factory finished or painted equipment and materials which are scratched or marred during shipment or installation.

1.08 IDENTIFICATION MARKERS

A. Provide manufacturer's standard laminated plastic, color coded duct markers. Conform to the following color codes:

Yellow/Green:	Supply air
Blue:	Exhaust, outside, return and mixed air
Nomenclature:	Include the following: Direction of air flow. Duct service (supply, return, exhaust, etc.)

1.09 GASKETS AND CONNECTORS

A. Provide new gaskets wherever gasketed mating equipment items or pipe connections have been dismantled. Gaskets shall be in accordance with manufacturer's recommendations.

B. Replace all assembly bolts, studs, nuts and fasteners of any kind which are bent, flattened, corroded or have their threads, heads or slots damaged.

C. Furnish all bolts, studs, nuts and fasteners for make-up of all connections to equipment and replace any of these items damaged in storage, shipment or moving.

PART 2 PRODUCTS

2.01 GENERAL

A. Each item of equipment shall be furnished and installed complete with all supports, mounting frames, duct work, piping, louvers, panels, grilles, electric drive units and controls, mechanical equipment, electrical work, insulation and appurtenances ready for operation.

B. All equipment and appurtenances shall be anchored or connected to supporting members as specified or as indicated on the Plans.

C. All mechanisms or parts shall be amply proportioned for the stresses which may occur during operation or for any other stresses which may occur during fabrication and erection. Individual parts furnished which are alike in all units shall be alike in workmanship, design, and materials and shall be interchangeable. All equipment shall be of the manufacturer's top line, industrial-commercial grade.

D. The Contractor shall ascertain that all chassis, shafts, and openings are correctly located, otherwise he shall cut all new openings required at his own expense. Cutting of new openings shall be coordinated with other trades. Proposed new cutting shall be submitted to the Engineer for review and acceptance prior to cutting.

E. The Plans shall be taken as diagrammatic. The Contractor shall check the Structural Plans and sections for detail dimensions and clearances. Sizes of ducts and their locations are indicated, but not every offset, fitting, or structural obstruction is shown.

F. Alignment of ducts may be varied where necessary to account for slight architectural changes or to avoid conflict with the Work of other trades without additional expense to DEP.

G. All supports required for the proper installation of the equipment, but not forming an integral part of the building structure, shall be provided, unless specifically noted otherwise. Equipment shall be supported on spring-type vibration isolators.

PART 3 EXECUTION (NOT USED)

- END OF SECTION –

NO TEXT ON THIS PAGE

Section 15513
Hot Water Boilers

NOTE: Detailed Specification 15513 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15513.

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install a hot water boiler system complete with auxiliary equipment and accessories as shown, specified, and/or required for proper operation. This section includes packaged, factory fabricated and assembles, cast-iron boilers, trim, and accessories for generating hot water.

B. The equipment shall be furnished complete with all accessories, special tools, spare parts, mountings, anchor bolts, and other appurtenances as specified or as may be required for a satisfactory installation.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SPECIFICATIONS

A. 15052H – Steel and Stainless Steel Pipe

B. 15076H – Piping and Equipment Identification

C. 15112H – Valves Smaller than 4 Inches

D. 15130 – Piping Specialties

E. 15530 – HVAC Pumps

F. 15608 – HVAC Electric Control Systems

G. 15760H – Unit Heaters, Hot Water

H. 15762H – Finned Tube Radiation

I. 15810H – Ductwork and Duct Accessories

J. 15951H – Testing, Adjusting, and Balancing

1.04 REFERENCES

A. NFPA 54 – National Fuel Gas Code

B. NFPA 70 – National Electric Code

C. ASME Boiler and Pressure Vessel Code – Section VIII

D. American Gas Association (AGA).

E. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

F. American Boiler Manufacturer's Association (ABMA).

1.05 SUBMITTALS

A. In accordance with the procedures and requirements set forth in the General Conditions and Division 1, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings
2. Operation and Maintenance Manuals
3. Spare Parts List
4. Reports of Certified Shop Tests
5. Seismic and Wind Load Calculations
6. Control system and panel wiring, schematic, interconnection and fabrication drawings.

B. Each Submittal shall be identified by the applicable Equipment Identification Number and Specification Section.

C. Shop Drawings

1. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
2. Shop drawings shall include but not be limited to:
   a. Equipment specifications and data sheets identifying make, model, all materials used, and methods of fabrication.

b. Connection drawings listing all nozzle sizes, connection types, function, and location on the equipment.

c. Assembly drawings

d. Details of coatings

e. Internal Wiring Diagrams

f. Example equipment nameplate data sheet

g. Spare parts list

h. List of recommended lubricants

i. Coordination stack manufacturer and calculations of the stack pressure drops and confirmation that the stacks furnished will meet all the code requirements.

j. Control, instrument, panel, and PLC submittals in accordance with Detailed Specification 15608.

k. Quality assurance information from section 1.06 below.

D. Operations and Maintenance Manuals

1. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 1.

E. The Manufacturer shall submit as part of the submittal a list of deviations from the Contract Specifications and Drawings. If no deviations have been taken then the Manufacturer shall indicate in writing that no deviations have been taken from the specification. The submittal shall be considered incomplete without this information and will be returned unreviewed.

1.06 QUALITY ASSURANCE AND QUALIFICATIONS

A. The equipment covered by these specifications shall be standard equipment of proven performance as manufactured by reputable concerns. The Manufacturer shall have a minimum of 5 years of experience. The Manufacturer of the boiler shall provide as part of the submittal a list of 5 locations where identical or similar equipment has been installed. Limited 10 year warranty against workmanship and defects shall be provided in writing from the manufacturer.

B. Equipment shall be designed, construction, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

C. All components of the Hot Water Boiler System shall be provided by the Contractor through one vendor. The Contractor through the vendor shall have the sole responsibility of matching all components and providing equipment which functions together as a system.

D. The boilers, pump, fuel systems, control systems and all associated equipment and components shall meet or exceed all applicable codes and requirements.

E. ASME compliance: Fabricate and label cast-iron boilers to comply with ASME Boiler and Pressure Vessel Code: Section IV and Section VIII, Div. 1.

F. U.L. compliance: Test cast-iron boilers to comply with UL-795, "Commercial-Industrial Gas Heating Equipment."

1.07 SPARE PARTS

A. The Contractor shall provide spare parts as recommended by the equipment manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide boiler (s) manufactured by one of the following:

1. Lochinvar (Basis of Design).
2. Weil Mclain
3. Or Approved Equal.

2.02 FIN TUBE HOT WATER BOILER

A. The unit shall be a factory fabricated, assembled, and tested low pressureboiler with power burner that pressurizes the firebox and operate under forced draft.

B. The boiler shall be in accordance with the equipment schedules shown on the Contract Drawings and additional requirements herein.

C. Boiler construction shall be:

1. With a heavy gauge galvanized steel jacket assembly, pre-painted on both sides with a minimum dry film thickness of 0.70 mils.

2. Built with a built-in draft diverter contained entirely within the jacket, and requiring no additional external draft hood devices

3. Assembled with short, individual draw rods

4. Cast with sealing grooves for high temperature sealing rope to assure permanent gas-tight seal

5. Sealed watertight by elastomer sealing rings. Each port opening as machined to completely capture sealing ring between sections.

6. Hydro-wall design to provide completely water-cooled combustion chamber.

7. Provided with sufficient tappings to install required controls.

D. Boiler shall be furnished with:

1. Top flue outlet.

2. Cast-in air elimination to separate air from circulating water and expansion tank tapping to divert separated air to expansion tank.

3. Insulated burner mounting plate having necessary holes and tappings to mount burner. Provide permanent gas tight seal between front section and plate. The mounting plate must support the burner weight independent of any support.

4. Observation ports (front and back) to allow visual inspection of the flame

5. Steel flue damper assembly with a built in adjustable damper capable of being locked into place after adjustment.

6. Flanged aluminized steel flue collector hood bolted to top of section assembly. Provide permanent gas-tight seal between hood and section assembly.

7. Heavy duty clean out plates to cover cleanout openings on the side of boiler.

8. Elastomer sealing rings to provide permanent watertight seal between sections

E. Boiler Trim:

1. All electrical components shall be of high quality and bear the U.L. label.

2. Water Boiler standard controls furnished:

a. Combination low temperature limit (operating) and high temperature limit control

b. Low temperature limit shall be 140F.

c. High temperature limit shall be 200F.

d. Combination pressure-temperature gauge with dial clearly marked and easy to read.

e. ASME certified pressure relief valve, set to relieve at 30psig.

f. Low water cut-off with ASME working pressure rating equal to or exceeding the maximum boiler working pressure as shown on the boiler's rating label. Install cut-off according to manufacturer's instructions. Do not use quick connect fittings on boilers. Locate so burner shuts down if boiler water level falls below allowable safe waterline

F. Burner and Burner Controls:

1. Burner controller shall be provided by the boiler manufacturer.

2. Provide forced draft flame retention power gas burner listed in the equipment schedule, or approved equal.

3. Burners shall be capable of burning the input rating of the associated hot water boiler.

4. Operating modes: On-Off

5. Burner shall be listed by Underwriters Laboratories and shall bear the appropriate U.L. label.

6. Burner shall ensure high efficiency and good performance under forced draft conditions with 0.5" W.C. negative pressure at the flue collar.

7. Housing shall be cast aluminum construction.

8. Stainless steel flame retention head, capable of withstanding temperature up to 1400F.

9. Combustion head assembly shall incorporate an air diffuser, gas spuds downstream of air diffuser and direct ignition electrodes.

10. Combustion gun assembly shall be removable and have the ability to be set or replaced. Full access to the burner combustion gun assembly shall be available without removing the burner chassis from the appliance.

11. Air required for combustion shall be supplied by a blower, mounted integral to the burner. The blower wheel shall be of a forward curved "squirrel Cage" design and shall be directly driven.

12. Burner shall be equipped with an SPDT differential air pressure switch interlocked and continuously monitored to prevent burner operation if there is insufficient combustion air.

13. Ignition: The burner ignition system shall directly ignite the propane fuel. The ignition spark shall be generated by a 6000 volt electronic igniter, and directed by porcelain insulated electrodes located on the combustion head assembly. Ignition shall occur only at a reduced firing rate, and only after the flame is proven shall full rate be actuated.

14. Each boiler/burner shall be provided with a microprocessor-based integrated burner controller with automatic burner sequencing, flame supervision, system status indication, system or self diagnostics and troubleshooting. The controller system shall consist of a relay module, subbase, amplifier, purge card, and keyboard display module.

15. Controls shall include flame safeguards for pre-purge, pilot recognition, main flame recognition, and post purge.

16. Burner controller shall be capable of receiving an enable/disable signal from the Hot Water System Local Control Panel. Burner controller shall send a general alarm signal to the local control panel.

17. When enabled to run, burner shall start/stop boiler to maintain hot water system loop temperature setpoints (temperatures provided in hot water boiler schedule). When disabled to run, the burner shall shut down if running or if it is not running, it shall not start.

PART 3 EXECUTION

3.01 INSTALLATION

A. All equipment and appurtenances shall be installed, connected, and placed into satisfactory working order in accordance with the manufacturer's instructions and details and the Contract Drawings.

B. Boilers shall be installed on concrete pads. Secure equipment to mounting surface with anchor bolts. Provide anchor bolts meeting manufacturer's recommendations and of sufficient size and number to secure equipment

3.02 IDENTIFICATION

A. Each unit of equipment shall be identified with the equipment item numbers given on the Contract Drawings and in Division 1. A corrosion resistant tag or nameplate, securely affixed in a conspicuous place on each unit shall give the equipment item

number, manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, to complete identification

3.03 FIELD TESTING

A. Field tests shall be performed in accordance with Division 1 and specification 15951 – Testing, Adjusting, and Balancing.

B. Engage a factory-authorized service representative to test, inspect, and adjust boiler components and equipment installation and to perform startup service. The start-up representative shall provide a burner light-off report as written proof that the burner was adjusted to optimum performance. The authorized agent shall provide a one year service warranty after start-up.

C. Perform installation and startup checks according to manufacturer’s written instructions.

D. Following the field tests, the manufacturer shall assemble all recorded data, calculations and final results into a well-organized format, and the Contractor shall submit these to the Engineer for review.

- END OF DETAILED SPECIFICATION -

Section 15530
HVAC Pumps

NOTE: Detailed Specification 15530 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15530.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish, install, test and place into satisfactory operation all pumps complete with all accessories, special tools, spare parts and other appurtenances as shown on the Contract Drawings and as specified herein.

B. The following index of this Specification is presented for convenience.

1.02 PAYMENT

A. No separate payment will be made for performing any work required under this Specification.

1.03 RELATED SPECIFICATIONS

A.	Detailed Specification 09900H	-	Painting
B.	Detailed Specification 15951H	-	Testing, Adjusting and Balancing
C.	Detailed Specification 16221H	-	Electric Motors
D.	General Specification 03300G	-	Cast-in-Place Concrete
E.	Detailed Specification 15052H	-	Steel and Stainless Steel Pipes
F.	Detailed Specification 15076H	-	Piping and Equipment Identification
G.	Detailed Specification 15081H	-	Piping Insulations
H.	Detailed Specification 15112H	-	Valves Smaller Than 4 Inches
I.	Detailed Specification 15130H	-	Piping Specialties

1.04 REFERENCES

A. Equipment shall comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Standards of the Hydraulic Institute
2. National Electric Code (NEC)
3. Standards of National Electrical Manufacturers Association (NEMA)
4. Institute of Electrical and Electronic Engineers (IEEE)
5. Anti-Friction Bearing Manufacturers Association (AFBMA)
6. American National Standard Institute (ANSI)

1.05 SUBMITTALS

A. The Contractor shall obtain from the equipment manufacturer-dealer and submit the following submittals.

1. Each submittal shall be identified by the applicable Equipment Identification Number and Specification Section.

2. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information and design calculations required for evaluation of the compliance of the proposed equipment with the Contract Documents.

3. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.

B. Shop Drawings:

Shop drawings shall include but not be limited to:

1. Equipment specifications and data sheets identifying all materials used and methods of fabrication.

2. Complete assembly, layout, installation and foundation drawings with clearly marked dimensions.

3. Motor nameplate data as specified in Detailed Specification 16221G – Electric Motors.

4. Pump performance curves indicating the operating point

5. Weights of all component parts, assembled weight of units and approximate total shipping weight.

6. Example equipment nameplate data sheet.

7. Interconnecting power and control wiring diagrams.

8. List of recommended lubricants.

C. Lubrication Survey

1. The manufacturer shall submit a list of four manufacturers of standard lubricants which may be used interchangeably for each type of lubricant required. The Contractor shall utilize this list in preparing the comprehensive survey as specified in Division 1 - General Requirements.

D. Operation and Maintenance Data and Manuals

1. The Contractor shall furnish and deliver to the Engineer operation and maintenance manuals in conformance with the Division 1 - General Requirements including but not limited to instructions, technical bulletins and other printed matter, containing full information required for the proper operation and maintenance and repair of equipment and system.

2. Two copies of a preliminary O&M manual shall be included in the shop drawing submittal. Without inclusion of these manuals, the submittal will be considered incomplete and will be returned without review.

E. Test Procedures for Witnessed Shop Tests.

F. All Test Reports.

G. Final Record Drawings.

H. Training Plans and Materials:

1. The Contractor shall obtain from the manufacturer and submit for approval in conformance with Division 1 - General Requirements a training plan and materials for approval.

1.06 QUALITY ASSURANCE AND QUALIFICATIONS

A. The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed in accordance with the best practices of the trade and as shown on the Contract Drawings.

B. Manufacturers, subcontractors, and dealers shall be submitted for approval in accordance with the Contract Documents.

C. All components of the specified system shall comply with the design and operational experience specified in Division 1.

D. Ensure that the pumps operate at specified design conditions without vapor binding and cavitation, is non-overloading in parallel or individual operation, and operates to ANSI/HI 9.6.3.1 standard for Preferred Operating Region (POR) unless otherwise approved by the engineer.

E. Ensure pump pressure ratings are at least equal to system's maximum operating pressure at point where installed but not less than specified.

F. Equipment manufacturer shall be a company specializing in manufacture, assembly, and field performance of provided equipment with a minimum of 20 years experience.

G. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session. New pump start-up shall be for the purpose of determining pump alignment, lubrication, voltage, and amperage readings. All proper electrical connections, pump's balance, discharge and suction gauge readings, and adjustment of head, if required. A copy of the start-up report shall be made and sent to both the Contractor and to the Engineer.

1.07 SPARE PARTS AND SUPPLIES

A. In conformance with Division 1 - General Requirements, the spare parts listed below shall be furnished. All spare parts shall be delivered neatly wrapped or boxed, indexed and tagged with complete information for use and reordering. The following spare parts shall be provided for each three (3) or less of same type, size and capacity pumps:

1. One (1) spare impeller
2. Two (2) mechanical seal kits
3. Two (2) shaft sleeves
4. Two (2) bearing frame assemblies
5. Two (2) flexible coupling kits
6. Two (2) sets of resilient motor mount bushings
7. One (1) spare motor

B. The Contractor shall provide replacement of accessories for any oil or lubricant change after startup and testing. In addition, the Contractor shall provide the necessary accessories associated with the initial post acceptance oil and lubricant change.

C. Lubricants

1. The Contractor shall provide as part of the bulk lubricant order the quantity of lubricants required to operate and maintain the equipment furnished under this section for a period of one year after acceptance. As a minimum, there shall be provided sufficient oil to make at least one oil change for each unit

as applicable. All lubricants used during startup and testing shall be replaced prior to acceptance of equipment and shall be furnished in addition to the lubricants included in the bulk order.

PART 2 PRODUCTS

2.01 PUMPS

A. General Information:

1. All pumps shall be selected from performance curves and not from rating tables. A copy of the curve, indicating the operating point, shall be submitted for each proposed pump.

2. Motors shall not be selected for operation in the service factor. The maximum brake horsepower required at any point on the performance curve shall not exceed the rated horsepower of the motor.

3. Pumps shall be factory tested at the operating conditions, nameplate for quiet operation as a unit, thoroughly cleaned, and painted with one coat of machinery enamel prior to shipment. A set of installation instructions shall be included with the pump at the time of shipment.

B. Inline Pumps:

1. The pumps shall be furnished and installed for hydronic radiant and geothermal heating and cooling systems as indicated on the contract drawings. Pumps shall be Bell & Gossett Series ecocirc XL or approved equal.

2. Pumps shall meet types, sizes, capacities, and characteristics as scheduled on the Equipment Schedule and drawings. Pump substitutions shall be provided with connection sizes equal to those scheduled. Pump connections shall not be downsized. Pump substitutions shall not be provided at efficiencies less than those scheduled.

3. Pumps shall be a wet rotor inline pump, in cast iron or lead free bronze body construction, specifically designed and guaranteed for quiet operation. Suitable for 230°F operation at 175 psig working pressure. The pump internals shall be capable of being serviced without disturbing piping connections.

4. Pumps shall be equipped with a water-tight seal to prevent leakage.

5. Pump volute shall be of cast iron design for heating systems or lead free bronze for domestic water systems. The connection style on the cast iron and bronze pumps shall be flanged. Flange to Flange dimension shall be standard Bell & Gossett boost sizes such as 6-3/8", 8-1/2", 11-1/2" and 12" or approved equal. Flange dimensions shall be HVAC industry standard 2 or 4 bolts sizes.

6. Each pump shall be factory performance tested and name-plated before shipment.

7. A flexible-type coupling shall be employed between the pump and motor. Pump shall be of a maintainable design and for ease of maintenance should use machine fit parts, not press fit components.

8. Pump shall be designed to allow for true pull-out access to the pump's working components for ease of maintenance.

9. Pump manufacturer shall be ISO-9001 certified. Pump shall be of U.S. manufacturer.

10. Pump shall have a three (3) year warranty from date of installation.

11. Motors for pump shall comply with the requirements given in Paragraph 2.02 Electric Motors.

2.02 ELECTRIC MOTORS

A. Unless otherwise noted, all pumps shall be provided with totally enclosed premium energy efficiency motors.

B. The Engineer reserves the right to reject driven equipment which requires motors with larger horsepower than specified, or require the Contractor to bear additional costs if larger electrical equipment is required.

C. Motor shall be a synchronous, permanent-magnet (PM) motor and tested with the pump as one unit. Conventional induction motors will not be acceptable

D. Each motor shall have an Integrated Variable Frequency Drive tested as one unit by the manufacturer.

E. Integrated motor protection shall be verified by UL to protect the pump against over/under voltage, over temperature of motor and/or electronics, over current, locked rotor and dry run (no load condition).

F. Pump shall have MODBUS or BACnet connections built into the VFD as standard options.

G. Analog inputs, such as 0-10V and 4-20mA, are standard inputs built into the VFD.

H. Pumps shall be UL 778 listed and bear the UL Listing Mark for USA and Canada with on-board thermal overload protection.

I. All motors shall comply with the above requirements and the requirements under Detailed Specification 16221H - Electrical Motors. The more stringent specification shall apply. The Contractor shall coordinate that motors furnished and installed under this section shall be compatible with the pumps furnished and installed under this Contract.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install equipment in accordance with the manufacturer's instructions and recommendations.

B. Install equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.

C. Reduction from line size to pump connection size shall be made with eccentric reducers attached to the pump with tops flat to allow continuity of flow and to avoid air pockets.

D. Furnish and install a line size shut-off valve on the suction and discharge sides of the pumps

E. Provide an adequate number of isolation valves for service and maintenance of the system and its components.

F. Circulating pump shall have sufficient capacity to circulate the scheduled GPM against the scheduled external head (feet) with the horsepower and speed as scheduled and/or as denoted on the drawings. Motors shall be of electrical characteristics as scheduled, denoted and/or as indicated on the electrical plans and specifications.

G. All piping shall be brought to equipment and pump connections in such a manner so as to prevent the possibility of any load or stress being applied to the connections or piping.

H. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer’s instruction and per applicable state, federal, and local codes.

I. Control wiring for remote mounted switches and sensor / transmitters shall be the responsibility of the control's contractor. All wiring shall be performed per manufacturer's instructions and applicable state, federal, and local codes.

J. Power and control wiring shall run in separate channel.

K. Pumps are supplied with an integrated VFD and should not be used with any external VFDs.

L. Pumps shall not be run dry to check rotation.

3.02 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:

1. Certified Shop Tests

a. All electric motors shall be tested in accordance with Detailed Specification 16221H - Electric Motors.

b. Equipment shall be tested to demonstrate that it has been properly assembled, properly lubricated, not overheating, is not overloading, and has no electrical or mechanical defects.

c. All certified shop test shall be performed and the shop test reports submitted.

d. All shop tests shall be witnessed by the City.

2. Field Tests

a. After installation of the equipment, controls and all appurtenances, the system shall be field tested for system operation and conformance to the specified performance parameters. Field tests shall be in accordance with Division 1 - General Requirements.

b. After the Contractor and the Engineer have mutually agreed that the equipment installation is complete and ready for continuous operation, Contractor and a qualified field service representative of the manufacturer shall conduct an operating test of the pumps and controls in the presence of the Engineer to demonstrate that each pump and its controls will function correctly.

c. Running Tests:

1) Field test all pumps together with their controls. Tests shall demonstrate to the Engineer that each part and all parts together function in the manner intended. All necessary

testing equipment and manpower shall be provided by the Contractor at his expense. The Owner will furnish all power required for the tests.

2) In the event that the manufacturer is unable to demonstrate to the Engineer that his equipment meets the requirements of the above-described test, the deficient equipment will be rejected and the Contractor shall adjust and/or modify or replace and retest the equipment as often as necessary to meet the specified requirements.

d. Report:

1) The Contractor shall submit a report by manufacturer of operating test results including all problems encountered and corrective actions taken.

3.03 IDENTIFICATION

A. Each unit of equipment shall be identified with the equipment item numbers given on the Contract Drawings and in Division 1. A corrosion resistant tag or nameplate, securely affixed in a conspicuous place on each unit shall give the equipment item number, manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, to complete identification.

3.04 MANUFACTURER'S REPRESENTATIVE

A. Installation and Start-up:

1. The services of a qualified technical representative of the Supplier of the equipment shall be provided by the Contractor, in accordance with the requirements of Division 1 - General Requirements, to review the installation and field testing of the equipment and make necessary adjustments and instruct the plant personnel in its operation and maintenance.

2. The services of the Supplier's representative shall be provided for a period of not less than three (3) days.

a. At least one (1) trip up of to one (1) day each during the installation of the equipment.

b. At least one (1)-day trip after acceptance of the equipment.

c. At least one (1)-day trip during the guarantee period.

Should additional services be required for a successful installation, such services shall be arranged for by the Contractor at no additional costs to the City.

B. Training:

1. The services of a qualified instructor from the Supplier of the equipment shall be provided by the Contractor, in accordance with the requirements of the Detailed Specification 01821, Equipment Start-Up Services and Training, of Division 1, General Requirements, to instruct the plant personnel in the operation and maintenance of the equipment and system furnished herein. Each training period shall consist of a minimum of two (2) days involving eight (8) hours of instruction. Depending on the lesson plan, the City may elect to have split sessions during a training period covering the same material in the morning and afternoon sessions.

2. The Contractor shall include in his request for manufacturer approval a certification that the manufacturer has been advised of the stringent requirements of Detailed Specification 01821, paragraph 1.05 - Training, and that the costs associated with said training submittals and training have been included in the manufacturer's pricing.

C. The manufacturer’s representative and/or instructor shall sign in and out at the office of the Resident Engineer on each day that he is at the construction site.

- END OF DETAILED SPECIFICATION -

NO TEXT ON THIS PAGE

Section 15575
Breeching, Chimney and Stacks

NOTE: Detailed Specification 15575 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15575.

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all labor, equipment and material for the complete installation of the boiler stack system as indicated on the Drawings and specified herein.

B. Systems shall be furnished and installed to operate as a system. The Contractor shall coordinate all requirements between boiler and flue to insure unit responsibility and compatibility of the system.

C. Codes and Standards:

1. NFPA: Comply with NFPA 211 "Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances."

2. UL: Comply with applicable portions of UL safety standards; provide products which have been UL 103 listed and labelled.

3. SMACNA: Comply with SMACNA Low Pressure Duct Standards for fabricated breeching and smoke pipe.

4. AWS: Comply with AWS Structural Welding Code for welder's qualifications, welding details, and workmanship standards.

5. ASHRAE: Comply with the ASHRAE Equipment Handbook for Chimney, Gas Vent, and Fireplace Systems, material requirements and design criteria.

D. Positive Pressure Flue

1. Provide factory-built modular connector, manifold and stack system that is tested and Listed by Underwriters' Laboratories, Inc. for use with building heating equipment and appliances which produce exhausted flue gases at a temperature not exceeding 1000° F under continuous operating conditions, and not exceeding 1400° F under intermittent operating conditions (UL 103) when burning gaseous, solid or liquid fuels as described in NFPA-211.

2. The UL Listed air insulated flue gas vent system shall have skin temperatures that have been obtained by Underwriters Laboratories (UL) test procedures. The published surface temperatures shall be the result of the UL 103 1000° F chimney test.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SPECIFICATIONS

1. Section 01300 - Submittals

1.04 REFERENCES

1.05 SYSTEM DESCRIPTION

1.06 QUALITY ASSURANCE AND QUALIFICATIONS

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five (5) years documented experience, who issues complete catalog data on total product.

B. All material and equipment shall be the latest design, new, not deteriorated, and the first quality standard product of manufacturers regularly engaged in the production of such material and equipment.

C. When two or more units of the same class of material or equipment are required, they shall be products of a single manufacturer.

D. All work shall be performed in a neat and workmanlike manner by workers skilled in their respective trades, and all materials and equipment shall be installed as recommended by the manufacturers and in accordance with specified codes and standards.

1.07 SUBMITTALS

A. The Contractor shall submit shop drawings on all equipment, accessories and appurtenances and all fabrication work or other mechanical work required, all in accordance with the requirements of Section 01300, Submittals.

B. Data to be submitted shall include but not be limited to:

1. Catalog data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used for the various parts and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.

2. Complete assembly and installation drawings with clearly marked dimensions. This information shall be in sufficient detail to serve as a guide for assembly and disassembly and for ordering parts. Drawings

shall be provided at ¼" = 1'-0" scale showing all structural support points and corresponding weights.

3. Weight of all component parts and assembled weight.

4. Details of fasteners and accessories.

C. The vent system manufacturer shall verify that the shop drawings' proposed exhaust system complies with the appliance manufacturers' written requirements and that the installation will safely exhaust the connected equipment. Draft calculations shall be based upon the appliance manufacturers' written requirements. The draft calculation shall be based upon ASHRAE's chimney design equation and submitted with the appliance manufacturers' requirements for review and approval by the engineer. The submittal shall include location of adjustable lengths, supports, guides, drains, etc.

D. The Contractor shall obtain from the manufacturer and submit to the Engineer copies of the results of all certified shop tests and certified letters of compliance.

1.08 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES (NOT USED)

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to the Project Site under the provisions of Division 1.

B. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.

C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures and finish.

D. Protect openings in casing and seal them with plastic wrap to keep dirt and debris. Protect coils from entry of dirt and debris with pipe caps or plugs.

1.10 SPECIAL WARRANTY PROVISIONS

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of venting system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, structural failures caused by expansion and contraction.

1. Warranty Period: 15 year (minimum) from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide flue system manufactured by one of the following:

1. Security Chimneys Model SS.

2. Or Approved Equal

2.02 MATERIALS/EQUIPMENT

A. 2.02 CONSTRUCTION

1. Construction Material:

a. Inner Liner: Type 316 stainless steel, 20 gauge min.

b. Outer Jacket: Type 316 stainless steel.

c. Insulation: 1-inch fiber.

d. Fasteners, Brackets and Accessories: Type 316 stainless steel.

2. The materials and construction of the modular sections and accessories shall be as specified by the terms of the product's UL Listing.

3. The stack system shall be designed and installed to be gas tight and thus prevent leakage of combustion products into the building. Additionally, the vent system shall also be UL tested and listed to 50-inches internal water column pressure.

4. Inner pipe joints shall be securely connected and sealed with factory applied V-bands and appropriate sealant as specified in the manufacturer's installation instructions.

5. The vent system shall be designed and installed to compensate for all flue gas induced thermal expansion.

6. The stack support shall be designed to withstand requirements (110 MPH-3 second gust).

B. PERFORMANCE

1. The inner diameter of the flue system shall be verified by the Boiler Manufacturer's venting computations. The computations used shall follow ASHRAE calculation methods and shall incorporate the specific flow characteristics of the inner pipe. Allowable stack draft pressure range is - 0.02" W.C. to -0.05" W.C.

2. The Contractor shall furnish the exact operating characteristics of all equipment to the manufacturer.

2.03 FABRICATION/ASSEMBLING/FINISHES (NOT USED)

2.04 SOURCE QUALITY CONTROL (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION/PREPARATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Manufacturer's services

1. Furnish services of qualified manufacturer's factory trained service personnel to assist in the installation of the equipment, check the installation before it is placed into operation, supervise initial operations. A certificate from the manufacturer relative to these services is required.

2. Service personnel shall not make less than one visit to site as necessary to assist in the installation of the equipment, to check the completed installation, and confirm proper installation.

3.02 INSTALLATION

A. The prefabricated flue system shall be installed according to the manufacturer's installation instructions and shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All chimney openings shall be cleaned and pressure tested prior to installation to confirm structural integrity.

C. Exterior stack assembly shall be properly secured and anchored to structure to withstand wind loading requirements.

D. All tees shall be 45-degree (lateral) tees; boot tees and 90-degree tees are not acceptable. Provide all modular straight sections, plate supports, guides, expansion joints, roof thimbles, drain tee caps, roof flashings, storm collars, and stack cap terminations as required to provide a complete system per the manufacturer's installation instructions.

E. Maximum distance between wall supports shall be 10 feet on center within chimney.

3.03 FIELD TESTING/QUALITY CONTROL

A. Field tests shall be performed in accordance with Division 1 and Specification 15951 – Testing, Adjusting, and Balancing.

B. Cleaning

1. Clean dirt and marks and other debris from exterior of equipment weekly.

2. Remove debris and waste material resulting from installation weekly.

3.04 STARTUP/DEMONSTRATION (NOT USED)

3.05 ADJUSTING/PROTECTION/CLEANUP

A. Guarantee

1. All components, parts, and assemblies shall be guaranteed against defects in workmanship for a period of one (1) year. All components, parts, and assemblies shall be guaranteed against defects in materials for a period of ten (10) years. The period of such warranties shall start on the date the particular equipment is placed in use by DEP with corresponding start-up certification provided by the manufacturer's technical representative as specified herein, provided that the equipment demonstrates satisfactory performance during the thirty day operational period after the equipment startup. If the equipment does not perform satisfactorily during the thirty day operational period, the start of the warranty period will be delayed until the equipment demonstrates proper operation. The Equipment Supplier shall repair or replace without charge to DEP any part of equipment which is defective or showing undue wear within the guarantee period, or replace the equipment with new equipment if the mechanical performance is unsatisfactory; furnishing all parts, materials, labor, etc., necessary to return the equipment to its specified performance level.

- END OF SECTION -

Section 15608
HVAC Electric Control Systems

NOTE: Detailed Specification 15608 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15608.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install the HVAC Electric Control System complete with auxiliary equipment and accessories as shown, specified and/or required for proper operation.

B. Automatic temperature control systems indicated on the Drawings and control devices such as thermostats, etc, indicated to be 24 volts shall be supplied, mounted, and wired (cable and conduit) by the ATC Contractor, unless otherwise indicated on the contract drawings. The Automatic Temperature Controls (ATC) Contractor shall size and provide low voltage transformers where required.

C. The following index of this Specification is presented for convenience:

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this

Specification.

1.03 RELATED SPECIFICATIONS

A. Detailed Specification 15951H – HVAC Testing, Adjusting, and Balancing

B. Detailed Specification 16121H – Electrical Wires and Cables

C. Detailed Specification 16131H – Electrical Conduit Systems

1.04 REFERENCES

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified. General requirements of this Contract shall supersede the Standards in case of conflict:

1. Air Moving and Conditioning Association (AMCA)
2. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
3. National Electrical Manufacturers' Association (NEMA)

B. Where reference is made to one of the above standards, the revision in effect at the time of the Work shall apply.

1.05 SUBMITTALS

A. Contractor shall submit working drawings, shop drawings and material specifications for the approval of the Engineer in accordance with the requirements of Division 1 of the Specifications.

B. Shop Drawings: Submit for approval the following:

1. Dimensions.
2. Wiring diagrams.
3. Materials of construction.
4. Cut sheets for all components used in the assembly of the control system.
5. Manufacturer's literature, illustrations, Specifications and engineering data.
6. Heat load and electrical load calculations for panel construction

C. Operations and Maintenance Manuals:

1. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 1, General Requirements of the Specifications.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Firms regularly engaged in the manufacture of electric control equipment, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

2. The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

B. Contractor's Qualifications:

1. Contractor shall have at least 5 years' experience in the installation of the Work specified. He shall employ only tradesmen with specific skills and experience in this type of Work.

2. Contractor shall have undivided responsibility as a single firm for performance and other requirements for the installation of equipment specified herein.

C. Requirements of Regulatory Agencies: Comply with applicable provisions of regulatory agencies below and others having jurisdiction.

1. Underwriters Laboratories, Incorporated (UL).

2. National Electrical Manufacturers Association (NEMA).

3. National Fire Protection Association (NFPA).

4. National Electrical Code (NEC).

5. Local and State Building Codes and Ordinances.

1.07 SPARE PARTS

A. Relays, Circuit Breakers, Fuses

1. Provide 10% (minimum of two (2)) spares for each size, type, and configuration for each ten (10) or part thereof installed.

B. Panel Mounted Switches, Push Buttons, and Indicating Lights

1. Provide 10% (minimum of two (2)) spares of each size, type, color, and configuration for each ten (10) or part thereof installed. (Including contact sets)

C. Terminals and Mounting Strips

1. Provide 20% (minimum of ten (10)) spares of each size, type, and configuration for each ten (10) or part thereof installed (including mounting rail).

D. Specialty Items Not Listed Above

1. Provide one (1) component for up to every five of the same item installed

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The electrical control systems shall be as manufactured by Honeywell, Inc.; Johnson Controls, Inc.; Allen Bradley; or approved equal.

2.02 MATERIALS AND EQUIPMENT

A. Provide electric control products in sizes and capacities indicated, consisting of valves, dampers, thermostats, clocks, sensors, controllers, and other components as required for complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by the manufacturer. Provide electric control system with the following functional and construction features as indicated.

B. Enclosures shall be NEMA 4X:

1. Panels shall be Type 316L stainless steel construction with a minimum thickness of 12 gage for all surfaces (except those areas requiring reinforcement) having a smooth brushed finish.
2. Wall mounted panels shall be furnished with stainless steel quick-release clamp assemblies on three sides of each door. Floor mounted panels shall be furnished with stainless steel 3-point door latch with stainless steel handle.
3. A lockable hasp shall be provided for all panels to prevent unauthorized access to the interior of the enclosure.
4. Panels shall be furnished with rolled lip around three sides of door and along top of enclosure opening.
5. Panels shall be provided with clear plastic, gasketed lockable hinged door to encompass all non-NEMA 4X front panel devices.

C. Temperature Switches:

1. Temperature switches shall be electro-mechanical type utilizing a vapor-pressure thermal design. Process temperature changes shall cause proportional vapor pressure changes in the temperature-sensing bulb that act on a diaphragm/piston assembly to actuate and deactuate a snap-action electrical switching element at discrete process temperatures.
2. Switch shall be U.L. listed
3. Switch shall be furnished with a temperature set point adjustment knob or nut.
4. Switches shall be furnished with terminal blocks for each switch output.
5. Enclosure: NEMA 4X
6. Switch element: Hermetically sealed switch SPDT, 5A, 125/250VAC, 30VDC.
7. Switch shall be rated for process pressures of 2300 psi max.
8. Deadband shall be fixed
9. Mounting: All switches shall be installed in thermowells with thermal transfer media. Thermowell material shall match piping or equipment material unless otherwise noted. All mounting shall be direct mount unless vibration is present.
10. Process connection shall be ½"NPT into ¾" thermowell process connection

11. Bulb length: Shall be suitable for location shown on Contract Drawings.
12. Range: 150F-260F
13. Tagging: Separate stainless steel tag permanently attached to housing and engraved with tag number required
14. Calibrations; switches shall factory calibrated with a factory certification provided for each switch
15. Manufacturer. Ashcroft G-Series for NEMA 4X and P-Series for explosion proof or approved equal

D. Space Temperature Sensors

1. Temperature sensor shall be a temperature transmitter of the Pt100 sensor type.
2. The temperature transmitter range shall be set from 0 degrees to 110 degrees.
3. The transmitter shall be capable of transmitting an analog 4-20mA signal.
4. Transmitter shall have an enclosure with a NEMA rating of 4X.
5. Temperature transmitters shall be Omega – EWSE-PT100-TX or approved equal.

E. Line-Voltage On-Off Thermostats

1. Provide externally mounted capillary sensing element type thermostats.
2. Thermostats shall be rated NEMA 4X.
3. Contractor shall coordinate thermostat contact rating with actual fan motor horsepower and damper actuators, if applicable.
4. Thermostat shall be rated for 16A minimum at 120V.
5. Thermostat switch differential temperature shall be a minimum of 3.5 degrees F.
6. Thermostats shall be Honeywell T631F, or equal

F. Damper Actuators

1. Actuators shall be provided by Belimo AFBUP-S or approved equal.
2. Operating temperature range shall be from -20 to 200^{o}F (-29 to 90^{o}C).
3. The actuator shall be provided with open and close limit switches. The open limit switch shall be adjustable.
4. Provide damper position indicator. The indicator shall be visible on the exterior of NEMA 4X enclosures. The position indicator shall not impact the NEMA 4X rating of the enclosures. NEMA 7 enclosures do not require a position indicator.
5. Size each motor to operate dampers with sufficient reserve power to provide smooth modulating action or 2-position action as specified.

6. Actuators shall be direct coupled type.
7. All actuators shall fail as indicated in the Contract Documents by an integrated spring return system. The actuator shall be capable of provided clockwise or counter-clockwise fail safe operation based on the required mounting.
8. Actuators shall be protected from overload at all angles of rotation.
9. Actuators shall be UL approved.
10. The actuators shall be constructed to meet the requirements for double insulation so an electrical ground is not required to meet agency listings.

G. Control Panels

1. Provide control panels with PLC based controls containing all required I/O points, relay logic, and other required devices to meet the requirements of the Contract Drawings and the Sequence of Operation below.
2. Construction of panels shall conform to the requirements of Division 16 and, where applicable, Division 17.
3. Components used shall not derate the NEMA rating of the enclosure.
4. All PLC, PC, or DCS equipped panels shall be furnished with a power conditioner unless powered by a UPS. Surge protection shall be provided to protect the electronic instrumentation system from surges propagating along the signal and power supply lines.
    a. Line regulation: shall provide regulated voltage output of +/- 3% when input varies +10% to -20% of nominal input rating.
    b. Output Harmonic Distortion: Max 3% total RMS content at full load.
    c. Unit shall tolerate a temporary voltage surge or sag of +20% to -35% of input voltage.
    d. Noise attenuation: 120 dB common mode; 60dB transverse mode
    e. Surge suppression: shall be tested in compliance with ANSI/IEEE C63.41 Class A & B waveform with a let through of less than 0.2%.
    f. UL listed
    g. MTBF: 25 years
    h. Efficiency: 90% at full load
    i. Operating temperature: -20 to 50 Deg C
    j. Wiring Type: Hardwired
    k. Overload Protection: 1.65 rated current at nominal input voltage
    l. Audible noise: 65 dB max
    m. Manufactured by Sola model Hevi-Duty MCR or approved equal.

5. All panels shall be furnished with one (1) 120VAC, 20A duplex, grounding type convenience power receptacle and 120 VAC fluorescent light fixture with 40 watt incandescent equivalent lamp and plastic protective shield. A minimum of one (1) lamp shall be provided for every four (4) square feet of panel face area.

    a. The power receptacle and fluorescent light shall have a dedicated circuit breaker and power feed.

    b. All lights shall be controlled by a single a snap switch which will turn all the lights on and off. The switch shall be installed in an outlet box with cover and located to be easily accessible. The switch shall be labeled as the "Control Panel Interior Light Switch".

H. Wiring and Conduit

1. For wiring requirements, refer to Detailed Specification 16121H – Low Voltage Wires, Cables and Accessories

2. For conduit requirements, refer to Detailed Specification 16131H – Electrical Conduit System

I. Relays

1. The Contractor shall provide mechanically held, socket type, oil tight, heavy-duty-type contactors (relays) for DIN rail mounting. Miniature relays are not acceptable. Relays shall be rated as required by the design with a minimum contact rating of 10 A. The relay shall be provided with the number of poles required by the design and one spare Type C dry contact.

2. Timing relays shall be Allen-Bradley, Series 700, or approved equal.

3. Relays shall be Square D Class 8501 or approved equal.

J. Indicating Lights

1. All indicating lights shall be transformer type with replaceable high intensity LED type lamp. All indicating lights shall be rated NEMA 4X. All indicating lights used on the project shall be from one manufacturer and shall be of the same line.

2. Devices shall be of the 30.5 mm type rated for extra heavy duty service.

3. Indicating light shall have a push to test function. The push to test feature shall not interact with any other circuitry.

4. Lens color shall be as indicating on the Contract Drawings.

5. Indicating lights shall be Square D Series 9001 or approved equal.

K. Switches and Buttons

1. Switches and push-button type operators shall be rated NEMA 4X. All operators used on the project shall be from one manufacturer and shall be the same line.
2. Devices shall be of the 30.5 mm type rated for extra heavy duty service.
3. Selector switches shall have gloved hand operating handles.
4. Push buttons shall be of the guarded type except those being used for stop control.
5. Emergency stop push buttons shall be Push-Pull mushroom-type with maintained contacts.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect units for damage prior to installation and correct as necessary.

B. Examine areas and conditions under which electric control systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

C. Provide factory shipping cartons for each piece of equipment, and control device. Maintain cartons through shipping, storage, and handling as require to prevent equipment damage, and to eliminate dirt and moisture from equipment. Store equipment and materials inside and protected from weather.

3.02 INSTALLATION

A. Control Wiring

1. The term “control wiring” is defined to include providing of wire, conduit, and miscellaneous materials as required for mounting and connecting electric control devices and sensors.

B. Wiring System

1. Install a complete control wiring system for the electric control system. Conceal wiring conduit, except in mechanical or electrical rooms and areas where other conduit and piping are exposed. Provide multi-conductor instrument harness (bundle) in place of single conductors where number of conductors can be run along common path.
2. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.
3. Number code conductors appropriately for future identification and servicing of control system.
4. Discrete signal wiring from panel to panel shall contain 10% additional wires (minimum of four (4)). The spare wires shall be terminated in terminal blocks.

The terminal blocks used for spare wires shall be considered in the number of used terminals when determining the number of spare terminal blocks required.

5. Discrete signal wiring from panel to device shall contain 10% additional wires (minimum of two (2)). The spare wires shall be terminated in terminal blocks. The terminal blocks used for spare wires shall be considered in the number of used terminals when determining the number of spare terminal blocks required.

3.03 CLEANING

A. Clean tar, cement, dirt or other construction debris from units.

B. Remove debris and other waste material resulting from installation.

C. Clean factory-finished surfaces, and repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.04 TESTING, ADJUSTING, AND BALANCING

A. The Contractor shall test all control panel and all other controls covered under this specification. The Contractor shall demonstrate that the provided system meets all of the control requirements indicated in this specification including but not limited to the Sequence of Operation, Alarms (both local and remote indication). The testing shall be accomplished by manipulating external parameters and set-points in order to initiate the required response. Making and breaking terminal connections to simulate signals is prohibited unless physical manipulation in order to generate the signal would cause damage to the equipment or is explicitly prohibited by the equipment manufacturer either of which shall be documented with a written statement from the equipment manufacturer.

B. Check room thermostats and wiring connections.

C. See specification 15951 – HVAC Testing, Adjusting, and Balancing for testing procedures and additional equipment testing requirements.

3.05 SEQUENCE OF OPERATION

A. Fans: EF-1, EF-2, EF,3, EF-4, EF-5, SF-1

1. EF-1, EF-2, EF-3, EF-4, SF-1 – Scheduled

a. Run Conditions – Scheduled

1) Exhaust fans shall be controlled by a timer. Timer shall enable the unit in the morning and disable the unit in the evening. Contractor shall coordinate with the owner for beginning and ending shift times. The enable and disable times shall be coordinated with the shift times such that the space is fully tempered by the start of the first shift. All schedule set points shall be adjustable.

2. EF-5

a. The system shall consist of a constant air volume exhaust fan. All dampers shall be proven open or closed via end switches prior to starting or stopping fans.

b. A "Hand-Off-Auto" (HOA) switch shall be provided for each exhaust fan. EF-1, shall be enabled and disabled using the units' respective HOA switch.

1) "Hand" Mode

a) When the manual switch is activated on the motor starter, the exhaust fan shall turn on and the intake dampers shall open.

2) "Off" Position

a) When the switch is in "Off" mode, the motor starter shall de-energize the fan and the damper. The motor starter shall not respond to any further signals.

3) "Auto" Position

a) When the space temperatures rises above the exhaust fan on setpoint (adjustable, initial value, 85 Deg F) the motor start shall be energized and the intake damper shall open.

b) When the space temperatures lower below the exhaust fan off setpoint (adjustable, initial value, 85 Deg F) the motor start shall de-energize and the intake damper shall close.

B. Air Handling Unit: AHU-1

1. Run Conditions – Scheduled

a. AHU shall be controlled by a timer. Timer shall enable the unit in the morning and disable the unit in the evening. Contractor shall coordinate with the owner for beginning and ending shift times. The enable and disable times shall be coordinated with the shift times such that the space is fully tempered by the start of the first shift. All schedule set points shall be adjustable.

C. VRF System: AC-1, AC-2, AC-3, AC-4, AC-5, AC-6, AC-7, AC-8, AC-9, AC-10, AC-11, AC-12, AC-13, AC-14

1. Run Conditions – Scheduled

a. The unit shall run according to an input from the programmable thermostat with user definable time schedule in the following modes:

1) Occupied Mode: The unit shall maintain

a) A 72°F (adj.) cooling setpoint

2) Unoccupied Mode (night setback): The unit shall maintain

a) A 85°F (adj.) cooling setpoint.

D. Electrical Closet Air Conditioning Units: AC-15, AC-16

1. Air conditioning units serving electrical closets shall operate based on the remote wall mounted thermostat. The AC units shall provide cooling with stand alone controls.

E. Hot Water System Local Control Panel: HWB-1, HWP-1, HWP-2

1. A Hot Water System Control Panel shall be furnished to control hot water boilers HWB-1, hot water pumps HWP-1 and HWP-2, and hot water valves. The hot water system shall deliver hot water to the unit heaters and fin-tube radiators throughout the facility.

2. A "Hand-Off-Auto" (HOA) switch shall be provided for control of the hot water pumps

a. "Hand" Position

1) With the hot water pump HOA switch in the "Hand" position, pump operation is controlled manually via the "Start" and "Stop" pushbuttons. A "Start" and "Stop" pushbutton shall be provided for each hot water pump.

b. "Off" Position

1) With the hot water pump HOA switch in the "Off" position, the pumps shall not operate.

2) The "Start" and "Stop" pushbuttons shall be disabled

c. "Auto" Position

1) With the hot water pump HOA switch in the "Auto" position, HWP-1 and HWP-2 shall operate in a Lead-Standby arrangement.

2) A "HWP-1–Auto–HWP-2" momentary switch shall be provided for control of the hot water pumps lead operation. The momentary switch shall default to the "Auto" position.

3) In the "Auto" position, the lead pump shall operate and the standby pump shall not operate. The hot water pumps shall alternate lead pump based on a timer. After one week (time adjustable), the lead pump shall automatically be switched to standby and the standby pump shall operate as the lead.

4) When "HWP-1" is activated on the momentary switch, the pump lead/standby timer shall be overridden, HWP-1 shall act as the lead pump and HWP-2 shall act as standby, and the timer shall be reset.

5) When "HWP-2" is activated on the momentary switch, the pump lead/standby timer shall be overridden, HWP-2 shall act as the lead pump and HWP-1 shall act as standby, and the timer shall be reset.

6) "HWP-1 Lead" indicator light shall illuminate when HWP-1 is the lead pump.

7) "HWP-2 Lead" indicator light shall illuminate when HWP-2 is the lead pump.

8) Upon failure of the lead pump, the standby pump shall automatically be switched to lead pump.

9) The "Start" and "Stop" pushbuttons shall be disabled

10) If the hot water boiler HOA switch is turned to the "Off" position, the hot water pumps shall stop. With boiler HOA in the "Hand" or "Auto" position, the lead pump shall start and run if at least one boiler is enabled.

3. A "Hand-Off-Auto" (HOA) switch shall be provided for control of the hot water boiler

a. "Hand" Position

1) With the hot water boiler HOA switch in the "Hand" position, boiler operation is controlled manually via the "Enable" and "Disable" pushbuttons.

2) An "Enable" and "Disable" pushbutton shall be provided for each hot water boiler.

3) When the "Enable" pushbutton is pressed, the boiler shall turn on.

4) When the "Disable" pushbutton is pressed, the boiler shall be called to stop.

b. "Off" Position

1) With the hot water boiler HOA switch in the "Off" position, the boilers shall not operate.

2) The "Enable" and "Disable" pushbuttons are disabled.

c. "Auto" Position

1) With the hot water boiler HOA switch in the "Auto" position, when the outside air thermostat is below the setpoint (Temperature, initial value, XXX) the boiler shall turn on.

4. Automatic pump lead/standby control shall operate on completely independent timers and shall be capable of operating on different schedules.

5. Boiler local controls provided by boiler manufacturer. Refer to specification 15513-Hot Water Boilers.

6. Alarms.

   a. The following alarms/indicators shall be provided at the local control panel:

      1) HWB-1 Fault (signal from the boiler local controller)

      2) HWP-1 Overload (signal from the motor starter)

      3) HWP-2 Overload (signal from the motor starter)

   b. All alarm indicating lights shall latch and require manual reset using the Alarm Light Reset Pushbutton.

7. Combustion air damper end switch shall be connected to boiler and boiler shall not be allowed to operate unless the motorized damper MD-1 is confirmed open.

- END OF DETAILED SPECIFICATION -

NO TEXT ON THIS PAGE

Section 15700
Decentralized HVAC Equipment

NOTE: Detailed Specification 15700 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15700.

PART 1 GENERAL

1.01 SUMMARY – Y-SERIES (HEAT/COOL MODEL)

A. Per the equipment schedule, the variable capacity, heat pump air conditioning system basis of design is Mitsubishi Electric CITY MULTI VRF (Variable Refrigerant Flow) zoning system(s).

B. Acceptable alternative manufacturers, assuming compliance with these equipment specifications, are Daikin, Panasonic, and Hitachi or approved equal.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SPECIFICATIONS

1. Section 01300 - Submittals

1.04 DELIVERY, STORAGE AND HANDLING

1. Deliver, store, protect and handle products to the Project Site under the provisions of Division 1.

2. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.

3. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures and finish.

4. Protect openings in casing and seal them with plastic wrap to keep out dirt and debris.

1.05 SCHEDULES ON DRAWINGS

1. In general, all capacities of equipment and motor and starter characteristics are shown in schedules on the Drawings. Reference shall be made to the schedules for such information. The capacities shown are minimum capacities. Variations in capacities of the scheduled

equipment supplied under this Contract will be permitted only with the written direction of the Engineer.

1.06 MANUFACTURER'S INSTRUCTIONS

1. Installation of all equipment shall be in accordance with manufacturer's data.
2. All changes from the installation procedures in manufacturers' data shall be submitted for approval in accordance with the requirements for shop drawings.
3. Keep all manufacturers' data provided in a secure manner at the job site at all times. Catalog and index this data for convenient reference.
4. Manufacturers' data shall be available for the information of the DEP, Engineer, and the use of other trades.
5. Turn over all data to the DEP through the DEP's representative at completion of the Work and final testing.
6. Submit all instruction books and manuals in accordance with Division

1.07 CODES, PERMITS AND STANDARDS

1. The Contractor shall obtain and pay for all permits (unless specifically excluded under Division 1 requirements) and shall comply with all laws and codes that apply to the work.
2. The Contractor shall be responsible for all added expenses due to his choice of equipment, materials or construction methods.
3. All work and materials shall be in full accordance with the latest State rules and regulations or publications including those of the State Fire Marshall, the State Mechanical and Energy Codes, and all local codes. Nothing in the Plans and/or Specifications shall be construed to permit work not conforming to the above codes, rules and regulations.
4. All equipment, materials and installations shall conform to the requirements of the most recent edition with latest revisions, supplements and amendments of the following, as applicable:
    a. American Society of Mechanical Engineers (ASME)
    b. American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE)
    c. American National Standards Institute (ANSI)
    d. American Society of Testing and Materials (ASTM)
    e. Air Movement and Control Association (AMCA)

f. Air-conditioning, Heating and Refrigeration Institute (AHRI)

g. National Fire Protection Association (NFPA)

h. National Electrical Code (NEC)

i. International Mechanical Code

j. Underwriters Laboratories (UL)

k. Applicable Federal, State and local laws and/or ordinances

5. Where conflict arises between the local codes and the requirements of the National Electrical Code, The National Fire Code, NEMA, ASTM, etc., the more stringent requirements shall prevail.

1.08 SUBMITTALS

1. In accordance with the procedures and requirements set forth in the General Conditions and Division 1 the Contractor shall obtain from the equipment manufacturer and submit the following:

   a. A list of all Contract deviations and non-applicable requirements. Those applicable Contract requirements that are not listed explicitly as deviations shall be deemed by the Contractor as being in total compliance with the Contract requirements. The Contractor is responsible for and will make any and all changes to installed equipment that does not comply with the Contract. Such changes shall be made at no additional cost.

   b. Shop Drawings

   c. Operation and Maintenance Manuals

   d. Special Tools List

   e. Reports of Certified Shop Tests

   f. AMCA Approval of Fan Ratings

2. Each submittal shall be identified as specified in the General Conditions and Division 1.

3. Shop Drawings:

   a. Each submittal shall be complete in all aspects incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions shall be returned to the Contractor disapproved without review.

b. Partial, incomplete or illegible submissions will be returned to the Contractor without review for resubmittal.

c. Shop drawings shall include but not be limited to:

d. Equipment specifications and data sheets identifying all materials used and methods of fabrication.

e. Complete assembly, layout, installation drawings with clearly marked dimensions.

f. Computer printout for coil selection.

g. Interconnecting wiring diagram.

h. Motor name plate data

i. Example equipment nameplate data sheet.

4. Operations and Maintenance Manuals

a. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 1.

b. One electronic copy of a preliminary O&M manual shall be included in the shop drawing submittal.

1.09 SPARE PARTS AND SUPPLIES

1. Furnish all special tools necessary to dissemble, service, repair and adjust the equipment.

2. Furnish additional spare parts as recommended by the equipment manufacturers.

3. Spare parts lists, included with the drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as “1 lot of packing material” are not acceptable.

4. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.10 QUALITY ASSURANCE AND QUALIFICATIONS

1. The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.

2. All wiring shall be in accordance with the National Electrical Code (N.E.C.).

3. The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

4. All units must meet or exceed the 2010 Federal minimum efficiency requirements and the ASHRAE 90.1 efficiency requirements for VRF systems. Efficiency shall be published in accordance with the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 1230.

5. System start-up supervision shall be a required service to be completed by the manufacturer or a duly authorized, competent representative that has been factory trained in system configuration and operation. The representative shall provide proof of manufacturer certification indicating successful completion within no more than two (2) years prior to system installation. This certification shall be included as part of the equipment and/or controls submittals.

1.11 SPECIAL TOOLS

1. Furnish all special tools necessary to dissemble, service, repair and adjust the equipment.

PART 2 PRODUCTS

2.01 OUTDOOR UNITS (Y-SERIES HEATING/COOLING (HEAT PUMP), AIR-COOLED OUTDOOR UNITS)

A. General:

1. The outdoor unit modules shall be air-cooled, direct expansion (DX), multi-zone units used specifically with VRF components described in this section and Part 5 (Controls). The outdoor unit modules shall be equipped with a single compressor which is inverter-driven and multiple circuit boards—all of which must be manufactured by the branded VRF manufacturer. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.

2. Outdoor unit systems may be comprised of multiple modules with differing capacity if a brand other than basis of design is proposed. All units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s). If an alternate manufacturer is selected, any additional material, cost, and labor to install additional lines shall be incurred by the contractor. Contractor responsible for ensuring alternative brand compatibility in terms of availability, physical dimensions, weight, electrical requirements, etc.

3. Outdoor unit shall have a sound rating no higher than 62 dB(A) individually or 62 dB(A) twinned. Units shall have a sound rating no higher than 51 dB(A) individually or 54 dB(A) twinned while in night mode operation. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.
4. Refrigerant lines from the outdoor unit to the indoor units shall be insulated in accordance with the installation manual.
5. The outdoor unit shall have the capability of installing the main refrigerant piping through the bottom of the unit.
6. The outdoor unit shall have an accumulator with refrigerant level sensors and controls.
7. The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.
8. VRF system shall meet performance requirements per schedule and be within piping limitations & acceptable ambient temperature ranges as described in respective manufacturers' published product catalogs. Non-published product capabilities or performance data are not acceptable.
9. The outdoor unit shall be capable of guaranteed operation in heating mode down to -13°F ambient temperatures and cooling mode up to 109°F without additional restrictions on line length & vertical separation beyond those published in respective product catalogs. Models with capacity data for required temperature range published as "for reference only" are not considered capable of guaranteed operation and are not acceptable. If an alternate manufacturer is selected, any additional material, cost, and labor to meet ambient operating range and performance shall be incurred by the contractor.
10. The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained. Oil return sequences must be enabled only during extended periods of reduced refrigerant flow to ensure no disruption to correct refrigerant flow to individual zones during peak loads. Systems which might engage oil return sequence based on hours of operation risk oil return during inopportune periods are not allowed. Systems which rely on sensors (which may fail) to engage oil return sequence are not allowed.
11. Unit must defrost all circuits simultaneously in order to resume full heating more quickly during extreme low ambient temperatures (below

23F). Partial defrost, also known as hot gas defrost which allows reduced heating output during defrost, is permissible only when ambient temperature is above 23F.

B. Unit Cabinet:

1. The casing(s) shall be fabricated of galvanized steel, bonderized and finished.

2. The outdoor unit shall be tested in compliance with ISO9277 such that no unusual rust shall develop after 960 hours of salt spray testing.

3. Panels on the outdoor unit shall be scratch free at system startup. If a scratch occurs the salt spray protection is compromised and the panel should be replaced immediately.

C. Fan:

1. Each outdoor unit module shall be furnished with direct drive, variable speed propeller type fan(s) only. Fans shall be factory set for operation at 0 in. WG external static pressure, but capable of normal operation with a maximum of 0.24 in. WG external static pressure via dipswitch.

2. All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.

3. All fans shall be provided with a raised guard to prevent contact with moving parts.

D. Refrigerant and Refrigerant Piping

1. R410A refrigerant shall be required for systems.

2. Polyolester (POE) oil—widely available and used in conventional domestic systems—shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two weeks prior to bidding.

3. Refrigerant piping shall be phosphorus deoxidized copper (copper and copper alloy seamless pipes) of sufficient radial thickness as defined by the VRF equipment manufacturer and installed in accordance with manufacturer recommendations.

4. All refrigerant piping must be insulated with ½" closed cell, CFC-free foam insulation with flame-Spread Index of less than 25 and a smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102. R value of insulation must be at least 3.

5. Refrigerant line sizing shall be in accordance with manufacturer specifications.

E. Coil:

1. The outdoor heat exchanger shall be of zinc coated aluminum construction with turbulating flat tube construction. The coil fins shall have a factory applied corrosion resistant finish. Uncoated aluminum coils/fins are not allowed.
2. The coil shall be protected with an integral metal guard.
3. Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.

F. Compressor:

1. Each outdoor unit module shall be equipped with only inverter driven scroll hermetic compressors. Non inverter-driven compressors, which may cause inrush current (demand charges) and require larger generators for temporary power shall not be allowed.
2. Crankcase heat shall be provided via induction-type heater utilizing eddy currents from motor windings. Energy-wasting "belly-band" type crankcase heaters are not allowed.
3. Compressor shall have an inverter to modulate capacity. The capacity for each compressor shall be variable with a minimum turndown not greater than 20%.
4. The compressor shall be equipped with an internal thermal overload.
5. Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.

G. Controls:

1. The unit shall be an integral part of the system & control network described in Part 5 (Controls) and react to heating/cooling demand as communicated from connected indoor e control circuit. Required field-installed control voltage transformers and/or signal boosters shall be provided by the manufacturer.
2. The outdoor unit shall have the capability of 4 levels of demand control for each refrigerant system based on external input.

H. Electrical:

1. The outdoor unit electrical power shall be 208/230 volts, 3-phase, 60 hertz or 460 volts, 3-phase, 60 hertz per equipment schedule.
2. The outdoor unit shall be controlled by integral microprocessors.
3. The control circuit between the indoor units and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

2.02 INDOOR UNITS (4-WAY CEILING-RECESSED CASSETTE WITH GRILLE INDOOR UNIT)

A. General:

1. The ceiling-recessed indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function, a test run switch, and the ability to adjust airflow patterns for different ceiling heights. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

B. Unit Cabinet:

1. The cabinet panel shall have provisions for a field installed filtered outside air intake.
2. Branch ducting shall be allowed from cabinet.
3. Four-way grille shall be fixed to bottom of cabinet allowing two, three or four-way blow.
4. The grille vane angles shall be individually adjustable from a wired remote controller to customize the airflow pattern for the conditioned space

C. Fan:

1. The indoor fan shall be an assembly with a statically and dynamically balanced turbo fan direct driven by a single motor with permanently lubricated bearings.
2. The indoor unit shall include an AUTO fan setting capable of maximizing energy efficiency by adjusting the fan speed based on the difference between controller set-point and space temperature. The indoor fan shall be capable of five (5) speed settings, Low, Mid1, Mid2, High and Auto.

3. The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow.

4. The indoor unit fan logic must include multiple setting that can be changed to provide optimum airflow based on ceiling height and number of outlets used.

5. The indoor unit vanes shall have 5 fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.

6. The vanes shall have an Auto-Wave selectable option in the heating mode that shall randomly cycle the vanes up and down to evenly heat the space.

7. Grille shall include a factory-installed "i-see" sensor, or equal, to work in conjunction with indoor unit control sequence to prevent unnecessary cooling or heating in unoccupied areas of the zone without decreasing comfort levels. Sensor must detect occupancy (not simply motion) and location of occupants by measuring size & temperature of objects within a 39' detecting diameter (based on 8.8ft mounting height) with 1,856 or more measuring points.

D. Filter:

1. Return air shall be filtered by means of a long-life washable filter

E. Coil:

1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.

2. The coils shall be pressure tested at the factory.

3. The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 33 inches above the condensate pan.

F. Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

2. The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

G. Controls:

1. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for

individual units to accommodate instances when compensation is not required.

2. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.

3. Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

4. Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.

5. A factory-installed drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.

H. 4-WAY CEILING-RECESSED CASSETTE WITH GRILLE FOR 2X2 GRID INDOOR UNIT

1. General:

2. The indoor unit shall be a four-way cassette style indoor unit that recesses into the ceiling with a ceiling grille. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

I. Unit Cabinet:

1. The cabinet shall be a compact 22-7/16” wide x 22-7/16” deep so it will fit within a standard 24” square suspended ceiling grid.

2. The cabinet panel shall have provisions for a field installed filtered outside air intake.

3. Four-way grille shall be fixed to bottom of cabinet allowing two, three or four-way blow.

J. Fan:

1. The indoor fan shall be an assembly with a turbo fan direct driven by a single motor.
2. The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.
3. The indoor unit shall include an AUTO fan setting capable of maximizing energy efficiency by adjusting the fan speed based on the difference between controller set-point and space temperature. The indoor fan shall be capable of five (4) speed settings, Low, Mid, High and Auto.
4. The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow.
5. The auto air swing vanes shall be capable of automatically swinging up and down for uniform air distribution.
6. Grille shall include a factory-installed "i-see" sensor, or equal, to work in conjunction with indoor unit control sequence to prevent unnecessary cooling or heating in unoccupied areas of the zone without decreasing comfort levels. Sensor must detect occupancy (not simply motion) and location of occupants by measuring size & temperature of objects within a 39' detecting diameter (based on 8.8ft mounting height) with 1,856 or more measuring points.

K. Filter:

1. Return air shall be filtered by means of a long-life washable filter.

L. Coil:

1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.
2. The coils shall be pressure tested at the factory.
3. The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 19-3/4" inches above the condensate pan.

M. Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
2. The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

N. Controls:

1. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.
2. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.
3. Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.
4. Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.
5. A factory-installed drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.

2.03 CONTROLS

A. Overview

1. The control system shall consist of a low voltage communication network and a web-based interface. The controls system shall gather data and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.
2. Furnish energy conservation features such as optimal start, request-based logic, and demand level adjustment of overall system capacity as specified in the sequence.
3. System shall be capable of email generation for remote alarm annunciation.

B. Electrical Characteristics

1. General:
   a. Controller power and communications shall be via a common non-polar communications bus and shall operate at 30VDC.
2. Wiring:

a. Control wiring shall be installed in a daisy chain configuration from indoor unit to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.

b. Control wiring for centralized controllers shall be installed in a daisy chain configuration from outdoor unit to outdoor unit, to the system controllers (centralized controllers and/or integrated web based interface), to the power supply.

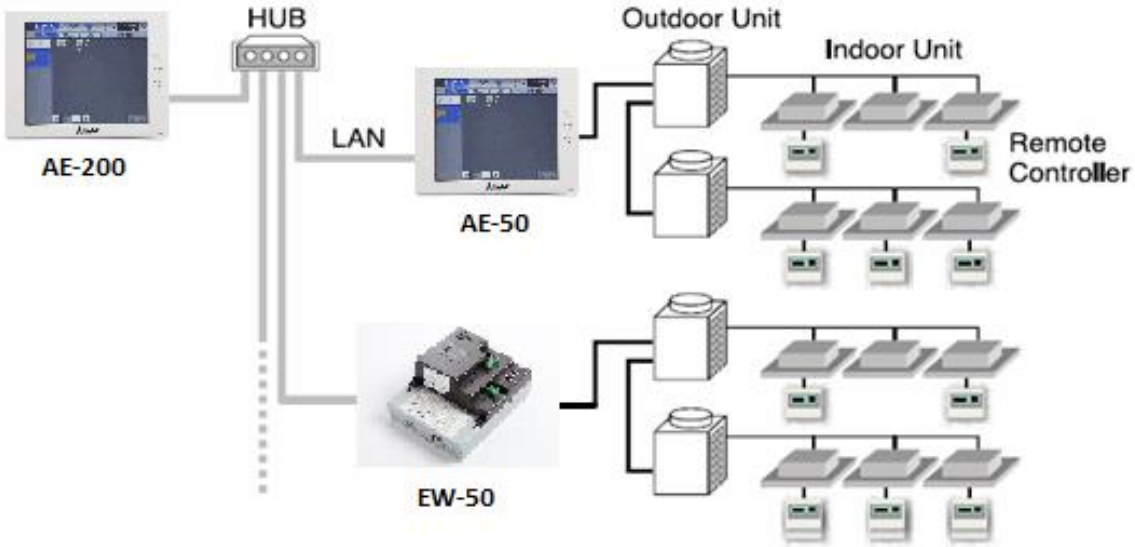
c. Wiring type:

1) Wiring shall be 2-conductor (16 AWG), twisted, stranded, shielded wire as defined by the Diamond System Builder output.

2) Network wiring shall be CAT-5 with RJ-45 connection.

C. CITY MULTI CONTROLS NETWORK

1. The CITY MULTI Controls Network (CMCN) consists of remote controllers, centralized controllers, and/or integrated web based interface communicating over a high-speed communication bus. The CITY MULTI Controls Network shall support operation monitoring, scheduling, occupancy, error email distribution, personal web browsers, tenant billing, online maintenance support, and integration with Building Management Systems (BMS) using either LonWorks® or BACnet® interfaces, or approved equal. The below figure illustrates a sample CMCN System Configuration.



CMCN System Configuration

D. Graphical User Interface

1. The Graphical User Interface (Integrated Centralized Control Web) shall require a field supplied PC or Tablet.

2. ICCW

a. The Integrated Centralized Control Web System (ICCW) interface shall enable the user to control multiple AE-200, AE-50, EW-50's and shall provide additional functions such as energy apportionment from a single network PC configured with the Charge Calculation Tool. The ICCW shall be capable of controlling up to forty AE-200/AE-50/EW-50 Centralized Controllers with a maximum of 2,000 indoor units across multiple CITY MULTI outdoor units. The ICCW shall be required if the user wants to simultaneously control more than 1 AE-200/AE-50/EW-50 Centralized Controllers from a single PC or tablet using a single web browser session. Licensing per function, per AE-200/AE-50/EW-50 Centralized Controller shall be required for the ICCW. Optional software features shall be available through the ICCW including energy apportionment and personalized web. These optional software features shall require the ICCW, advance purchase from the customer, and licensing from ICCW.

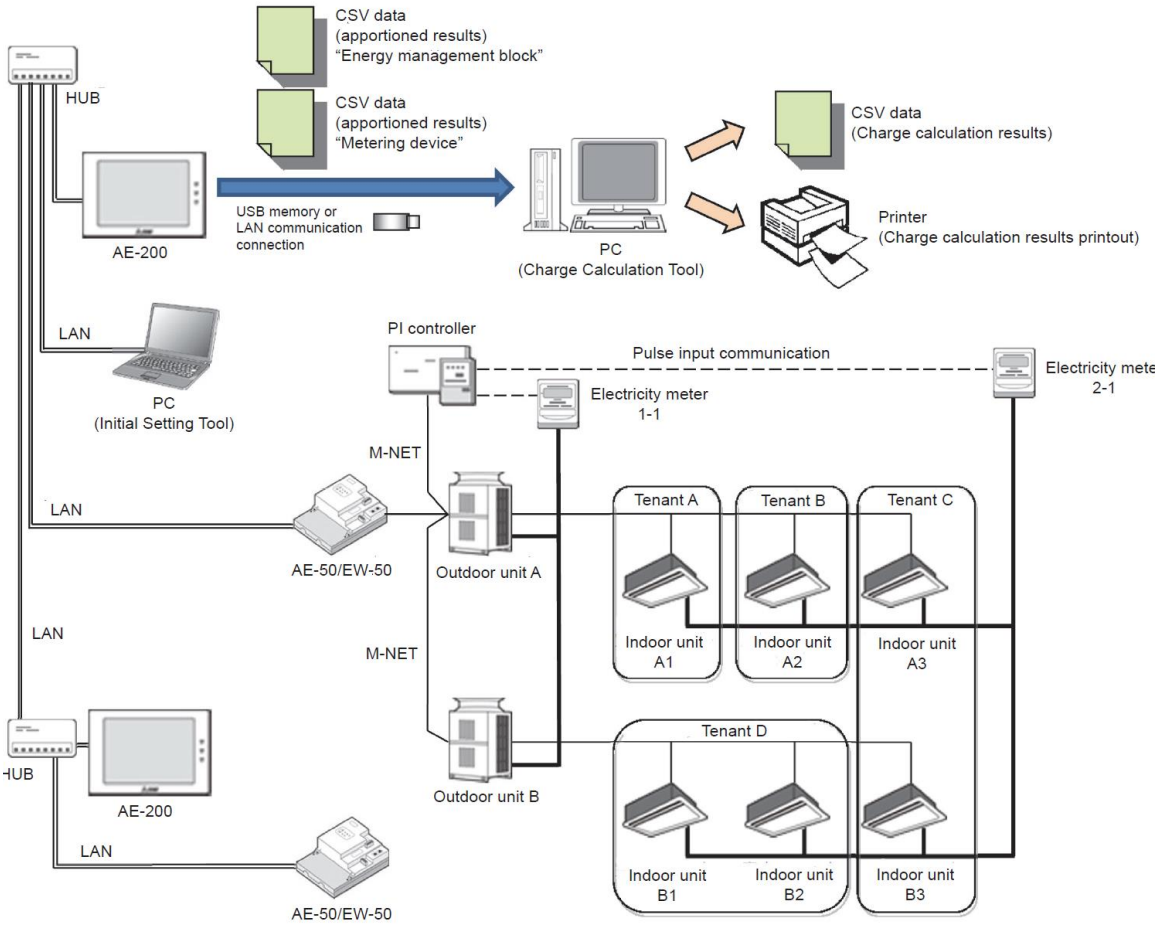
ICCW (Integrated System Software)	
Item	**Details**
ON/OFF	The units can turn ON and OFF for all floors or in a block, floor, or group of units.
Operation Modes	The operation mode can be switched between COOL, DRY, FAN, AUTO, and HEAT for all floors or in a block, floor, or group of units
Temperature Setting	Sets the temperature for a single group. Range of Temperature setting from 57°F – 87°F depending on operation mode and indoor unit model. Separate COOL and HEAT mode set points available depending on remote controller and connected mechanical equipment.
Fan Speed	The fan speed can be set to four stages for all floors or in a block, floor, or group of units
Air Direction	The air direction can be set in four vertical directions or to swing for all floors or in block, floor, or group of units. (The selectable air direction differs according to the model.)
Interlocked Unit ON/OFF LOSSNAY	If there is an interlocked unit (LOSSNAY), then the unit can be turned ON (strong/weak) or OFF for all floors or in a block, floor, or group of units. (Note that the ventilation mode cannot be selected for interlocked units.)
Local Operation Prohibit	The items for which operation with the local remote controller are to be prohibited can be selected for all floors or in a block, floor, or group of units. (The items that can be prohibited are ON/OFF, operation mode, set temperature and filter sign reset.)
Annual / Weekly Schedule	The annual/weekly schedule function can be used by registering the license. Two settings, such as seasonal settings for summer and winter, can be saved.
Power Rate Apportionment Charging	A watt-hour meter (WHM) with kWH pulse output is connected to calculate the air conditioning charges based on the amount each tenant's air-conditioner has operated. Five charging rates can be applied per day. ***OPTIONAL ENERGY APPORTIONMENT SOFTWARE (SW-CHARGE) and PI Controller (PAC-Y60MCA) REQUIRED
History	Up to 3,000 items for the error history and up to 10,000 items for operation history can be saved. Each history file can be output as a daily report or monthly report in CSV format. (The operation history consists only of the operations carried out with the ICCW and is limited to some limited operation items.)

ICCW (Integrated System Software)	
Item	**Details**
Operation Time Monitor	The cumulative operation time of each indoor unit can be viewed or output as a CSV format file. (This function is valid only when the charging function license is registered.)
Filter Sign Display Mask	The filter sign display at the remote controllers can be disabled.
Set Temperature Limit	The set temperature lower limit can be set for cooling and the upper limit for heating. (ME remote controller required)

E. CMCN: SYSTEM INTEGRATION

1. The CMCN shall be capable of supporting integration with Building Management Systems (BMS) via industry standard communication protocols including BACnet and LonWorks®, or approved equal.

F. Energy Appointment Method for City Multi Centralized Controllers, or approved equal.



CMCN System Configuration

1. System Overview

   a. For centralized systems serving multiple tenants for which one-to-one electricity metering is not possible, an apportioned electricity billing function that attributes just the electrical energy consumed by each individual tenant's air conditioner is required. The Energy Apportionment function takes the information on the electrical energy usage gathered from Watt Hour Meters (WHM) connected to dedicated breaker panels serving the system's outdoor units and synthesizes it with the information on the operating status of the indoor units that is collected by the CITY MULTI centralized controller(s).

2. Watt Hour Meters

   a. Requirements:

1) The Watt Hour Meters (WHMs) to be used to read the electrical energy consumption of the outdoor units must be capable of a pulse output, which would be configured based on the current rating of the units. The associated current transformers/ transducers (CTs) must also be sized based on the current rating of either the individual outdoor units or the dedicated air conditioning electrical panels they are to be reading. The proper quantity of meters for a particular sized system must be selected in order to ensure sufficient resolution and hysteresis in the unit pulse output of the meters so as to ascribe an acceptable level of accuracy to the apportionment of energy usage for each tenant's system. The system is designed to work with any WHM capable of a pulse output that meets ANSI C12.20 class 0.2% or 0.5% accuracy standards.

b. Connection:

1) The WHMs are to be physically connected to the integrated pulse input module or an external Mitsubishi Electric PI Controller if such an input is not available or if there is a wiring length limitation or installation hardship. The cable type of the interconnecting wiring shall be according to the wiring specifications of the WHM manufacturer.

3. CITY MULTI Centralized Controller Requirements

a. Licensing:

1) Each centralized controller (AE-200/AE-50/EW-50) to which units are assigned that require the energy apportionment function must have the "SW-Charge" software license purchased and properly unlocked in order to enable the operating status of the indoor units to be passed to the energy apportionment tool. The procedure for licensing the centralized controllers with this function and the necessary forms can be found on Mitsubishi Electric's technical documentation repository, mylinkdrive.com. Purchase Order information for the licenses will be required at the time of submission of the licensing request forms.

b. Dedicated AE-200 for apportionment (no MNET connection)

1) A dedicated AE-200 centralized controller, for which the SW-Charge license is purchased and the energy apportionment function enabled, must be provided in order to serve as the portal for exporting metering device and energy management data to a USB drive or to a PC via LAN connection. This means that by virtue of selecting this AE-200 to serve this function, the MNET capability of this particular centralized controller will be disabled. All indoor units must be physically wired via MNET to other centralized controllers (AE-50/EW-50), which must be physically wired via LAN with Static IP addresses and a network hub or switch to the AE-200 Apportionment controller.

4. PC for collecting charge calculation results

a. A networked PC, which does not necessarily have to be dedicated to the task of collecting energy apportionment data, can be provided and loaded with the Charge Calculation Tool software for exporting data necessary to generate billing documentation to be performed by a third party. The system requirements of the PC are as follows:

Item	Requirements
CPU	1 GHz or better (at least 2 GHz recommended)
Memory	2GB or more
Screen Resolution	1024 x 768 or better
OS	Windows 7, Windows 8.1 (32bit/64bit)
System requirements	The system should meet the minimum requirement for Windows 7 or Windows 8.1

	• Net Framework 4.5 or later
Internal LAN port or LAN card	100 BASE-TX or better
Porting device	Mouse, etc.

G. CMCN: REMOTE CONTROLLERS

1. Simple MA Remote Controller (PAC-YT53CRAU):

a. The Backlit Simple MA Remote Controller shall be capable of controlling up to 16 indoor units (defined as 1 group).

b. The Backlit Simple MA Remote Controller shall only be used in same group with Wireless MA Remote Controllers (PAR-FL32MA-E / PAR-FA32MA-E) or with other Backlit Simple MA Remote Controllers (PAC-YT53CRAU), with up to two remote controllers per group.

Simple MA Remote Controller			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation for a single group	Each Group	Each Group
Operation Mode	Switches between Cool/Drying/Auto/Fan/Heat/Setback. Operation modes vary depending on the air conditioner unit. Auto and Setback mode are available for the R2/WR2-Series only.	Each Group	Each Group
Temperature Setting	Sets the temperature from 40°F – 95°F depending on operation mode and indoor unit.	Each Group	Each Group

Simple MA Remote Controller			
Item	**Description**	**Operation**	**Display**
	Separate COOL and HEAT mode set points available depending on central controller and connected mechanical equipment.		
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Group	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter). *1: Centrally Controlled is displayed on the remote controller for prohibited functions.	N/A	Each Group *1
Display Indoor Unit Intake Temp	Measures and displays the intake temperature of the indoor unit when the indoor unit is operating.	N/A	Each Group
Display Backlight	Pressing the button lights up a backlight. The light automatically turns off after a certain period of time. (The brightness settings can be selected from Bright, Dark, and Light off.)	N/A	Each Unit

Simple MA Remote Controller			
Item	**Description**	**Operation**	**Display**
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed	N/A	Each Unit
Test Run	Operates air conditioner units in test run mode. *2 The display for test run mode will be the same as for normal start/stop (does not display "test run").	Each Group	Each Group *2
Ventilation Equipment	Up to 16 indoor units can be connected to an interlocked system that has one LOSSNAY unit.	Each Group	N/A
Set Temperature Range Limit	Set temperature range limit for cooling, heating, or auto mode.	Each Group	Each Group

H. CMCN REMOTE CONTROLLERS: SYSTEM INTEGRATION

1. The CMCN shall be capable of supporting integration with Building Management Systems (BMS).

I. LMAP04U: LonWorks® Interface:

1. The Mitsubishi Electric Cooling & Heating LonWorks® interface, LMAP04U, or approved equal, shall support up to fifty indoor units with a variety of network variables on a per indoor unit basis. Input variables include, but are not limited to, on/off, operation mode, fan speed, prohibit remote controller, and filter sign reset. Output variables include, but are not limited to, model size, alarm state, error code, and error address.

PART 3 EXECUTION

3.01 INSTALLATION

1. Air conditioning unit shall be installed, connected and placed in satisfactory working order in accordance with the manufacturer's

instructions and details and per the Contract Drawings. The Contractor shall furnish and install interconnecting wiring and conduits for any field mounted devices and the evaporator/condensing units and between the evaporator and condensing units. The number of control signals are per the manufacturer's requirements. The wiring and conduit shall be installed per the electrical requirements provided in Division 16.

3.02 IDENTIFICATION

1. Each unit of equipment shall be identified with the equipment item numbers given on the Contract Drawings. A corrosion resistant tag and nameplate, securely affixed in a conspicuous place on each unit shall give the equipment item number, manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, to complete identification.

3.03 TESTING

1. All tests shall be performed in accordance with the requirements of the General Conditions.

3.04 MANUFACTURER'S SERVICES

A. The Contractor shall provide the services of a qualified manufacturer's technical representative who shall provide on-site supervision of the installation and testing of the equipment furnished under this specification and the associated appurtenances of the system.

B. The Contractor shall submit documentation from the manufacturer's representative that certifies and agrees the installation and operational testing of all units comply with the manufacturer's recommendations.

C. Any additional time, costs, or changes required to achieve manufacture approved successful installation and operation shall be at the expense of the Contractor.

D. Training:

1. The Contractor shall provide training for plant personnel by a certified manufacture representative. Training shall include written material and a minimum of an 8 hour day at site to train the plant personnel as to the manufacturer required equipment operation and maintenance.

3.05 WARRANTY

A. The CITY MULTI units, or approved equal, shall be covered by the manufacturer's limited warranty for a period of one (1) year parts and seven (7) year compressor to the original owner from date of installation.

B. Manufacturer shall have a minimum of fifteen (15) years continuous experience providing VRF systems in the U.S. market.

C. All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required. Registering and sign-in requirements which may delay emergency service reference are not allowed.

D. The CITY MULTI VRF system, or approved equal, shall be installed by a contractor with extensive CITY MULTI install and service training. The mandatory contractor service and install training should be performed by the manufacturer.

E. All components, parts, and assemblies shall be guaranteed against defects in materials and workmanship for a period of one (1) year. The period of such warranties shall start on the date the particular equipment is placed in use by the DEP with corresponding start-up certification provided by the manufacturer's technical representative as specified herein, provided that the equipment demonstrated satisfactory performance during the thirty day operational period after the equipment startup. If the equipment does not perform satisfactorily during the thirty day operational period, the start of the warranty period will be delayed until the equipment demonstrates proper operation. The Equipment Supplier shall repair or replace without charge to the DEP any part of equipment which is defective or showing undue wear within the guarantee period, or replace the equipment with new equipment if the mechanical performance is unsatisfactory; furnishing all parts, materials, labor, etc., necessary to return the equipment to its specified performance level.

- END OF SECTION -

NO TEXT ON THIS PAGE

SECTION 15720H
Heating and Ventilating Units

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15720 – Heating and Ventilating Units, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.04.B shall be deleted.

Replace 1.04.10 with the following:

10. New York State Building Code.

PART 2 PRODUCTS

Replace 2.01 with the following:

2.01 HEATING AND VENTILATING UNITS (TYPE I)

A. General:
   1. Heating and ventilating unit shall conform to the requirements and conditions listed under this section.
   2. Heating and ventilating unit shall be specifically designed for the performance and service conditions specified, and shall be designed to operate in a humid and corrosive environment, continuously or intermittently, whichever imposes the most severe duty.

B. Manufacturers:
   1. Heating and ventilating unit specified shall be as manufactured by:
      a. Greenheck, Schofield, WI.
      b. Or approved equal.

C. Material and Construction:
   1. Units shall be complete with face damper, angled filters, vertical tube integral face and by-pass heating coils, fan section and discharge module

as required. This equipment shall be designed to operate in a damp, salty, wet atmosphere. All parts of the equipment herein shall be amply proportioned for all stresses that may occur during fabrication, shipment, erection and continuous operation. All corresponding parts shall be interchangeable and all parts subject to wear shall be standard pattern and easily replaceable. Adequate lubrication shall be provided for bearings and lubrication points shall be readily accessible.

2. Casing:
   a. The heating and ventilation unit shall be constructed of galvanized steel or aluminum. The base shall be braced to support internal components without sagging or pulsating. The entire base shall be guaranteed waterproof. The floor shall be 3/16 inch thick aluminum plate. Caulk seals or gaskets to guarantee water tightness are not acceptable. The perimeter support member shall be at least a 6 inch structural channel. The underside of the base shall be insulated with minimum 2 inch thick, 1.5 pounds per cubic foot high density fiberglass covered with a plastic sheet to form a vapor barrier. All side panels shall be insulated with 2-1/2 inch thick, 3 pounds per cubic foot high density fiberglass insulation material and flashed by the unit manufacturer with aluminum flashing. Each section of the base shall contain a drain to facilitate system washdown maintenance and condensate removal. Areas in the unit where potential standing water cannot be removed through a drain are not acceptable.
   b. The heating and ventilation unit panel casing system shall be built up from the unit base. The unit manufacturer shall manufacture the panel casing system. All panels shall be double-wall and insulated construction with 0.040" aluminum exterior and interior skin thickness. Each panel shall contain an integral frame of extruded aluminum pressure and heat bonded to the facing sheets to provide an air and vapor tight seal at the panel perimeter. Each panel shall have a minimum of 6 seals at every joint location.
   c. A leak-free panel joint system shall be guaranteed to assure that specified system capacity, performance, and cleanliness standards specified are not compromised. Panels shall be load-bearing and capable of forming the enclosure.
   d. Panels shall be joined together with extruded mullions and fastened with closed-end rivets. Any safing, internal partitions, or other tie-ins to the casing shall be made using internal support mullion extrusions extending inward which are an integral part of the casing. Component tie-ins, safing, etc. bolted, screwed, or welded to or through the casing (causing potential rust propagation, air bypass, and air leakage) are not acceptable.
   e. The thickness of the panel skin, core density, rib spacing, and mullion spacing shall be designed to eliminate panel pulsation, and restrict

deflection to 1/200 of any span at a design load of 1-1/2 times design pressures. The core material must comply with NFPA-90A criteria for flame spread and smoke developed ratings.

f. Each unit section shall have an access door, for service, maintenance, and removable components. Access doors shall be of the same construction as the panels above. They shall be guaranteed tight closing by means of two continuous separate gasket seals around the entire periphery, beveled at a 45 degree angle to assure a true perpendicular, tight, non-shearing compression fit. Single gasket seals or 90 degree gasket configurations are not acceptable. Each access door shall have a safety glass window and built-in static pressure probe port for ease of pressure readings across various internal components and to limit unnecessary or unauthorized access inside the unit. Each access door shall be air tight and mounted with corrosion-resistant continuous piano hinges. At least two cast aluminum handles operable form either side shall be provided. Access door shall also be provided with self-locking nuts for handles and stainless steel hardware.

g. Units shall be provided with lighting system. Lighting system shall include vapor tight incandescent marine type light fixture, switch and receptacle.

3. Coils:

a. Heating coils shall be vertical tube integral face and by-pass (VIFB) heating coils type. Each VIFB coil shall bear the seal indicating manufacturer's compliance with ARI Standard 410.

b. Heating coil shall consist of built-in series of finned heating elements and by-passes with interlocked dampers controlled by electric damper motor and thermostat as specified in control strategies in the Contract Documents. Dampers shall be arranged so as to completely enclose and isolate the heating coil passes when no temperature rise is required. Each coil shall be capable of maintaining a constant discharge air temperature regardless of variations in entering air temperatures with full water flow.

c. Proportioning of the air shall be such that the temperature at any point in a plane parallel to the face of the coil three feet downstream from the leaving side shall not vary more than 5 F from the average discharge airstream temperature.

d. Dampers shall be 16 gauge roll-formed cold-rolled steel with air dried enamel finish.

e. Casing shall be 14 gauge galvannealed steel, with rigid framework, completely painted.

f. Finned heating elements shall be fabricated of seamless straight, vertical copper tubes with rectangular aluminum fins spaced not closer than 12 fins per inch. Each tube shall be individually secured

to the supply and return headers by a brazed joint with provision for individual tube expansion and contraction.

g. Finned elements shall be factory tested at 200 PSI steam and 500 lbs. hydrostatic pressure.

h. Volume of air passing through the coil shall not vary more than ±5%, regardless of the position of the internal dampers.

i. Direct expansion (DX) coils shall have round seamless copper tubes with mechanically bonded aluminum fins. Coils shall have round, seamless, copper pipe liquid lines and suction headers with male sweat connections

j. Direct expansion coils shall be 715 PSI and leak tested at 650 PSI. Coil performance shall be in accordance with the current edition of AHRI Standard 410.

k. Coils shall be as manufactured by:
   (1) Trane, Bridgeton ,MO.
   (2) Or approved equal.

4. Filter Sections and Filters:
   a. The filter section shall be complete with filters. Holding frames shall be installed and individually sealed to prevent leakage around frames. Filter banks shall be reinforced with vertical structural members to assure rigidity.
   b. Filters shall be removable.
   c. Air filters shall be medium efficiency, pleated, 2 inch thick disposable type. Each filter shall consist of a non-woven cotton and synthetic fabric media, media support grid and enclosing frame. The filter shall be Underwriters' Laboratories Class 2 listed.
   d. Filter media shall be of a non-woven cotton fabric type. The filter media shall have an average efficiency of 25-30 percent on ASHRAE Test Standard 52-76. It shall have an average resistance of 90-92 percent in accordance with that test standard.
   e. The effective filter media shall be not less than 4.6 square feet of media per 1.0 square foot of filter face area and shall contain not less than 15 pleats per linear foot. Initial resistance at 500 fpm approach velocity shall not exceed .28 inch w.g.
   f. The media support shall be a Type 316 stainless steel welded wire grid with an effective open area of not less than 96 percent. The welded wire grid shall be bonded to the filter media to eliminate the possibility of media oscillation and media pull away. The media support grid shall be formed in such a manner that it effects a radial pleat design, allowing total use of filter media.
   g. The enclosing frame shall be constructed of a rigid, heavy-duty, high wet-strength beverage board, with diagonal support members bonded to the air entering and air exiting side of each pleat, to ensure pleat

stability. The inside periphery of the enclosing frame shall be bonded to the filter pack, thus eliminating the possibility of air bypass.

h. The frames shall be pre-drilled for convenient assembly into banks. They shall be installed to provide service from the dirty air side. The frames shall be equipped with factory installed butyl gaskets.

i. The frames shall be made of 16 gauge aluminized steel, 2-13/16 inch in depth. They shall be equipped with integral spring type latches to securely hold the filter against the gaskets.

j. Unit manufacturer shall provide a Magnehelic gauge to indicate the operating pressure drop of the filter.

5. Fan and Drives:

a. The fans shall be double-width double-inlet (DWDI) all aluminum construction capable of operating over the entire class range in accordance with the equipment schedule on the Contract Drawing. Fan wheels shall utilize non-overloading airfoil blades in all sizes. Flat, single thickness blades are not acceptable. Fans shall be in compliance with the layout shown on the drawing.

b. Fan ratings shall be based on tests made in accordance with AMCA Standard 210 and licensed to bear the AMCA Certified Rating seal for Air Performance. Only AMCA certified fans will be accepted. Fans shall have a sharply rising pressure characteristic extending throughout the operating range to assure quiet and stable operation under all conditions from wide open to closed off. Fan brake horsepower shall be equal to or less than the BHP specified in the schedule at the listed static pressure and CFM.

c. Fan manufacturer shall provide sound power level ratings for fans tested and rated in accordance with AMCA Standards. Sound power ratings shall be in decibels (reference 10-12 watts) in eight octave bands.

d. Fan housings shall be minimum gauge 12, continuously welded all aluminum construction. Housing with lock seams or partially welded construction are not acceptable. Housings shall be reinforced with rigid bracing to increase structural integrity and prevent vibration. Housing inlet cones shall be aerodynamically designed and spun providing a minimum separation of air flow. Wheel diameters and outlet areas shall be in accordance with the standard dimensions adopted by AMCA for centrifugal fans.

e. Shafts are to be ASTM A-108 steel, grade 1045, precision turned, ground and polished. The shaft's first critical speed shall be at least 125 percent of the fans maximum operating speed for each fan class. The drive end of the fan shaft shall be counter sunk for tachometer readings.

f. All fan surfaces are to be thoroughly cleaned prior to painting using a combination of washing and hand and power tool cleaning as

required. After cleaning, all surfaces are to be coated with an industrial grade alkyd enamel. Surfaces of bolted components not accessible after assembly shall be coated with an industrial grade alkyd enamel. Surfaces of bolted components are not accessible after assembly shall be coated and allowed to dry prior to final assembly. Primer only will not be acceptable.

g. All fans shall receive a final inspection by a qualified inspector prior to shipment. Inspection to include: fan description and accessories, balance, welding, dimensions, bearings, duct and base connection points, paint finish and overall workmanship.

h. Operating fan brake horsepowers shown on the schedule shall not be exceeded.

i. The fan drive shall be multiple cog, non-static V-belts sized at 1.5 times the fan motor horsepower. All sheaves shall be fixed. The fan sheaves shall be single pitch with tapered split and keyed hub. The fan drive guard shall be in accordance with OSHA requirements, with tachometer opening provisions for measuring the fan speed without removing the guard. The guard shall be split for adjustment and belt change.

j. The fan and motor shall be provided with housed spring vibration isolation for a minimum of 90 percent isolation efficiency. An integral adjustable motor base shall be provided.

k. Fan bearings shall be split pillow-block design. All bearings shall be designed for a minimum L-50 life of 100,000 hours when rated at the maximum operating speed. The beltguard shall be a two-piece split design for easy removal and convenient maintenance and service.

l. The unit manufacturer shall provide a flexible connection between the fan and the unit discharge. Thrust arrestors shall be provided on fan assemblies as required.

m. The discharge sections shall be complete with aerodynamically designed framed discharge openings or spun bellmouth fittings in order to reduce overall system static pressures and the associated operating costs. Openings shall conform to the size and configuration of the ductwork where shown.

6. Dampers (External or Internal):

a. Dampers shall be low leakage, opposed blade design. Leakage rate shall not exceed 3 CFM per square foot at 4" static pressure and 2000 FPM.

b. Damper frames shall be made of extruded aluminum. Damper blades shall be extruded aluminum airfoil shape for extra strength to withstand high velocities and static pressures. Dampers shall be provided with stainless steel blade end seals and neoprene blade edge seals to keep leakage to a minimum.

2.02 shall be deleted.

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

Section 15740
Packaged Air Conditioning Units

NOTE: Detailed Specification 15740 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15740.

PART 1 GENERAL

1.01 SUMMARY

1. These specifications describe requirements for a precision environmental control system. The system shall be designed to maintain temperature and humidity conditions in the rooms containing electronic equipment. The manufacturer shall design and furnish all equipment to be fully compatible with heat dissipation requirements of the room and accessories. Refer to schedules for applicable equipment features.
2. All necessary accessory equipment and appurtenances shall be provided for a complete and operating system whether or not specifically stated in the Specifications. This installation shall incorporate the highest standards for the type of service shown on the Drawings included field testing of the entire installation and instruction of the regular operating personnel in the care, operation, and maintenance of all equipment.
3. The equipment shall be furnished complete with all accessories, special tools, spare parts, extra set of filters, and other appurtenances as specified or as may be required for a satisfactory installation.
4. Work Included Under Other Sections:
    a. 480V, 3-phase power wiring and conduit under Division 16, Electrical.
    b. Motor starters under Division 16, Electrical, unless factory mounted and wired by equipment manufacturer

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SPECIFICATIONS

1. Section 01300 - Submittals

1.04 DELIVERY, STORAGE AND HANDLING

1. Deliver, store, protect and handle products to the Project Site under the provisions of Division 1.

2. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.

3. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures and finish.

4. Protect openings in casing and seal them with plastic wrap to keep out dirt and debris.

1.05 SCHEDULES ON DRAWINGS

1. In general, all capacities of equipment and motor and starter characteristics are shown in schedules on the Drawings. Reference shall be made to the schedules for such information. The capacities shown are minimum capacities. Variations in capacities of the scheduled equipment supplied under this Contract will be permitted only with the written direction of the Engineer.

1.06 MANUFACTURER'S INSTRUCTIONS

1. Installation of all equipment shall be in accordance with manufacturer's data.

2. All changes from the installation procedures in manufacturers' data shall be submitted for approval in accordance with the requirements for shop drawings.

3. Keep all manufacturers' data provided in a secure manner at the job site at all times. Catalog and index this data for convenient reference.

4. Manufacturers' data shall be available for the information of the Owner, Engineer, and the use of other trades.

5. Turn over all data to the Owner through the Owner's representative at completion of the Work and final testing.

6. Submit all instruction books and manuals in accordance with Division

1.07 CODES, PERMITS AND STANDARDS

1. The contractor shall obtain and pay for all permits (unless specifically excluded under Division 1 requirements) and shall comply with all laws and codes that apply to the work.

2. The Contractor shall be responsible for all added expenses due to his choice of equipment, materials or construction methods.

3. All work and materials shall be in full accordance with the latest State rules and regulations or publications including those of the State Fire Marshall, the State Mechanical and Energy Codes, and all local codes.

Nothing in the Plans and/or Specifications shall be construed to permit work not conforming to the above codes, rules and regulations.

4. All equipment, materials and installations shall conform to the requirements of the most recent edition with latest revisions, supplements and amendments of the following, as applicable:
   a. American Society of Mechanical Engineers (ASME)
   b. American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE)
   c. American National Standards Institute (ANSI)
   d. American Society of Testing and Materials (ASTM)
   e. Air Movement and Control Association (AMCA)
   f. Air-conditioning, Heating and Refrigeration Institute (AHRI)
   g. National Fire Protection Association (NFPA)
   h. National Electrical Code (NEC)
   i. International Mechanical Code
   j. Underwriters Laboratories (UL)
   k. Applicable Federal, State and local laws and/or ordinances
5. Where conflict arises between the local codes and the requirements of the National Electrical Code, The National Fire Code, NEMA, ASTM, etc., the more stringent requirements shall prevail.

1.08 SUBMITTALS

1. In accordance with the procedures and requirements set forth in the General Conditions and Division 1 the Contractor shall obtain from the equipment manufacturer and submit the following:
   a. A list of all Contract deviations and non-applicable requirements. Those applicable Contract requirements that are not listed explicitly as deviations shall be deemed by the Contractor as being in total compliance with the Contract requirements. The Contractor is responsible for and will make any and all changes to installed equipment that does not comply with the Contract. Such changes shall be made at no additional cost.
   b. Shop Drawings
   c. Operation and Maintenance Manuals
   d. Special Tools List

e. Reports of Certified Shop Tests

f. AMCA Approval of Fan Ratings

2. Each submittal shall be identified as specified in the General Conditions and Division 1.

3. Shop Drawings:

a. Each submittal shall be complete in all aspects incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions shall be returned to the Contractor disapproved without review.

b. Partial, incomplete or illegible submissions will be returned to the Contractor without review for resubmittal.

c. Shop drawings shall include but not be limited to:

d. Equipment specifications and data sheets identifying all materials used and methods of fabrication.

e. Complete assembly, layout, installation drawings with clearly marked dimensions.

f. Computer printout for coil selection.

g. Interconnecting wiring diagram.

h. Motor name plate data

i. Example equipment nameplate data sheet.

4. Operations and Maintenance Manuals

a. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 1.

b. One electronic copy of a preliminary O&M manual shall be included in the shop drawing submittal.

1.09 SPARE PARTS AND SUPPLIES

1. Furnish all special tools necessary to dissemble, service, repair and adjust the equipment.

2. The following spare parts shall be furnished with each unit specified, as applicable per the Contract Drawings. Refer to schedule for applicable features:

a. Four (4) sets of Pleated Filters

b. Two (2) sets of Match V-Belts

c. One (1) Temperature Sensor

d. Two (2) Cans of 18oz. Spray-on Touch-Up Paint

3. Furnish additional spare parts as recommended by the equipment manufacturers.

4. Spare parts lists, included with the drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

5. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.10 QUALITY ASSURANCE AND QUALIFICATIONS

1. The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. In conformance with Article 5 of the General Conditions, equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and as shown on the Contract Drawings.

2. All material and equipment shall be the latest design, new, not deteriorated, and the first quality standard product of manufacturers regularly engaged in the production of such material and equipment.

3. When two or more units of the same class of material or equipment are required, they shall be products of a single manufacturer.

4. All work shall be performed in a neat and workmanlike manner by workers skilled in their respective trades, and all materials and equipment shall be installed as recommended by the manufacturers and in accordance with specified codes and standards.

5. Touch up and/or repaint to match original factory finishes for all finished or painted equipment and materials which are scratched or marred during shipment or installation.

6. Factory Authorized Start-Up Services: The Contractor shall provide the services of a qualified manufacturer's technical representative who shall adequately supervise the installation and field testing of all equipment furnished under this Contract and instruct the Contractor's personnel and the Owner's operating personnel in its maintenance and operation.

1.11 SPECIAL TOOLS

1. Furnish all special tools necessary to dissemble, service, repair and adjust the equipment.

PART 2 PRODUCTS

2.01 TYPE I – THROUGH WALL MOUNTED

1. Subject to compliance with requirements of the Contract documents provide precision control air conditioning unit(s) manufactured by one of the following:
   a. Specific Systems (Basis of Design)
   b. or approved equal
2. The Control Room Air Conditioning System shall be a self-contained factory assembled units. The system shall have the following built-in components:
   a. Cabinet and Frame Construction: The cabinet and frame shall be constructed of aluminum. The exterior panels shall be insulated with a minimum 1", 3 lbs. Density fiberglass thermal and acoustical insulation.
   b. Filter Chamber: The filter chambers shall be an integral part of the system, located within the cabinet serviceable from the inside of the room. The filters shall be rated with a minimum MERV 8 unless otherwise indicated on the Contract Drawings.
   c. Evaporator Fan Section: The fan shall be the centrifugal type, backward inclined and shall be statically and dynamically balanced as a completed assembly to a maximum vibration level of two mils in any plane. The shaft shall be heavy duty stainless steel with self-aligning ball bearings with a minimum L-10 life span of 100,000 hours. The fan motor shall be 1750 RPM or less and mounted on an adjustable slide base. The drive package shall be two-belt, variable pitched, sized for 200 percent of the fan motor horsepower. The fans shall be located to draw air over the A-Frame coil to ensure even air distribution and maximum coil performance.
   d. Control System: The control system shall be microprocessor based. Unit-mounted panel with main fan contactor, compressor contactors, compressor start capacitor, control transformer with circuit breaker, solid-state temperature- // and humidity // -control modules // humidity contactor //, time-delay relay, heating contactor, and high-temperature thermostat. The display and housing shall be viewable while the unit panels are open or

closed. The controls shall be menu driven. The display shall be organized into three main sections: User Menus, Service Menus and Advanced Menus. The system shall display user menus for: active alarms, event log, graphic data, unit view/status overview (including the monitoring of room conditions, operational status in % of each function, date and time), total run hours, various sensors, display setup, and service contacts. A password shall be required to make system changes within the service menus. Service menus shall include: set-points, standby settings (lead/lag) timers/sleep mode, alarm setup, sensor calibration, maintenance/wellness settings, options setup, system/network setup, auxiliary boards and diagnostics/service mode. A password shall be required to access the advanced menus, which include the factory settings and password menus. Menu shall allow the set-points within the following ranges:

a. Temperature Set-point: 65-85^{o}F
b. Temperature Sensitivity: +1-10^{o}F
c. Humidity Set-point: 20-80% RH
d. Humidity Sensitivity: 1-30% RH
e. High Temperature Alarm: 35-90^{o}F
f. Low Temperature Alarm: 35-90^{o}F
g. High Humidity Alarm: 15-85% RH
h. Low Humidity Alarm: 15-85% RH

e. Refrigeration System: The refrigeration system shall consist of two 50% independent circuits. Each refrigeration circuit shall include hot gas mufflers, liquid line filter dryers, refrigerant sight glass with moisture indicator; adjustable, externally equalized expansion valves and liquid line solenoid valves. Unless indicated otherwise in the equipment schedule, compressors shall be scroll type:

1) Scroll Compressors: The compressor shall be scroll-type. The compressor shall be suction gas cooled motor, vibration isolators, thermal overloads, automatic reset high pressure switch with lockout after three failures, service valves, pump down low pressure transducer, suction line strainer and a maximum operating speed of 3500 RPM.

2) All compressors shall be furnished with electric crankcase heaters.

3) A-Frame D.X. Coil: The evaporator coil shall be an A-Frame design and a minimum of 4 rows deep. It shall be constructed of copper tubes and aluminum fins.

Refrigerant of each system shall be distributed throughout the entire coil face area. A stainless steel condensate drain pan shall be provided. When indicated on the Contract Drawings, the coil shall be provided with a Heresite corrosion resistant coating. The Heresite coating shall have a UV resistant top coat. Blygold coating is an acceptable alternative, or approved equal.

f. Smoke Detector: The smoke detector shall immediately shut down the environmental control system and activate the alarm system when activated. The smoke detector shall be mounted in the control panel with the sensing element in the return air compartment. The smoke sensor is not intended to function as or replace any room smoke detection system that may be required by local or national codes. The smoke sensor shall include a supervision contact closure.

g. Motors: The motors shall be of the high premium efficiency totally enclosed fan cool type with built-in overload protection.

3. Air Cooled Condensing Unit (Integral to AC Unit)

a. The air-cooled condensing unit shall be contained within the Air Conditioning Unit and shall not require any additional refrigeration piping. The system shall be designed for 95oF ambient unless otherwise noted on the Contract Drawings.

b. The control system for the air cooled condensing unit shall be constant fan speed control unless indicated otherwise in the Contract Drawings. The fan speed control condensing unit shall have a fan speed controller sensing refrigerant pressure and varying the speed of the fan speed control duty motor. If condensing unit has more than one fan, any additional fan motors shall be fixed speed, cycled On/Off by ambient air thermostats to further vary flow across the coils. The fan speed control system shall provide positive startup and operation in ambient temperatures as low as -20oF.

c. Condensing unit coils shall be constructed on copper tubes on a staggered tube pattern. Tubes shall be expanded into continuous, rippled aluminum fins. The fins shall have full-depth fin collars completely covering the copper tube. Copper tubes shall be connected to heavy wall type 2 headers, inlet coil connector tubes shall pass through relieved holes in the tube sheet, for maximum resistance to piping strain and vibration. Coils shall be factory leak-tested at 400 psig (minimum); dehydrated, evacuated and charged.

d. Fans shall have aluminum blades. Fan shall be secured to fan shaft by means of a heavy-duty keyed hub and dual set screws. Fans shall be factory balanced and run before shipment.

e. When indicated on the Contract Drawings, the air cooled condensing unit coils shall be provided with a Heresite corrosion resistant coating. The Heresite coating shall have a UV resistant top coat. Blygold coating is an acceptable alternative or an approved equal.

4. When corrosion resistant coating is required for the evaporator and condensing unit coils, all copper piping inside the condensing and evaporator units but external to the coils shall also be coated with a corrosion resistance coating. A spray on coating such as Incralac, Heresite, Blygold, or equivalent shall be used. The coating shall provide long-term protection in a hydrogen sulfide (3 ppm) operating environment. The Heresite coating shall have a UV resistant top coat.

5. Controller shall be provided with 2 sets of remote alarm contacts and 2 sets of shutdown contacts.

PART 3 EXECUTION

3.01 INSTALLATION

1. Air conditioning unit shall be installed, connected and placed in satisfactory working order in accordance with the manufacturer's instructions and details and per the Contract Drawings. The Contractor shall furnish and install interconnecting wiring and conduits for any field mounted devices and the evaporator/condensing units and between the evaporator and condensing units. The number of control signals are per the manufacturer’s requirements. The wiring and conduit shall be installed per the electrical requirements provided in Division 16.

3.02 IDENTIFICATION

1. Each unit of equipment shall be identified with the equipment item numbers given on the Contract Drawings. A corrosion resistant tag and nameplate, securely affixed in a conspicuous place on each unit shall give the equipment item number, manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, to complete identification.

3.03 TESTING

1. All tests shall be performed in accordance with the requirements of the Contract Documents.

3.04 MANUFACTURER'S SERVICES

A. The Contractor shall provide the services of a qualified manufacturer's technical representative who shall provide on-site supervision of the installation and testing of the equipment furnished under this specification and the associated appurtenances of the system.

B. The Contractor shall submit documentation from the manufacturer's representative that certifies and agrees the installation and operational testing of all units comply with the manufacturer's recommendations.

C. Any additional time, costs, or changes required to achieve manufacture approved successful installation and operation shall be at the expense of the Contractor.

D. Training:

1. The Contractor shall provide training for plant personnel by a certified manufacture representative. Training shall include written material and a minimum of an 8 hour day at site to train the plant personnel as to the manufacturer required equipment operation and maintenance.

3.05 GUARANTEE

A. All components, parts, and assemblies shall be guaranteed against defects in materials and workmanship for a period of one (1) year. The period of such warranties shall start on the date the particular equipment is placed in use by DEP with corresponding start-up certification provided by the manufacturer's technical representative as specified herein, provided that the equipment demonstrated satisfactory performance during the thirty day operational period after the equipment startup. If the equipment does not perform satisfactorily during the thirty day operational period, the start of the warranty period will be delayed until the equipment demonstrates proper operation. The Equipment Supplier shall repair or replace without charge to DEP any part of equipment which is defective or showing undue wear within the guarantee period, or replace the equipment with new equipment if the mechanical performance is unsatisfactory; furnishing all parts, materials, labor, etc., necessary to return the equipment to its specified performance level.

- END OF SECTION -

NO TEXT ON THIS PAGE

SECTION 15760
Unit Heaters – Hot Water

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15760 – Unit Heaters – Hot Water, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.01 UNIT HEATERS

Revise Article 2.01.A as follows:

A. Manufacturers:
   a. Trane Company, Long Island City, NY.
   b. Modine Manufacturing Company, Racine, WI..
   c. Airtherm, Westfield, MA.
   d. Or approved equal.

Section 2.02 shall be deleted

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15762H
Finned Tube Radiation

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15762 – Finned Tube Radiation, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.01 FIN TUBES

Replace 2.01.A with the following:

A. Accepted as manufactured by:
   1. Slant Fin, Greenvale, NY
   2. Trane Co, Long Island City, NY.
   3. Rittling, Buffalo, NY.
   4. Or approved equal.

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15810H
Ductwork and Duct Accessories

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15810 – Ductwork and Duct Accessories, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A and B with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.06 QUALITY ASSURANCE

Replace 1.06.C.4.a with the following:

a. New York State Building Code

PART 2 PRODUCTS

2.01 MATERIALS

Delete Section 2.01.A.1, 2.01.A.2

Replace 2.01.A.3 with the following:

3. Aluminum (with 3003 ductwork H-14 alloy and temper): All ductwork shall be constructed of Aluminum except where specified or indicated on plans. All air devices and ductwork accessories for aluminum ductwork shall be aluminum. ASTM B209, alloy 1100, 3003, or 5052 for all applicable ducts and of adequate strength and rigidity to meet the conditions of the service and installation requirements and shall be properly protected where subject to mechanical injury.

2.02 METAL DUCTWORK

Replace Section 2.02.B with the following:

B. Aluminum Ductwork:

1. All ductwork shall be constructed of Aluminum except where specified or indicated on the Drawings
2. Transverse duct connections for rectangular ducts shall be bolted, gasketed connections made with standard Ductmate 35 System as manufactured by Duct Mate Industries, W.D.C.I. or approved equal. All longitudinal seems shall be Pittsburg Z, or better. Duct flange system material shall match the duct material. Gaskets shall be suitable for exposure to hydrogen sulfide 2ppm.
3. Transverse duct connections for round ducts shall be bolted, gasketed connections in accordance with chapter 12 of SMACNA Round Industrial Duct Construction Standards. Duct connections shall be the same material as the duct. Utilize longitudinal seam ductwork. Gaskets shall be suitable for exposure to hydrogen sulfide 2 ppm and outdoor use.
4. All ductwork shall be shop fabricated in sections with flanged ends. The Ductmate 35 flange system, or approved equal shall be factory spot welded to the ductwork. No field welding of ductwork shall be permitted. Welding equipment and electrodes shall be of a type specifically suited for aluminum, as applicable, to provide consistently good quality welds.
5. All duct sections shall be constructed and installed without forming dips and traps.
6. All ducts shall have a minimum clearance of three (3) inches from all combustible material.

2.03 DUCTWORK ACCESSORIES

Delete 2.03.A.6

Add 2.04.K

K. Louvers:

1. Combination Louver/Dampers:
   a. Manufacturer: Provide products of one of the following:
      (1) Ruskin
      (2) Greenheck
      (3) Approved Equal
   b. Frame, blade, axle, bearings, jamb seal, and linkage materials: 6063T5 Aluminum
   c. Inside and outside of all parts shall be coated with a corrosion resistant coating. The coating shall be Kynar 500 or approved equal. Final color selection shall be provided by the Owner. The Contractor shall submit a full color chart for selection and approval.

d. Frame shall be 0.125 inches thick
e. Front Blades:
   (1) Drainable with minimum wall thickness of 0.081 inch
   (2) Blades shall be angled at 37 degrees
f. Rear Blades:
   (1) Double wall airfoil shape with minimum wall thickness of 0.14 inch
   (2) Linkage shall be concealed in the frame
   (3) Bearings shall be stainless steel
   (4) Axles shall be stainless steel
g. Damper shafts shall be solid hexagonal or square shape.
h. Seals:
   (1) Blade edge seals shall be extruded vinyl
   (2) Jamb seals shall be compressible type of aluminum construction
i. Drain gutters shall be in head frame and each blade
j. Downspouts in jambs shall drain water from louver
k. Provide aluminum bird screens. Screens shall be expanded and flattened type.

PART 3 EXECUTION

3.04 CLEANING

Add the following new paragraph after section 3.04.B

C. All ductwork shall be cleaned in accordance with the latest edition of NAPCA, National Air Duct Cleaners Association

D. Contractor shall provide duct service openings in accordance with NAPCA to ensure proper duct cleaning.

3.06 CONSTRUCTION AND MATERIAL SCHEDULE

Replace 3.06.A with the following:

A. Schedule of Metal Duct Construction Standards:

Duct Construction Schedule

Service	Pressure Class	Duct Material	Seal Class	Leakage Class	Construction Standards
All ductwork on fan discharge side	+/- 2 inwg.	Aluminum	A	12	SMACNA HVAC Duct Construction Standards
All ductwork on suction side	+/- 4 inwg.	Aluminum	A	6	SMACNA HVAC Duct Construction Standards

Delete 3.06.A.1.a

- END OF DETAILED SPECIFICATION –

SECTION 15815H
Duct Insulation

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15815 – Duct Insulation, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.06 QUALITY ASSURANCE

Replace 1.06.C.3.a with the following:

a. New York State Building Code

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15830H
Fans

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15830 – Fans, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

Section 2.02, 2.03, 2.05, 2.06, 2.07, 2.08 2.09, 2.10, 2.11, 2.12, 2.13 shall be deleted

2.04 IN-LINE SQUARE CENTRIFUGAL FANS

Replace 2.04.A with the following:

A. In-line square fans shall be of centrifugal belt or direct driven in-line type. The fan housing shall be of the square design constructed of heavy gauge all aluminum and shall include square duct mounting collars.

Replace 2.04.G with the following:

G. Fans shall be Model BSQ or SQ as manufactured by:

1. Greenheck, Schofield, WI.
2. Or approved equal.

- END OF DETAILED SPECIFICATION -

NO TEXT ON THIS PAGE

Section 15951
Testing, Adjusting, and Balancing

NOTE: Detailed Specification 15951 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15951.

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies the requirements and procedures for testing, adjusting, and balancing the HVAC systems. Requirements include measurement and establishment of the fluid quantities of the HVAC systems as required to meet design specifications, and recording and reporting the results.

B. The following HVAC systems shall be tested, adjusted and balanced:

1. Supply air systems, all pressure ranges, including new and existing systems
2. Exhaust air systems
3. Outside air systems
4. Air Heating systems
5. Hot Water systems
6. Air Cooling systems
7. Verify HVAC Master Control Station (HMCS) operation

C. This Section does not include specifications for materials for patching HVAC systems, or specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 DEFINITIONS

A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes the balance of air distribution, water distribution, the adjustment of total system to provide design quantities, the electrical measurement, and the verification of performance of all equipment and automatic controls.

1. Test: To determine quantitative performance of equipment.

2. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

3. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

4. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

5. Report Forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.

6. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets or supply outlets on air terminals and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

7. Main: Duct containing the system's major or entire fluid flow.

8. Submain: Duct containing part of the systems' capacity and serving two or more branch mains.

9. Branch Main: Duct serving two or more terminals.

10. Branch: Duct serving a single terminal.

1.04 SUBMITTALS

A. Prior to balancing, the Contractor shall perform Equipment Testing as indicated in section 3.1. Prior to performing System Testing, the Contractor shall have the system balanced as indicated in section 3.1.

B. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.

C. The Contractor shall submit a detailed testing procedure which shall include:

1. Step by step instructions as to how the tests will be performed including but not limited to temporary layout modifications, procedures for testing instrument functionality, steps required to prove that the Control Strategy has been properly implemented, and steps required to compensate for ambient air temperature versus normal operating temperature such as thermostat setpoint adjustment. The steps shall indicate all actions to be taken, the expected result of the actions, and what the expected result verifies in regards to proving that the unit operates as designed.

2. A list of any additional or temporary equipment necessary to perform the tests.

3. Provide a checklist of items that will checked during the test as listed in Section 3.1. Each item shall be initialed by the Contractor's Testing and Balancing Technician conducting the test. The Contractor's Testing and Balancing Engineer shall sign and date the bottom of the test sheet verifying all results.

D. The Contractor shall submit the signed results of the equipment testing to the Engineer for approval. The equipment manufacturer's representative shall be present for all testing. The results shall include a letter from the manufacturer's representative stating that the equipment has been installed per the manufacturer's installation requirements and is in satisfactory working order.

E. The Contractor shall submit an adjusting and balancing procedure which shall include:

1. Standard procedure the Contractor will use for balancing the systems.

2. Tables specific to the equipment for this project for recording the required information from Part 3 – Execution.

3. Flow diagrams specific to the systems present on this project. The flow diagrams shall contain at a minimum:
    a. A diagrammatic representation of the system
    b. All duct or pipe sizes
    c. All inline equipment such as fans, pumps, duct heaters, filters, and strainers
    d. All air inlet and outlet grilles and registers
    e. All dampers, valves, or flow control equipment

4. A list of the equipment the balancing technician will use to balance the system

F. Submit completed adjusting and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been adjusted and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. The adjusting and balancing reports shall contain at a minimum

1. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
    a. General Information and Summary
    b. Technician Qualifications and Certificates
    c. Completed Adjusting and Balancing Report including procedure
    d. Temperature Control System Settings
    e. Calibration Certificates of all Instruments Used

2. Report Contents: Provide the following minimum information, forms and data:

a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name, address, telephone number, and signature of the Certified Test and Balance Engineer.

b. Calibration Certificates: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to the date of the start of balancing.

c. Flow Diagrams

d. Balancing Datasheets

e. Balancer Comments: The Balancer shall provide comments, suggestions, and corrective actions to any issues that occur during balancing including excessive noise, excessive vibration, or an inability to meet design conditions.

1.05 QUALITY ASSURANCE

A. Test and Balance Personnel Qualifications: The personnel responsible for testing, adjusting, and balancing the specified systems shall have at least three years' experience in testing and balancing systems similar to this project and shall be an employee of the installer or an independent testing and balancing agency.

B. Codes and Standards:

1. NEBB, "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

2. ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.

C. Contractor shall provide all necessary instrumentation, tools, ladders, and labor etc. to complete all air balancing, tests and adjustments.

D. Instrumentation shall be in accordance with NEBB, AABC, or SMACNA requirements and shall be calibrated to the accuracy standards demanded by these organizations.

E. All testing, adjusting, and balancing of air systems shall be performed in compliance with the standard procedure manual published by the testing, adjusting, and balancing organization affiliated with NEBB, AABC, or SMACNA Organization. Testing, adjusting, and balancing technician shall hold current certification by one of these organizations. Submit certification to Engineer for approval.

F. Contractor shall be solely responsible for the protection and safeguarding of his work and shall provide every protection against accidents, injury, and damage to persons and property.

G. Contractor shall keep dust, dirt, and debris to an absolute minimum and reinstall all removed ceiling components to their original positions at the end of each day.

H. Contractor shall be fully responsible for removal and reinstallation of ceiling system and replacement of any component damaged.

1.06 SEQUENCING AND SCHEDULING

A. Systems shall be fully operational prior to beginning procedures.

1.07 RELATED SECTIONS

A. Section 15500 - Basic HVAC Requirements

B. Section 15130 – Hydronic Piping Specialties

C. Section 15053 – Aluminum, Copper, Brass Pipe

D. Section 15830 - Fans

E. Section 15810 – Ductwork and Duct Accessories

F. Section 15608 – HVAC Electric Control Systems

G. Section 15720 – Heating and Ventilating Units

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.01 HVAC TESTING

A. Equipment to be tested shall include at a minimum all fans, unit heaters, H&V units, dehumidifiers, and electric control systems. The specific requirements

for equipment indicated below shall be performed in addition to any requirements of the Manufacturer for startup and initial operation.

B. The equipment manufacturer's representative shall be present for all testing.

C. Fans:

1. Pre Startup Inspection:
    a. Verify proper equipment mounting and setting
    b. Verify that control, interlock and power wiring is complete
    c. Verify alignment of motors and drives
    d. Verify proper belt tension
    e. Verify proper duct connections and accessories
    f. Verify that lubrication is completed
    g. Verify that equipment is in good condition and free from damage
    h. Verify that all packing materials, temporary stops, and temporary supports used during shipping have been removed
    i. Verify that equipment and associated ducts are free from debris
    j. Verify that equipment is installed per the Manufacturer's requirements
2. Equipment Test:
    a. Prior to energizing motor, verify and record voltage of power supply
    b. Bump motor to verify direction of rotation
    c. Run the fan for 1 hour of continuous trouble free operation. Any issues or stops required for tuning or repairs shall cause the test to be restarted from the beginning of this procedure.
    d. Monitor heat build-up in bearings
    e. Monitor for any abnormal noises or vibration
    f. Check motor loads against nameplate data
    g. Record fan sound levels ten (10) feet from the surface of the fan in five (5) minute intervals during 1 hour run period. The sound levels shall not be used for any sound rating verification. The

sound levels shall be used for information by the owner to identify areas that will require hearing protection.

3. System Test:

   a. Verify the system operates per the respective equipment specification 15590-Fans and Section 15608-HVAC Electric Control Systems including all modes of operation, interlocks, alarms, and safeties.

D. Pumps:

1. Pre Startup Inspection:

   1) Verify proper equipment mounting and setting

   2) Verify that control, interlock and power wiring is complete

   3) Verify alignment of motors and drives

   4) Verify proper pipe connections and accessories

   5) Verify that lubrication is completed

   6) Verify that equipment is in good condition and free from damage

   7) Verify that all packing materials, temporary stops, and temporary supports used during shipping have been removed

   8) Verify that strainers are clean and screens are in place

   9) Verify that equipment is installed per the Manufacturer's requirements

2. Equipment Test:

   a. Prior to energizing motor, verify and record voltage of power supply

   b. Bump motor to verify direction of rotation

   c. Run the pump for 1 hour of continuous trouble free operation. Any issues or stops required for tuning or repairs shall cause the test to be restarted from the beginning of this procedure.

   d. Monitor heat build-up in bearings

   e. Monitor for any abnormal noises or vibration

f. Check motor loads against nameplate data

g. Record pump sound levels ten (10) feet from the surface of the pump in five (5) minute intervals during 1 hour run period. The sound levels shall not be used for any sound rating verification. The sound levels shall be used for information by the owner to identify areas that will require hearing protection.

3. System Test:

a. Verify the system operates per the respective equipment specification and Section 15608-HVAC Electric Control Systems including all modes of operation, interlocks, alarms, and safeties.

E. Air Handling Units, Packaged DX Units, Split Systems, and Fan Coil Units

1. Pre Startup Inspection:

a. Verify proper equipment mounting and setting

b. Verify that control, interlock and power wiring is complete

c. Verify proper duct connections and accessories

d. Verify that lubrication is completed

e. Verify that equipment is in good condition and free from damage

f. Verify that all packing materials, temporary stops, and temporary supports used during shipping have been removed

g. Verify that equipment and associated ducts are free from debris

h. Verify that the refrigeration system has been evacuated and charged per the Manufacturer's requirements

i. Verify that equipment is installed per the Manufacturer's requirements

2. Equipment Test:

a. Prior to energizing unit, verify and record voltage of power supply

b. Run the unit for 1 hour of continuous trouble free operation. Any issues or stops required for tuning or repairs shall cause the test to be restarted from the beginning of this procedure. If the ambient air temperature is too low to have the refrigeration system running constantly for 1 hour, the Contractor shall take

into account any additional measures required to accomplish the testing based on the ambient air temperature. The Contractor shall provide any temporary heating equipment required to run this test including but not limited to temporary fans, ductwork, heaters, generators, heat exchangers, combustion equipment, and fuel storage and pumping at no cost to the project. Use of any heating equipment that was installed as part of this work shall not be permitted to be used as a heat source.

c. Monitor discharge and return air temperatures

d. Monitor for any abnormal noises or vibration

e. Record fan sound levels ten (10) feet from the surface of the equipment in five (5) minute intervals during 1 hour run period. The sound levels shall not be used for any sound rating verification. The sound levels shall be used for information by the owner to identify areas that will require hearing protection.

3. System Test:

a. Verify the system operates per Section 15740- Packaged Air Conditioning Units and 15608-HVAC Electric Control Systems including all modes of operation, interlocks, alarms, and safeties.

F. H&V Units

1. Pre Startup Inspection:

a. Verify proper equipment mounting and setting

b. Verify that control, interlock and power wiring is complete

c. Verify alignment of motors and drives

d. Verify proper belt tension

e. Verify proper duct connections and accessories

f. Verify that lubrication is completed

g. Verify that equipment is in good condition and free from damage

h. Verify that all packing materials, temporary stops, and temporary supports used during shipping have been removed

i. Verify that equipment and associated ducts are free from debris

j. Verify that equipment is installed per the Manufacturer's requirements

2. Equipment Test:

a. Prior to energizing unit, verify and record voltage of power supply

b. Run the unit for 1 hour of continuous trouble free operation in heating mode and for 1 hour of continuous trouble free operation in ventilating mode. Any issues or stops required for tuning or repairs shall cause the test to be restarted from the beginning of the respective 1 hour test. Any safety trips will cause this testing to be restarted from the beginning of this procedure. If the ambient air temperature is too high to have the unit heating constantly for 1 hour, the Contractor shall adjust the setpoint temperature of the unit. The Contractor shall coordinate this testing with all other trades. The Contractor is responsible for scheduling this testing and shall take into account any additional measures required to accomplish the testing based on the ambient air temperature. The Contractor shall not raise the temperature in the space to a point where it will cause damage to any equipment in the space or create unsafe or uncomfortable working conditions for the workers as determined by the Resident Engineer. If the Resident Engineer determines that the ambient conditions will not allow the testing of this equipment because the Contractor has scheduled the testing for a point in the season known to be warm, the Contractor shall provide any temporary cooling required to run this test including but not limited to temporary fans, ductwork, chillers, generators, cooling towers, make-up water supplies, heat exchangers, or air conditioners at no additional cost to the project.

c. Monitor heat build-up in bearings

d. Monitor for any abnormal noises or vibration

e. Check unit loads against nameplate data

f. Record fan sound levels ten (10) feet from the surface of the fan in five (5) minute intervals during both 1 hour continuous operating periods.

3. System Test:

a. Verify the system operates per Section 15720-Heating and Ventilation Units and 15608-HVAC Electric Control Systems including all modes of operation, interlocks, alarms, and safeties.

G. Dehumidification Units

1. Pre Startup Inspection:

a. Verify proper equipment mounting and setting

b. Verify that control, interlock and power wiring is complete

c. Verify alignment of motors and drives

d. Verify proper belt tension

e. Verify proper duct connections and accessories

f. Verify that lubrication is completed

g. Verify that equipment is in good condition and free from damage

h. Verify that all packing materials, temporary stops, and temporary supports used during shipping have been removed

i. Verify that equipment and associated ducts are free from debris

j. Verify that refrigeration system has been properly evacuated and charged per the Manufacturer's requirements (applicable to DX type dehumidifiers only)

k. Verify that equipment is installed per the Manufacturer's requirements

2. Equipment Test:

a. Prior to energizing unit, verify and record voltage of power supply

b. Run the unit for 1 hour of continuous trouble free operation in dehumidifying mode and for 1 hour of continuous trouble free operation in heating mode. Any issues or stops required for tuning or repairs shall cause the test to be restarted from the beginning of the respective 1 hour test. Any safety trips will cause this testing to be restarted from the beginning of this procedure. If the ambient air temperature is too high to have the unit heating constantly for 1 hour, the Contractor shall adjust the setpoint temperature of the unit. The Contractor shall coordinate

this testing with all other trades. The Contractor is responsible for scheduling this testing and shall take into account any additional measures required to accomplish the testing based on the ambient air temperature. The Contractor shall not raise the temperature in the space to a point where it will cause damage to any equipment in the space or create unsafe or uncomfortable working conditions for the workers as determined by the Resident Engineer. If the Resident Engineer determines that the ambient conditions will not allow the testing of this equipment because the Contractor has scheduled the testing for a point in the season known to be warm, the Contractor shall provide any temporary cooling required to run this test including but not limited to temporary fans, ductwork, chillers, generators, cooling towers, make-up water supplies, heat exchangers, or air conditioners at no additional cost to the project. The Contractor shall run the dehumidification test when the outdoor dewpoint is above 55^{o}F.

c. Monitor heat build-up in bearings

d. Monitor for any abnormal noises or vibration

e. Check unit loads against nameplate data

f. Record fan sound levels ten (10) feet from the surface of the fan in five (5) minute intervals during both 1 hour continuous operating periods.

3. System Test:

a. Verify the system operates per Section 15740-Packaged Air Conditioning Units and 15608-HVAC Electric Control Systems including all modes of operation, interlocks, alarms, and safeties.

H. Drip Pans

1. Drip pans and drains shall be hydrostatically tested under gravity of a filled drip pan and drain line for a minimum of 30 minutes. Any leaks shall be corrected and the drip pan/drains retested until a watertight drip pan drainage system is confirmed.

I. Ductwork

1. All openings in the ductwork shall be temporarily sealed and the ductwork shall be pressurized and leak tested to demonstrate that the

installation meets the specified SMACNA leakage class requirements. The Contractor shall follow SMACNA procedures for testing as outlined in SMACNA's HVAC Air Duct Leakage Test Manual.

J. Piping

1. Piping shall be tested as indicated in specification 15130 – HVAC Hydronic Piping Specialties and 15053 – Aluminum, Copper, and Brass Pipe.

K. At the completion of all of the individual equipment testing, the Contractor perform a HVAC System Run Test. The Run Test shall consist of operating the entire HVAC system as a whole using automatic controls for a period of not less than 15 consecutive days with no significant disruptions, repairs, reprogramming, or outages. Any issues during this period shall reset the testing period until it passes.

3.02 ADJUSTMENT AND BALANCING REQUIREMENTS

A. Identify and list size, type, and manufacturer of all equipment to be balanced, including air terminals and all end user equipment.

B. Test and record motor voltages, running amperes, shaft rpm and power factor including motor nameplate data, and starter heater ratings for each unit listed above.

C. Air Equipment Balancing

1. The Contractor shall start the fan and verify that the fan amperage and speed are within the design requirements. The Contractor shall then proportionally balance the air distribution system using the dampers at the air terminals. When the system is proportionally balanced, the Contractor shall adjust the fan speed to achieve the total design flowrate of the system. Fan speed adjustment shall be accomplished by adjusting variable pitch drives or by replacing the fan sheaves. The Contractor shall then take final readings for the total system flow as well as readings for each air terminal.

2. For all ducted air systems, the Contractor shall measure the flow rate in cfm at each air inlet, at the fan, and at each outlet for each system. The Contractor shall provide this information in the report to demonstrate that the system as installed meets the seal class rating as indicated in section 15810-Ductowrk and Duct Accessories.

3. Test and record the following:

a. Fan system static pressure.

b. All fan speeds.

c. Air quantity delivered by each grille and register.

d. Pressure drop across each piece of inline equipment such as a duct heater or filter bank. Filters shall be new and clean at time of testing and balancing.

e. Final damper and air extractor positions for all dampers and extractors

4. Distribution:

a. Adjust volume dampers, control dampers, etc., to provide the proper design CFM in ducts.

5. Air Terminals:

a. Identify each air terminal as to location and determine required flow reading.

b. Test and adjust each air terminal to within flow rate tolerance of design requirements as listed below. Under no circumstances shall the balancing impact the pressurization of spaces that are required to have a specific pressurization:

c. Diffusers and Supply Registers: 0% to +10%

d. Return Registers: 0% to -10%

e. Exhaust Registers: 0% to -10%

6. Verification:

a. At the completion of the balancing work, the Contractor shall check and record the flow rate and static pressure at all supply, return, and exhaust air points to show final balanced conditions. The Contractor shall provide in the report a table with a summation of readings comparing the required cfm, final cfm, and final static pressure for each supply, return, and exhaust terminal and all final damper positions.

b. Verify design cfm at fans as described above.

c. If the air systems are not properly balanced, the Contractor shall re-balance and recheck all data.

D. Hydronic Equipment Balancing

1. For hydronic systems that operate on a constant pressure differential, the balancer shall determine the minimum pressure differential that will allow the system to balance at maximum system flow. The balancing valve for the equipment that is deemed to have the highest system resistance shall not be more than 10% closed. The balancer shall set this loop differential pressure value in the system controls.

2. For all hydronic systems, the Contractor shall measure the flow rate in gpm at each piece of equipment or bypass station for each system. The Balancer shall set all pieces of equipment to simultaneously operate at maximum design flow. The Contractor shall provide all information in the report.

3. Test and record the following:

   a. Pump suction and discharge pressures, pipe sizes, and gauge height

   b. All pump speeds

   c. Flowrate delivered to all equipment

   d. Final balancing valve position

4. Distribution:

   a. Adjust balancing valves, control valves, etc to provide the proper design gpm to equipment.

5. Hydronic Equipment:

   a. Identify each end user of the hydronic system including location and required flow reading.

   b. Test and adjust each end user to within +/- 5% of the design flow.

6. Verification:

   a. At the completion of the balancing work, the Contractor shall check and record the flow rate and pressure at all hydronic equipment to show final balanced conditions. The Contractor shall provide in the report a table with a summation of readings comparing the required gpm, final gpm, and all final balancing valve positions.

   b. Verify design flow at pumps as described above.

c. If the hydronic systems are not properly balanced, the Contractor shall re-balance and recheck all data.

E. The testing and balancing activities described in this Section shall culminate in a report to be provided in quadruplicate (4), individually bound and also provided electronically to the Engineer for approval. Neatly type and arrange data. Include with the data, the dates tested, personnel present, weather conditions, nameplate record of test instrument and list all measurements taken after all corrections are made to the system. Record all failures and corrective action taken to remedy incorrect situation. The intent of the report is to provide a reference of actual operating conditions for the Owner's operations personnel.

F. All measurements and recorded readings (of air, water, electricity, etc.) that appear in the report must have been made at the Project Site by the permanently employed technicians or engineers of the TAB Firm.

3.03 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified in accordance with the detailed procedures outlined in the referenced standards.

B. Cut insulation and ductwork for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Patch insulation, ductwork, and housings using materials identical to those removed.

D. Seal ducts, test, and repair leaks created during the testing and balancing procedures on the hydronic and air systems.

E. Seal insulation to re-establish integrity of the vapor barrier at all locations where the vapor barrier was disturbed during the testing and balancing procedures.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.04 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with standard practices and the specific requirements identified in this section.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

- END OF SECTION -

SECTION 15009
High Density Polyethylene (HDPE) Pipe

NOTE: Detailed Specification 15009 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15009.

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all high density polyethylene (HDPE) pipe, fittings, flanges, unions, couplings, as specified in this section, shown on the Contract Drawings or as required for a complete installation.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

A. Detailed Specification 15400 – Overall Plumbing

1.04 REFERENCES

A. Con Edison Yellow Book "A Customer's Guide to Natural Gas Service Installation"

1.05 SYSTEM DESCRIPTION

A. Furnish and install all HDPE pipes per latest Con Edison's specifications and requirements.

1.06 QUALITY ASSURANCE AND QUALIFICATIONS (NOT USED)

1.07 SUBMITTALS (NOT USED)

1.08 DELIVERY, STORAGE, AND HANDLING

A. Refer to the latest version of Con Ed spec G-8122 Inspection, Handling, Storage, and Transportation of Polyethylene (PE) Plastic Pipe, Tubing, and Fittings for Gas Mains and Services.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES (NOT USED)

1.10 SPECIAL WARRANTY PROVISIONS (NOT USED)

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Refer to the latest version of Con Ed spec G-8104 Polyethylene Pipe, Tubing and Fittings for Gas Mains and Services.

2.02 MATERIALS/EQUIPMENT

A. HIGH DENSITY POLYETHYLENE (HDPE) PIPE

1. Refer to the latest version of Con Ed spec G-8100 General Specification of the Installation of Gas Distribution.

2. The pipe shall be manufactured from Type III, Category 5, Class C, Grade P34 polyethylene resin in accordance with ASTM D 1248 and shall be SDR11, minimum. The pipe shall be manufactured in accordance with ASTM F 714 and shall conform to cell classification PE 345434C for PE 3408 under ASTM D 3350. The pipe material shall conform to the following cell classification requirements:

Property	Value	ASTM Test Procedure Designation
Density	0.955 gm/cm^3	D-1505
Melt Flow	0.1 gm/10 mil	D-1238
Flexural Modular	133,000 psi	D-790

Tensile Strength	3500 psi	D-638
ESCR	F_o>5000	D-1693
Hydraulic Design Basis	1600 psi	D-2837
UV Stabilizer	2-3% carbon black	D-160

3. The HDPE pipe shall have an elastic modulus of 100,000 psi as tested under ASTM D 638. The brittleness temperature shall be not greater than –180°F nor the Vicat Softening Temperature greater than 255°F as tested under ASTM D 746 and D 1525, respectively. The coefficient of thermal expansion shall be 8 x 10 5 inch/°F as tested under ASTM D 606. The Shore Hardness D shall be greater than 61 as tested under ASTM D 2240. The Hydrostatic Design Stress Basis (HDB) shall be 1,600 psi at 23°C and 800 psi at 60°C as tested under ASTM D 2837. The pipe shall contain no recycled materials or compounds.

4. HDPE pipe shall be marked either continuously or on intervals not to exceed five (5) feet by indirect printing with the following information:

   a. Name and/or trademark of the manufacturer.

   b. Nominal pipe size.

   c. Dimension ratio.

   d. The letters PE followed by the polyethylene grade per ASTM D 1248, followed by the Hydrostatic Design basis in 100's of psi.

   e. Manufacturing Standard Reference.

   f. Production Code from which time and date of manufacture can be determined.

5. HDPE fittings shall be manufactured to the requirements of ASTM D 3261 and this Specification. Fabricated fittings shall be manufactured from pipe of at least one SDR heavier pipe than the system piping, and shall be pressure rated to match the system piping. The butt fusion outlets of fabricated fittings shall be machined to the same SDR as the system piping to which they are to be fused. The manufacturer shall subject samples of each production lot of molded fittings to x ray inspection for voids. Voids shall not be permitted, should voids be found in the samples, the entire production lot shall be x ray inspected. If additional voids are found, the production lot shall be rejected. The x ray testing shall be conducted by an independent laboratory and certified test reports made

available to the Engineer upon request. Initial sampling shall be limited to not less than 5% of the production lot.

6. HDPE pipes and fittings shall be joined one to another by thermal butt fusion, saddle fusion, or socket fusion in accordance with procedures recommended by the pipe manufacturer and as outlined in ASTM D 2657. The manufacturer shall provide fusion training services to the Contractor upon request.

7. Butt fusion joining of unlike SDR's shall not be permitted. Transition from one SDR to another shall be accomplished by the use of mechanical couplings or a transition nipple, which is a short length of the heavier SDR pipe with one end machined to the lighter SDR.

8. Mechanical connections of polyethylene pipe to systems or fittings of other materials, or to unlike SDR, shall be by means of flanged connections (flange adapters and back up rings rated for the same pressure service as the system piping), or mechanical compression couplings designed for jointing HDPE to HDPE or HDPE to another piping material.

9. Flanged joints shall use compatible bolts in accordance with the American Standard Gaskets of reinforced rubber or asbestos rubber shall be required when joining to non HDPE materials. Flanged HDPE joints shall be gasketed at all service pressures.

10. Bolts in flanged joints shall be evenly torqued in a crossing pattern. Bolts shall be re torqued after one hour or more has passed. HDPE pipe adjacent to flanged joints and the joints themselves shall be rigidly supported for a distance of one (1) foot or one pipe diameter, whichever is greater, beyond the flange assembly.

11. When mechanical compression couplings are used HDPE pipes shall be reinforced by a stiffener in the pipe bore. Stiffeners shall be properly sized from the size and SDR of pipe being joined. Mechanical couplings shall be installed in accordance with the manufacturer's recommended procedure.

12. Tests for compliance with this Specification shall be made as specified herein and in accordance with the applicable ASTM Specification. A certificate of compliance and a report of each test shall be furnished by the manufacturer for all material furnished under this Specification. HDPE pipe and fittings shall be rejected for failure to meet the requirements of this Specification.

2.03 FABRICATION/ASSEMBLING/FINISHES (NOT USED)

2.04 SOURCE QUALITY CONTROL (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION/PREPARATION (NOT USED)

3.02 INSTALLATION

A. Refer to the latest version of Con Ed drawing IP-27 Installation of Electrofusion Fittings.

B. Refer to latest version of Con Ed spec G-8096 Sealing the Annular Space Between a Gas Pipe and a Wall, Casing Pipe, or Sleeve.

3.03 FIELD TESTING/QUALITY CONTROL

A. Refer to the latest version of Con Ed spec G-8204 Pressure Testing Requirements for Gas Mains and Services

3.04 STARTUP/DEMONSTRATION (NOT USED)

3.05 ADJUSTING/PROTECTION/CLEANUP (NOT USED)

- END OF SECTION -

NO TEXT ON THIS PAGE

A Customer Guide to Natural Gas Service Installation

SME Revised:

November 2021

Rev. 16

conEdison

Consolidated Edison Company of New York, Inc. (Con Edison)
Gas Service Requirements

Customers
Architects and Engineers
Plumbing Contractors
City and County Building Inspectors

Revised: November 2021

2021 Edition Rev. 16

(Supersedes All Previous Editions and Revisions)

The Customer Guide to Natural Gas Service Installation is a Guide to Con Edison requirements and specifications for establishing gas service to **new** or **remodeled applicant installations.** In addition to the utility requirements, **local or state officials may stipulate additional provisions for the installation of equipment and materials** that are in their authorized areas of responsibility and jurisdiction. Should you have any questions regarding this guide, please contact your local Con Edison Customer Service Representative. Applicant gas service and meter installation arrangements are subject to Con Edison's review and approval. Applicants should submit a Work Request as soon in the planning process as possible.

DISCLAIMER: This is a guidance document for the convenience of the public. It does not substitute for any applicable laws, rules, codes or regulations, and information in it regarding procedures is subject to change without notice. It is the Licensed Plumbing Contractor's responsibility to be aware of the code requirements for the area of the installation. Con Edison does not assume the obligation of enforcing State, City and Local Municipal code requirements.

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A Customer Guide to Natural Gas Service Installation

Accidents involving dig-ins to under- ground facilities occur every year. They can damage equipment, and more importantly, sometimes lead to serious injuries, even death. We want to reduce the number of accidents so we joined a One-Call-System designed to make it safer for you to dig and work near under-ground facilities. The customer shall immediately notify Con Edison of any suspected leakage or escape of gas by calling the company's toll-free hotline 1-800-75CONED or 1-800-752-6633.

It's the Law! Call before you dig!

Much of the Con Edison equipment that transmits and delivers energy is under the ground, including more than 4,300 miles of natural gas pipelines. We work diligently to keep our systems safe and our excellent safety record demonstrates that commitment. New York State law requires anyone planning to dig or excavate to call a one-call center two to 10 days in advance. The one-call center will contact Con Edison on your behalf to obtain the necessary clearances, including the locations of all in-ground electrical and natural gas lines near your job site.

811 Know what's below. Call before you dig.

UNDERGROUND UTILITIES CALL CENTERS

NYC and WESTCHESTER: 811
NY Code 753 requires 2-10 working days' notice.

GAS EMERGENCIES CALL
1-800-75-CONED (800-752-6633) OR 911

HEARING IMPAIRED
Toll-free, teletype line
(1-877-423-4372)
Billing and Service inquiries

We think you should know . . . . .

At Con Edison, when we say: "We're here to help," we mean it! Our responsibility is to provide our gas customers with safe, reliable and cost effective service. Con Edison's prices for natural gas service are among the lowest in the State of New York. Before you start planning your project, please visit https://www.coned.com/en/small-medium-size-businesses/building-project-center/ to create a Work Request using Con Edison's Project Center application.

Approximately one week after Con Edison receives a work request from your licensed contractor, you will receive correspondence indicating the name and contact number of the representative handling your case. You can also find this and other information pertaining to the status of your case on-line under Project Management and then selecting Project Status inquiry. Please check this site before calling a representative. Our representatives are responsible for specific geographic territories, or districts, a list of area representatives can be found on-line at https://www.coned.com/en/small-medium-size-businesses/building-project-center/contact_us.asp. We will be happy to provide you with information and assistance, as well as ways to save you energy and money.

The Con Edison System

For more than 180 years, Con Edison has served the world's most dynamic and demanding marketplace – metropolitan New York while maintaining a safe and reliable natural gas supply to more than 1.1 million gas customers. We have employees on duty 24 hours a day, 365 days a year to ensure the safety and reliability of our gas system. We work closely with multiple pipeline suppliers to ensure a consistent and reliable flow of gas into our distribution system.

This guide is intended to protect the mutual interest of our gas customer and Con Edison. Close attention and adherence to our Gas Specifications will ensure timely and efficient installation of a gas service that meets your requirements.

This guide will be revised and/or amended as required in keeping with developments and progress in the natural gas industry. The latest revision of this guide may be obtained at: https://www.coned.com/en/small-medium-size-businesses/building-project-center/contractor-resources

Table of Contents

Quick Start

A. Frequently Asked Questions

1. Q - **How can this guide help me?**

A - This guide, entitled “Natural Gas Service Customer Installation Guide”, is issued as a means of exchanging pertinent information between Consolidated Edison Co. of NY, Inc. (here after referred to as “Con Edison”) and its customers, architects, plumbers, engineers, builders, contractors and municipal inspectors.

2. Q - **When should I apply for natural gas service?**

A – An application for any new, additional or an alteration to an existing service should be made as far in advance as possible to ensure adequate time for engineering and construction details to be arranged.

3. Q - **Is gas service readily available?**

A – Prior to ordering equipment or starting pipe work, it is important that the customer contact Con Edison to make sure of the availability and proximity to existing gas facilities. The type and/or size of gas service requested by a customer may not be available at a specific location. Gas service may only be available through special negotiation and at the expense of the customer.

4. Q – **How do I initiate having a gas service installed?**

A – Visit Con Edison’s Project Center portal at https://www.coned.com/en/small-medium-size-businesses/building-project-center/ to submit a service request form.

5. Q - **When should I contact 811?**

A – By law, excavators and contractors working in New York State must contact 811 (New York 811 in the five boroughs of NYC and Dig Safely NY in Westchester County) at least 48 hours but no more than 10 working days (excluding weekends and legal holidays) prior to beginning any mechanized digging or excavation work to ensure underground lines are marked. Excavators and contractors can also submit locate requests online.

For safety reasons, homeowners are strongly encouraged to call as well when planning any type of digging on their property. For excavation work completed on personal property, it is the contractor’s responsibility—NOT the homeowner’s—to contact 811.

6. Q - **Where will my gas meter be located?**

A – 1-3 Family residential gas meters will be placed outdoors. 4 –dwellings and larger, commercial and mix-use will be placed outdoors unless “Waiver” exceptions apply.

7. Q - **Do I have to physically protect the gas meter?**

A – Yes, gas meters, regulators and associated gas piping that may be subjected to vehicle damage must be adequately protected. Pipe posts or bollards shall be installed by the customer. Certain installations may require more substantial protection at the discretion of Con Edison.

8. Q - **Why is odorant added to natural gas?**

A – Natural gas is flammable, colorless and odorless. To make its use safe, an odorant must be added so that it is easily detectable if a leak occurs. All gas transported in Con Edison’s distribution system is to be adequately odorized so as to render it readily detectible by the public and company employees with a normal sense of smell. Please refer to additional information on Odor Fade in Section 2- N. below

9. Q - **What is the BTU rating of natural gas in the Con Edison gas distribution system?**

A – The natural gas heating value fluctuates as it passes through the distribution system. The heating value of gas can range from 0.95 MMBtu/MCF to 1.090 MMBtu/MCF.

Btu Rating = (0.950-1.050) MMBtu/MCF
1 MCF * (Btu Rating) = 1 MMBtu
1 MMBtu / (Btu Rating) = 1 MCF
1 Therm = (MCF) * 10

However, if the Btu rating is assumed to be 1.0 MMBtu/MCF, the following ratios apply:

1 CF = one cubic foot of gas = 1,000 Btu
1 CFH = one cubic foot of gas per hour = 1,000 Btu/hour
1 CCF = 100 CF = 100,000 Btu = 1 Therm
1 MCF = 10 CCF = 1000 CF = 1,000,000 Btu = 10 Therms
1 MMBtu = 1,000 Mbtu + 1 MCF = 1 DekaTherm = 10 Therms
1kW (kiloWatt – 1,000 Watts) = 3,413 BTU

B. Customer Request for Gas Service – "Our Service to You"

Customer requests for all new or additional gas service, as well as certain non-service work, will be made through our web-site www.coned.com/en/small-medium-size-businesses/building-project-center Project Center. See Work Request Process.

Step - 1
Opening a Work Request (WR)

When you are ready to begin the process for a new gas service or for a gas service information ruling please have a licensed professional installer as the referred contact agent for the work request.

1. Initiate Project Center www.coned.com/en/small-medium-size-businesses/building-project-center and e-file the work request.
2. Input the request for gas supplied to your end-use of equipment, example are, gas range, water heater, boiler or furnace and a back-up emergency generator. Gas consumption will be totaled; a customer representative will be assigned to the work request.
3. Energy Services/Gas Conversion will follow-up with Acknowledgement Letter confirming your request for the referenced location and an assigned ID No. to track the progress of the request.
4. Energy Services/Gas Conversions will arrange scheduled meetings with customer/customer's agent to discuss the preliminary gas service layout while working with the customer to ensure the most economic means are addressed and that the project is satisfactory installed with no delays to service completion date. (**pg. 16**).
5. The company will determine the point of entry (POE) to the building. A preferred POE will be a special cost to the customer. The property line/building line and other easement issues will be discussed in **Step- 3**.
6. Tracking the job progress as a registered user (customers/contractor) can e-file all work request, quickly review status of current cases and receive email alerts when current milestones are reached or inquire of the status of the project.
7. If applicable, Con Edison will require the customer contractors' operator qualifications to be submitted in advance of creation of the case.

Step - 2
Gas Service Ruling

Con Edison Representative will initiate a case management number to the project and a case triage assessment will determine:

1. Review customer / contractor work requests.
2. All load requests will be reviewed by Engineering. Please provide accurate Gas Loads when filling a case
3. Gas Engineering to further determine the adequacy of existing services when new or additional loads are added to the customer premises.
4. Ruling returns from Gas Engineering and the existing gas service is not adequate, Energy Services will issue the necessary work orders to the construction department to excavate and install gas services according to approved gas engineering layouts.
5. Issue to the customer and contractor an approved service layout with all current company specifications, meter drawings, outlining company and customer responsibility.
6. Gas Engineering Service Layouts are valid for 60 days from the date of issuance. A new load study and service layout will need to be prepared as Con Edison cannot reserve pipeline capacity.
7. Gas Cost Estimates are valid for six (6) months from the date of issuance **(pg. 13)**.

Step - 3
Inspections & Gas Service Layout

Depending on the case request type, actions by Con Edison Representative may include:

1. Site verification that the wall sleeve has been installed in the building point of entry **(pg. 21)**.
2. Discuss with the customer / contractor to obtain the necessary operator qualifications, city certificates and affidavits related to the installation, pressure testing of gas service pipe, distribution piping and/or metering, to avoid a delay in a service completion date **(pages 17 - 19)**.
3. To monitor the progress of work by customer / contractors through field visits, e-mail correspondences and Work Management Systems.
4. Track status updates encourage customer to use Project Center to follow up on their case by contacting the assigned representative. To avoid delays by the company in order to meet customer service dates.
5. Site visits to verify status of customer's project and or discuss case details/specifications with customer's contractor.
6. The Gas Service Layout, the drawing which includes a sketch and description of company construction work to be performed.

Step - 4
Construction of Gas Service Installation

Con Edison Representative reviewing the customer's project progress will determine when to release the requests to the appropriate groups for the construction of the facilities. It will include:

1. Gas Operations or Construction Management – oversee third party contractors working for Con Edison on the installation of Company owned facilities.
2. Gas Operations – installation of Company owned facilities. Generally, mains, services and gas regulator set-up.
3. Customer Operations to establish the application of the customer service gas rate account and to collect payment agreement for deposits, easements and the cost of the gas service work.
4. Energy Services or Gas Conversion – Customer's licensed contractor has completed the applicable piping installation while fulfilling the requirements of all federal, state, city, municipal and company requirements for natural gas service installation.
5. Customer to contact Energy Services/ Gas Conversion representative to schedule final inspection **(Pages 74 – 76)**.

Step - 5
Final Inspection and Gas Meter Turn- On

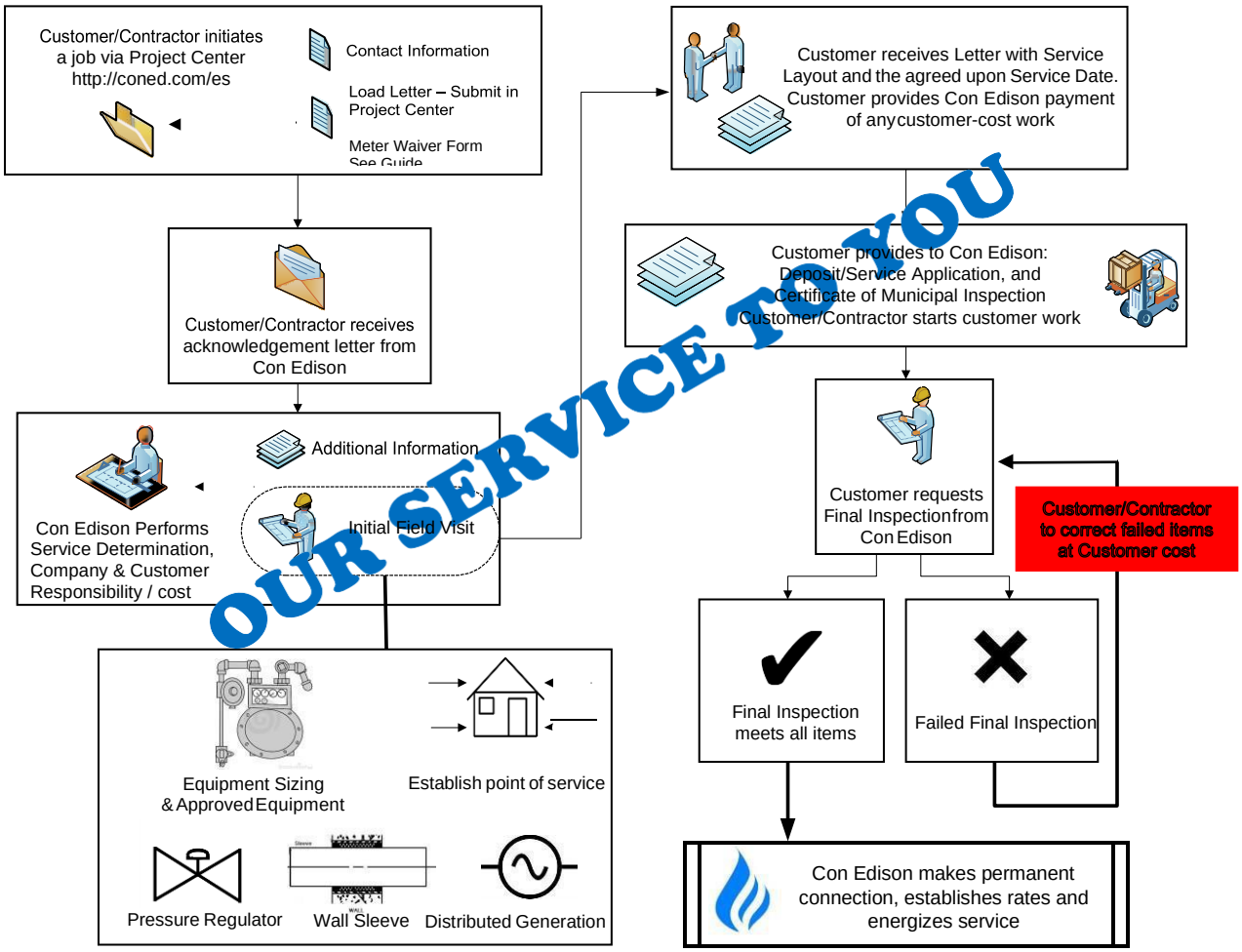
Customer on completion of his/her work request will contact the assigned Con Edison Representative for the final inspection and the release of the gas meter:

1. Work order will be issued for a gas meter by Energy Services/Gas Conversion upon sign-off of a complete final inspection checklist.
2. The gas meter is the property of Con Edison and the size and type selected are based on the gas service ruling for residential and commercial dwellings.
3. Con Edison Meter Bureau will deliver, set meters and turn on the gas service.

Energy Services / Gas Conversion Representative will:

1. Review the case work request; verify the accuracy of the customer's account and billing as well as the documentation of any revenue associated with the project **(pg. 18)**.
2. Once all the case task/steps have been verified the case is closed out.

C. Gas Work Request Flow Process



SECTION 1 - General Information

A. Purpose

The information in this handbook provides a basic and uniform set of specifications and guidelines covering the installation of gas service for Con Edison's customers. The codes we have referenced, and the information provided in this booklet in no sense relieves the customer of the responsibility to install gas piping and appliances in accordance with the latest revisions of the applicable governing codes that are listed in Section 2. It is the Licensed Plumbing Contractor's responsibility to be aware of the code requirements for the area of the installation. Any change or modification to our Gas Service Layout(s) or equipment type including location and point of entry (POE) requires advanced approval from Con Edison. Our Gas Specifications have been prepared to assure compliance with all the various codes and safety requirements. Changing anything without prior approval from Con Edison, will result in the **job not being accepted,** requiring a contractor to make corrections causing potential delays. Corrections to piping configurations will incur an additional expense to the customer and/or licensed contractor. Altering a gas specification creates the potential for a code or safety violation. The customer should always feel free to consult a company Representative regarding safe practices and practical applications of gas installation and equipment connection.

Representatives are available to discuss design details while in the planning stage.

Con Edison does not assume the obligation of enforcing State, City and Local Municipal code requirements.

B. Scope

The information and specifications found in this handbook relate to the piping and equipment necessary for connecting the customer's appliances to the company's gas distribution piping as well as other subjects of mutual interest to developers, customers, architects, engineers, and licensed plumbing contractors. **This handbook is intended to be a guideline and is not a complete set of rules governing natural gas installations.**

C. Application for Service

Con Edison requires a company application for new or additional gas service requests. To ensure a timely service connection your application should be submitted well in advance of the date service is required. All customers are required to consult with the company regarding service availability before the completion of plans, purchase any equipment and before any construction commences on a facility that you plan to connect to the company's gas distribution system. An application for new and additional natural gas service may be made through Con Edison's customer Project Center portal via the intranet. The portal can be accessed through Con Edison's Energy Services Resource Web site using at www.coned.com/en/small-medium-size-businesses/building-project-center . Submitting an application for service using the Project Center application ensures an immediate response along with confirmation the application was received. As per the PSC Code, natural gas is delivered at a minimum of four inches (4") of water column (WC) at the outlet of the gas meter (for indoor meter installations) or the outside building wall (for outdoor meter installations). The installation of appliances and/or equipment requiring more than 4-inches WC must NOT be installed until evaluated and approved in advance by Gas Engineering. Request for approval should be submitted through the Commercial Service Representative. The customer or his/her contractor must furnish Con Edison with information on the proposed gas service installation or any increase in required gas load. Con Edison provides Licensed Plumbing Contractor Work Request forms for convenience.

1. During the application process, the customer contractor is required to provide Con Edison with proof of gas Operator Qualifications as per Subpart N in 49 CFR Part 192, for work on gas service pipe. A copy of the contractor's operator qualification card (from ITS On Board) showing the QR code, a transcript (from the On Board Learning Management System) and the OQ Affidavit will be acceptable forms of OQ proof.

2. Con Edison Gas Cost Estimates are valid six (6) months from the date of issuance.

D. Rates & Terms of Service

The rates and terms of service under which Con Edison provides gas service is set forth in schedules (also referred to as "tariffs") filed with the New York State Public Service Commission ("NYPSC"), which regulates the state's electric, gas and steam utilities and reviews and approves their rates and terms of service. The Company's schedules on file with the NYPSC – including current, pending, and canceled or superseded tariff leaves - can be found on the NYPSC's website located at http://www.dps.ny.gov/.

The rates and terms of service shown on the Con Edison website are provided for your convenience and do not replace or provide an authorized substitute for the official schedules (including the rates and terms of service) and the Statements of rate adjustments on file with the NYPSC. The Company does not guarantee that the Summaries available on this website reflect the rates and adjustments contained on the Statements filed with the NYPSC and in effect or that the tariff leaves, Statements, and Summaries shown on this website reflect the most recent filings made with the NYPSC.

NOTE: The leaves (pages) in tariffs found on the Company's website may have headers and footers that differ from the official leaves on file with the NYPSC. The NYPSC marks its official leaves with receipt and actual effective date "stamps" and with information on cancelled or superseded leaves that may not be shown on the Company's leaves found at https://www.coned.com/en/accounts-billing/your-bill/public-service-commission-rates-tariffs

E. Customer's Responsibility for Safety Inspection:

Wherever the Customer is responsible for performing any work or furnishing or maintaining any gas equipment or facilities, the Customer shall do the same or cause the same to be done at its expense, except that the Company will visit the Customer's premises without charge if the Company becomes aware of a safety issue. The Company will make the situation safe and will make minor screwdriver repairs, encompassing the provisions of technical advice, minor adjustments and minor repairs, including the relighting of gas pilot lights, only when such work is performed incidental to other work being performed by the Company to provide safe and reliable gas service. Screwdriver repairs will not include parts replacement, will be short in duration and will not be solicited but performed only in response to a request for a safety inspection by the Customer.

F. Customer Entitlement for New Gas Service

1. Customer entitlement for gas service is explained in its entirety in Gas Rates and Tariffs General Rules III 3. (A) (B) "Installation of Mains and Services" Leaf 28 to 38.2. Special Service Performed by the Company for Customers at a Charge is explained in Gas Rates and Tariffs General Rules IV (1) (2) (3) Cost and Special Services. A brief summary of cost responsibility for heating and non-heating customers is listed below:

a) **Firm Residential Applicant – Non-Heating**
1, 2 and 3 family detached, semi-attached or attached homes containing less than four (4) dwelling units.

The material and installation costs relating to up to 100 feet of any combination of main and service line measured from the centerline of the public right-of-way (or the main if it is closer to the customer and development will be limited to one side of the right-of-way for at least 10 years), service connections and appurtenant facilities, but not less than 100 feet of main (if necessary) plus the length of service line necessary to reach the edge of the public right-of- way.

b) **Firm Residential Applicant – Heating**
The material and installation costs relating to:

- Up to 100 feet of main and appurtenant facilities; and

- Up to 100 feet of service line measured from the centerline of the public right-of-way (or the main if it is closer to the customer and development will be limited to one side of the right-of-way for at least 10 years), service connections and appurtenant facilities; but not less than the length of service line necessary to reach the edge of the public right-of-way.

c) **Firm Non-Residential Applicant**
If an applicant which will be a firm, non-dual-fuel customer requests service other than residential service, the material and installation costs relating to:

- Up to 100 feet of main and appurtenant facilities; and
- Service line, service connections and appurtenant facilities located in the public right-of-way;

d) **Charges for Additional Facilities**
Refer Rates and Tariffs General Rules III 3. (C) "Installation of Mains and Services" Leaf 32 to 38.2 for instances where Customer Cost and/or Surcharge is applicable, i.e., main reinforcement, extension, firm dual-fuel capability **(pg. 18)**.

e) **Special Service Performed by the Company for Customers at a Charge**
Refer to Section 1 for a list of task that Con Edison will charge accommodation cost of the project gas service installation, the definition of cost and the following elements of cost where applicable **(pg. 18)**.

2. If required by the company, each applicant or customer is responsible to execute and deliver to Con Edison free from cost, satisfactory permanent easements or rights-of-way to enable and permit Con Edison to provide gas service.

G. Customer Responsibility for Maintenance and Replacement of Existing Gas Services

1. **Service Piping** is all piping, tubing and fittings that transport the gas from the main *to*:

   - *For inside meter(s) – the outlet of the meter*
   - *For outside meter(s) – outside the building wall*[1]

   See Exhibit M, Diagrams 1 through 5 for various service piping scenarios

   The Customer is responsible for the costs to maintain (in accordance with Company specifications) all service piping on their property, beginning with the point of service termination as defined in the Company gas rates and tariff: "Schedule for Gas Service," PSC No. 9 – Gas".

   The Customer, his/her Agent and/or Contractor bears the responsibility of maintaining all gas service piping and associated equipment in a safe operating condition and in compliance with all applicable regulations.

2. The Company may elect to insert or replace the entire service, beyond the point of service termination without charge, where it is cost effective.

3. If a service or any part of a service is temporarily disconnected or relocated at the request of the customer due to an act or omission of the customer, the customer shall bear the cost of such work.

4. Any change requested by the Customer in the point of service termination or location of the service pipe, provided such change is approved by Con Edison, will be made at the sole expense of the Customer. The entire estimated cost must be paid in full prior to service installation.

[1] ***For outside meter sets, Con Edison defines "the building" to be the building (or other final use appliance) for which gas is being served, even if the piping first passes through a different building before reaching the outside wall of the building being served. Therefore, the gas service should take the most direct route to the final destination building and/or outdoor appliance. See Exhibit M, diagrams 1 through 14 for various scenarios***.

H. Identification of Con Edison Employees and Company Contractors

In an effort to protect customers from unauthorized persons representing themselves as Con Edison company employees, each of our employees and contractors has an identification card that will be shown upon request.

I. Access to a Customer's Premise

The Customer shall not permit access by anyone, except authorized employees of the Company, to the meters, equipment or any other property of the Company, and shall not interfere or permit interference with the same; and the Customer shall be responsible for their safe keeping on the Customer's premises. The Company's duly authorized representatives shall have the right of access to the premises of the Customer and to all of the Company's property thereon at all reasonable times for the purposes of reading and testing meters, inspecting equipment used in connection with its service, installing, inspecting, maintaining and replacing, where necessary, its load testing equipment, removing its property.

J. Customer Cooperation

It is the desire of Con Edison to provide and maintain dependable, safe and satisfactory natural gas service in a courteous and efficient manner. Cooperation from our customer's and/or their agents is always necessary to ensure we can evaluate and process each gas service request in a timely manner.

K. Information Inquiries

Con Edison will assist the customer and/or his/her contractor with any questions or concerns regarding the physical application of our specification requirements. Company Service Representatives are available to receive inquires and process requests for information regarding the application of these gas specifications.

L. Gas Service Layouts

Individual detailed Gas Service Layouts will be provided to the Customer's Contractor on all applications for natural gas service.

M. Customer Pipe Size and Adequacy

Proper sizing of customer pipe and ensuring adequacy for current and future use is the sole responsibility of the customer. The Customer's Engineer or Licensed Plumbing Contractor should assist the customer in determining that the natural gas piping installation will have adequate capacity for future use.

N. Un-Metered Connection (Flat)

Un-Metered (Flat) connections are prohibited and can result in a termination of service.

O. Gas Work Permits and Certifications aka Gas Authorization or Blue Cards

All Gas piping and associated components before the Point of Delivery are to be installed in accordance to Gas Specification Standards of Con Edison, Operator Qualification requirements and are regulated by Federal DOT and New York Public Service Commission Standards in accordance to Part 255 and are not governed by the NYCDOB or the local AHJ. Con Edison or its approved contractors performing gas service work (new, replacement or maintenance) do not require gas authorization for work up to the point of delivery. All gas piping installation after the Point of Delivery requires certification that the gas piping system has been pressure tested build to the local AHJ's requirements and there is Gas Authorization and or permit documentation that the building's gas service is authorized for natural gas fuel supply. It is the owner /contractor's responsibility to make the appropriate arrangements and notify Con Edison when such action has been accepted prior to requesting a gas turn-on appointment.. Utility Jurisdiction ends at the Meter Outlet for Inside meter installations and the outside foundation wall for outside meter Sets. Please reference Appendix M and

Section 1.T and other sections in this book for additional information on Utility Jurisdiction and requirements.

In order to avoid a delay to the gas service completion date, please obtain and conform to the following

1. Installation must comply with all the required applicable Con Edison Specifications and Operator Qualification requirements.

2. Required AHJ/City permits must be obtained for any gas piping work after the Point of Delivery.

For Gas Services installed by Licensed Master Plumbers behind the property line and for such Gas service installations, in addition to the Con Edison Operator Qualification requirements, Hold Point Inspection and Second Inspection of Fuses may require municipal certification that the gas piping system has been pressure tested and permit documentation that the building's gas service is authorized for fuel supply only for the area that the local AHJ has jurisdiction. It is the owner /contractor's responsibility to make the appropriate arrangements and notify Con Edison when such action has been acceptable for gas turn-on appointment. In order to avoid a delay to the gas service completion date, please obtain and conform to the following:

3. Installation must comply with the current applicable Con Edison Specifications and shall meet all below grade Operator Qualification requirements, Hold Point Inspections and Second Inspection of Fuses for PE plastic installation as outlined in this Yellow Book.

Required city and local certification permits must be obtained for non-Con Edison related service work.

- **Distribution Piping** – Identified as customer piping from the outlet of the meter and under AHJ jurisdiction Gas Service Authorization: In NYC- DOB NOW Inspections - REQ-GA – Approved or Blue Card/Gas Certificate in Westchester County. For outside meter installations overlapping utility and AHJ jurisdiction apply

- **Meter Piping** – Identified as the piping between the Head of Service Valve and the meter outlet.

- **Point of Delivery –** Identified as the point in the gas service line where utility responsibility ends, governed by Federal DOT and NYSPC and the customer-owned piping begins governed by the NYCDOB or the local Authority Having Jurisdiction. The Point of delivery may be located physically at different points in the piping depending on the meter header configuration and the meter location if this is situated indoors or outdoors.

a) **In New York City**

For Inside meter installations:

- **Gas Distribution (house) Piping (after the meter)** – **Requires NYC DOB Gas Authorization** Distribution piping work requires a valid EWN – for emergency minor repair work or REQ-GA/Gas Authorization for other type of work for a gas turn on.

- **Gas Meter Piping (before the meter)** – Under **PSC Jurisdiction and requires OQ.** Meter piping work requires an Integrity test and meter piping affidavit, OQ Affidavit, final gas checklist for a gas turn on if gas was shutoff at the Head of Service Valve required for service restoration.

- **Required Affidavits:**

a. An Integrity test Affidavit Exhibit A is required for all work/testing before and after the meter.
    - **Including Gas Authorization (i.e., Gas Certificate/Blue Card), when required by the local building code requirements.**
b. A meter piping and OQ affidavit Exhibit B and B.1 is required for work/testing before the meter and if the gas was shut off at the head of service valve (before the meter control valve)
c. If the gas is shut off at the meter control valve and work is done after the meter, there is no pressure test required between the meter control valve and the inlet side of the meter. Only an integrity test affidavit and Final checklist are required.
d. No pressure test shall be applied up against a valve (meter control valve or Head of service valve) that has live gas on the other side

Additional items listed below require Gas Authorization from the authority having jurisdiction.

i. The installation of any new, alteration of existing, or complete replacement of gas piping
ii. New Gas Fired Equipment installation
iii. Meter Bar replacement when required as identified in this book.
iv. Restoration of service discontinued (cut-off) due to a fire or other conditions or where all the gas service to a building has ceased for over six (6) months.

Testing and purging of gas piping after the meter requires permits in NYC. Check with the local AHJ for any other requirements:

The following does not require Gas Authorization but an LAA filing is required to be filled with the NYCDOB:

Installation of new gas appliances and the replacement of a gas water heater or a gas fired boiler with a capacity of 350,000 BTU or less where the existing gas appliance gas wing valve is not moved and no gas piping is required. - Gas Authorization is not required for direct replacement of appliances, for work after the appliance valve, however an LAA (Limited Alteration Application- Permit) is required by the NYCDOB in NYC. Always check with the appropriate requirements of the AHJ.

All required Affidavit forms can be found on the Con Edison Energy Services Resource web-site located at https://www.coned.com/en/small- medium-size-businesses/building-project-center/resources.asp or refer to the Exhibits in this book

b) **In Westchester County**

- **Distribution Piping – Requires AHJ Authorization**
Gas Service Authorization or Blue Card will be required. The Pressure Test Verification Affidavit can be found on the Con Edison Energy Services Resource web-site located at https://www.coned.com/en/small-medium-size-businesses/building-project-center/contractor-

resources or refer to the Exhibits in this book.

- **Meter Piping – Under PSC Jurisdiction and requires OQ**
  Requires a Meter Piping Pressure Test and OQ Affidavit. The Meter Pressure Test Verification Affidavit form can be found on the Con Edison Energy Services Resource web-site located at https://www.coned.com/en/small-medium-size-businesses/building-project-center/contractor- resources or refer to Exhibit - B.

  i. An affidavit is required for the gas meter piping for all installations excluding 1, 2 and 3 family residential homes where gas meters are installed outdoors.

  ii. Con Edison requires a written document of pressure test certification for any new piping or replacement piping that is installed to a newly installed gas end-use piece of equipment.

  iii. Restoration of service discontinued (cut-off) due to a fire or other conditions or where all the gas service to a building has ceased for over six (6) months.

P. Special Services Provided at Cost

Upon the Customer's request, the Company will perform the following special services for a Customer and will charge the Customer upon the basis of cost to the Company as defined "Definition of Cost":

1. Change the point of service termination or location of the service pipe.

2. Relocate Company street facilities to accommodate Customers.

3. Remove and relocate Company facilities when a street is to become private property.

4. Make gas main extensions in private roads or streets of real estate developments under a refunding agreement based on use of service, provided that the Customer furnishes evidence of intent, satisfactory to the Company, that the Customer will cede or otherwise transfer said roads or streets for public street purposes to the municipal or other governmental authority having jurisdiction, subject to "Installation of Mains and Services" in the current Gas Tariff;

5. Inspect or clear drips on the service pipe beyond the point of service termination.

6. Install service lines, service connections, and appurtenant facilities in addition to those required under customer entitlements.

7. Change an existing customer's service configuration from multiple-meter to a single-meter configuration, including all costs associated with removing and upgrading meter(s).

8. Provide a meter or auxiliary metering equipment not normally furnished by the Company and not required for billing the customer's service, including meter upgrades and furnishing of equipment that permits remote reading of the meter.

9. Bottled gas when used to maintain gas integrity when a gas service is being upgraded per customer request.

Q. Definition of Cost

The cost to be charged for the furnishing of the special services listed in "Special Services at Cost" consists of the following elements of cost where applicable.

1. Labor of the Company organization unit involved at average payroll rate plus related expenses and indirect costs. Overtime and Sunday rates will be charged where applicable;

2. Material at the average actual storeroom price plus 8.5% for handling cost (Sales Taxes to be added where applicable);

3. Use of transportation vehicles at rates covering operation, maintenance, carrying charges and taxes;

4. Contract work and sundry vendors' bills at invoice cost, including any taxes contained therein;

5. Use of large tools and equipment at rates covering operation, maintenance and carrying charges;

6. Corporate overhead for the above five defined costs, (1 through 5) at (a) 9% for engineering and drafting, unless the labor cost for those services is separately stated or was already charged on a prior invoice, (b) 11% for construction management, if applicable, and (c) 2% for administration;

7. Salvage credit at storeroom price of materials reduced by salvaging cost, or at junk value.

   The above-described costs, where applicable, shall be increased to reflect the percentage increase in Rates and Charges, as per the current Gas Tariff.

R. Flat Rate Policy (Maintain integrity of gas piping during building swing-over)

Upon the Customer's request, the Company will supply temporary gas, to maintain integrity to the building's gas piping to enable the customer's contractor to perform a swing over from the old service to the new service (not-applicable to residential homes). This work will be charged to the customer at a flat-rate price as an accommodation cost and is due at the time the Final Inspection is scheduled. The customer is advised to discuss all alternatives with their engineer or contractor and with the Licensed Master Plumber performing the gas piping work.

S. Shut-Down of Building Gas Service Requiring Utility Notification

The following are situations where Con Edison **MUST BE** notified to avoid an interruption of gas service to a customer in a building:

1. Any time that a curb valve needs to be operated.

2. Any time that a service head valve needs to be operated, regardless of elevated pressure limit.

3. Any time a gas meter valve is being operated.

If any of the above situations are needed, Con Edison will schedule shut-down upon notification. **A customer contractor should never perform this work.**

After shut-down is performed by Con Edison, never re-open a meter valve, once closed. Please contact the company for service restoration and provide a gas integrity test form submittal to energize the gas service.

T. Operator Qualification (OQ) Requirements

a) Different OQ requirements exist, depending on the type of work and location of work being performed. The following scenarios are provided:
- Work on below grade service line piping
- Work on indoor service line piping and meters
- Work on above grade service line piping and meters

See applicable sketches in Exhibit M, Diagrams 6 through 8

b) **OQ Instructions**:
The following instructions are for customers (or their representatives) to follow, if required to gain Operator Qualifications when working on jurisdictional piping (aka- service pipe)[2].

When working on below grade gas service pipe on customer property, the person performing the work is required to meet all local jurisdictional licensing requirements and in addition, be Operator Qualified per Subpart N in 49 CFR Part 192. In order to gain Operator Qualifications, the contractor must comply with the Con Edison Operator Qualification (OQ) Plan which incorporates principle elements contained in the Northeast Gas Association (NGA) OQ Program.

In order to gain Operator Qualifications (OQ) to work on Con Edison's gas system, you must:
1. Identify the required covered tasks needed for your project (see Appendix A and/or B) for below grade pipe installation.
2. Ensure technicians seeking qualification have had the necessary technical training, including instructor led training and/or equivalent on-the-job experience, to perform the work.

[2] Per The Yellow Book, service pipe is defined as: all piping, tubing and fittings that transport the gas from the main to:
- For inside meter(s) – the outlet of the meter
- For outside meter(s) – outside the building wall

3. For inside service piping work (i.e.: covered tasks 86 and/or 87): If you plan to do inspection and repair work on inside service pipe, as well as new construction of inside service piping upstream of the meter:
    a. if working in NYC, contact the Plumbing Foundation City of New York, Inc. This organization will facilitate the process to obtain the required training and qualification requirements are met. Visit the Plumbing Foundation's website at: www.plumbingfoundation.nyc/gas-operator-qualification
    b. if working in Westchester County: you can contact the Independent Master Plumbers of Westchester, by emailing DOTOQ@IMPW.NET
4. For below grade new gas service installation only: If not already part of an OQ program, you may contact the Northeast Gas Association (NGA), to sign-up for an online account/profile, for those who need to gain operator qualifications.
    a. Email: oq@northeastgas.org to start the process of setting up a database.
    b. The NGA OQ Team will email you step by step instructions to complete the process of setting up your database and getting trained to navigate the ITS Onboard system.
    c. If additional training is needed regarding the use of the ITS Onboard system, you may contact the NGA Help Desk at ngaqualificationservicedesk@northeastgas.org for further support AFTER you complete your onboarding webinar training.
    d. Take online refresher training courses associated with the required covered tasks[3]
    e. If additional technical training is needed, you may contact the NGA at OQ@northeastgas.org for further additional technical training options.
5. Scheduling OQ testing: Depending on the required tasks, this may include written and/or practical (i.e.- hands on) evaluations
    a. The NGA can assist in scheduling practical evaluations (if required). To schedule a hands on session email oq@northeastgas.org with hands on tasks needed.
    b. For instructions on booking written evaluations with a testing block at a Prometric center, please email oq@northeastgas.org
        i. If you are already familiar with this process you can book a Prometric session directly at NGA's custom link here: https://www.prometric.com/en-us/clients/NGA/Pages/landing.aspx
    c. If preferred, Con Edison can provide written evaluations at our Learning Center facility, located in Long Island City (Queens). To request written evaluations be taken at Con Edison, please email: GasOpsTraining@coned.com
6. Once all required covered tasks have been gained, a copy of the individual's operator qualification transcript (or OQ card) can be provided to Con Edison's project representatives, prior to the start of work.
7. Please note- project specific requirement, including but not limited to Con Edison's A Customer Guide to Natural Gas Service Installation (aka- the Yellow Book), must be reviewed, understood and followed for all aspects of service pipe installation, repair or replacement.

For any questions related to Con Edison Operator Qualification requirements, please email OPQUAL@coned.com

Common Answers to Frequent Asked OQ Questions:

- Cold Roll Bend installation requires Task 87
- CT 87 is required to make the final connection to the head of service valve

[3] Please note: On-line refresher courses ARE NOT intended as initial instructor lead training. Technicians seeking qualification must have completed an instructor lead training program (in NYC, such as the Licensed Master Plumber Local 1 Training Center) or have equivalent on-the-job training working under the license of a LMP in NYC or equivalent outside of NYC such as the Master Plumbers Council (MPC) programs.

- For existing meter shut down for work after an outdoor meter, DOT jurisdiction ends at the building wall, and therefore CT 87 would be required on that piping.
- For below grade service line work on private property, all Con Edison requirements still apply.

For additional information, scenarios and frequently asked questions please reference the Plumbing Foundation of NY website at:

https://www.plumbingfoundation.nyc/wp-content/uploads/2019/08/FAQs-on-CT87-revised.pdf

Appendix A: Plastic Pipe Installation Covered Task List

The following list of covered tasks encompasses all possible tasks needed for a new, below-grade plastic pipe installation, repair or replacement.
Please note: not all tasks may be required for every single job. If you do not plan to perform one of the following tasks, then you do not need to be operator qualified in that task.

Task #:	Task Name:	Notes:
31A	Installation of Pipe: Storage, Handling and Inspection of Pipe: General Knowledge	
31B	Installation of Pipe: Install Pipe in a Ditch	
31E	Installation of Pipe: Installing Pipe by Dead Insertion	*Required if inserting through any type of sleeve*
34	Performing pressure test on a pipeline	
40	Install/Replace tracer wire	*Required to install tracer wire on buried plastic gas pipe and electronic markers (i.e. marker balls) on buried plastic, steel, and copper gas pipe*
41/42	Inspecting, Lubricating, Repairing and Operating distribution valves	*Required if installing and/or inspecting below grade valves*
*50/51/52 Electrofusion Saddle	Joining and Inspecting Plastic Pipe Saddle Electrofusion	*Only required if this is the type of pipe joining being performed*
*50/52 Electrofusion Coupling	Joining and Inspecting Plastic Pipe Coupling Electrofusion	*Only required if this is the type of pipe joining being performed*
*50/52 Hydraulic Butt Fusion	Joining and Inspecting Plastic Pipe Hydraulic Butt Fusion	*Only required if this is the type of pipe joining being performed*
*50/51 Mechanical Bolt On	Joining and Inspecting Plastic Pipe Mechanical Bolt On	*Only required if this is the type of pipe joining being performed*
*50/51 Mechanical Compression	Joining and Inspecting Plastic Pipe Mechanical Compression	*Only required if this is the type of pipe joining being performed*
*50/51 Mechanical Nut Follower	Joining and Inspecting Plastic Pipe Mechanical Nut Follower	*Only required if this is the type of pipe joining being performed*
*50/52 Manual Butt Fusion	Joining and Inspecting Plastic Pipe Manual Butt Fusion	*Only required if this is the type of pipe joining being performed*

70	Properties of Natural Gas and Abnormal Operating Conditions	*This covered task is a pre-requisite to all other required tasks.*
71	Excavation & Backfill	*1. Not required during excavating, if digging an open trench (with no gas facilities in the area)* *2. Is required during backfill*

**A Practical Evaluation is required for this Covered Task. Please contact the NGA to schedule an evaluator.*

Appendix B: Steel Pipe Installation Covered Task List

The following list of covered tasks encompasses all possible tasks needed for a new, below-grade non-welded steel pipe installation, repair or replacement.

Please note: not all tasks may be required for every single job. If you do not plan to perform one of the following tasks, then you do not need to be operator qualified in that task.

Task #:	Task Name:	Notes:
11E/12E/17E	Pipe Coatings (Mastic)	*Only required if this is the type of coating being utilized*
11F/12F/17F	Pipe Coatings (Cold Applied Tape)	*Only required if this is the type of coating being utilized*
11H/12H/17H	Pipe Coatings (Paint)	*Only required if this is the type of coating being utilized*
14A	Installing/Replacing an Anode on a Pipeline including Exothermic Welding	
15A	Installing, Replacing and Testing Electrical Isolation Couplings	
16A	Installing or Replacing a Corrosion Test Station on a Pipeline including Exothermic Welding	
31A	Installation of Pipe: Storage, Handling and Inspection of Pipe: General Knowledge	
31B	Installation of Pipe: Install Pipe in a Ditch	
31E	Installation of Pipe: Installing Pipe by Dead Insertion	*Required if inserting through any type of sleeve*
34	Performing pressure test on a pipeline	
40	Install/Replace tracer wire	*Required to install electronic markers (i.e. marker balls) on buried plastic, steel, and copper gas pipe*
41/42	Inspecting, Lubricating, Repairing and Operating distribution valves	*Required if installing and/or inspecting below grade valves*
49.1/49.2 Threaded and Flange	Mechanical Joining of Pipe other than plastic: Threaded and Flange	*Only required if this is the type of pipe joining being performed*
*49.3 Compression	Mechanical Joining of Pipe other than plastic: Compression	*Only required if this is the type of pipe joining being performed*
70	Properties of Natural Gas and Abnormal Operating Conditions	
71	Excavation & Backfill	*1. Not required during excavating, if digging an open trench (with no gas facilities in the area)* *2. Is required during backfill*

**A Practical Evaluation is required for this Covered Task. Please contact the NGA to schedule an evaluator.*

***NOTE: If new steel pipe being installed below grade is to be joined together via welding, additional requirements apply. Welding certifications in accordance with Con Edison specifications are required, plus covered tasks 44/54, Welding on a Pipeline.*

U. Drug and Alcohol (D&A) Requirements:

Per state and federal pipeline safety regulations, anyone who performs operation and/or maintenance functions on a pipeline are subject to the D&A code requirements, and therefore, must participate in a D&A Program. Performing work on a service line pipe is considered a covered function, per the regulations.

In addition to the above OQ requirements, when performing repair or replacement work of existing services (on jurisdictional piping), individuals performing the work must be participants of a Con Edison approved PHMSA (Pipeline and Hazardous Materials Safety Administration) D&A program.
By working with your local plumbing association (i.e.- the Plumbing Foundation of New York or the Independent Master Plumbers of Westchester), you can gain OQ status, as well as be added as a participant to an acceptable Drug & Alcohol Program. See above OQ instructions for points of contact in your area.

SECTION 2 – Gas Services

A. General Information:

1. Gas service piping will be installed by Con Edison, its authorized contractor, or a Customer Operator Qualified contractor (when applicable).

2. No person, unless in the employ of the Company, shall repair, alter, open or make connections to the service piping or do any work on any parts of Con Edison's gas supply system, including operation of a curb valve, head of service/riser valve, or meter valve.

3. Con Edison reserves the right to determine the location and type of any all-service pipes to be installed.

4. Gas service will be supplied to each building or premise through a single service pipe. Any request for additional service pipes will be communicated to the assigned Customer Service Representative. Additional service must be pre-approved and are subject to Excess Distribution Facility (EDF) charges to be paid by the customer. Excess facilities will be provided at the discretion of Gas Engineering.

5. A Customer's request to supply a natural gas-fired generator installed to provide required emergency power in accordance with the NYC Building Code requires a separate outside gas shut-off valve that is separate from the existing gas service to the building. This additional gas service is subject to Excess Distribution Facility (EDF) charges to be paid by the Customer.

6. All gas meter sets shall be located in accordance with Section 4 of the Yellow Book. Location exceptions require an approved waiver per Section 4

B. Customer Pipe Size

Acceptable methods of calculating pressure loss are outlined in NYC, NYS or National Fuel Gas Code as appropriate.

1. Any meter piping in excess of 3 feet between the Con Edison head of service valve and Con Edison regulator/meter installation shall not have a pressure loss (drop) of more than 0.1" WC. This piping is in excess of the piping shown in Con Edison drawings and referred to in this installation guide. Indoor location waiver: Where room space clearance is limited, the trunk line shall be the same size or larger than the head of service valve. The gas service regulator(s) and gas meter(s) trunk line shall be the size of the largest meter diameter plus one pipe diameter. For diaphragm and rotary meters, the lockable valve and meter shall be within 5 feet of the trunk line for adequate delivery of gas supply to end use gas equipment. Refer to G-703 gas specification. If there is any meter piping in excess of 3 feet between the Con Edison head of service valve and Con Edison regulator/meter installation or if there is multiple regulators and/or meters, you must comply with Con Edison specification G-703

2. Customer piping systems shall follow National Fuel Gas Code (NFPA 54), New York State Fuel Gas Code (FGNYS) and NYC Fuel Gas Code (NYCFGC) where applicable and be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand without undue loss of pressure between the Con Edison meter outlet and the customer's equipment. The design pressure loss (drop) shall not be more than 0.3" WC. Sizing of Customer gas piping/fitting/valves and shall meet requirements of National Fuel Gas Code, Chapter 6 and Annex B, and NYC Fuel Gas Code Section 402 of the NYC Fuel Gas Code for Schedule 40 metallic pipe with a pressure drop of 0.3" WC

3. Elevated pressures may not be available throughout the Con Edison service territory. Requests for elevated pressure must be approved in advance by Con Edison. In instances where customer equipment requires elevated pressure, Con Edison will provide additional requirements. If a location requires elevated pressure because of gas utilization equipment requirements, the customer or the Licensed Master Plumber shall provide the required information in writing for further evaluation. Customers may not request elevated pressure for the sole purpose of downsizing the houseline size. In NYC reference section 402.6 of the Fuel Gas Code for Gas distribution pressures and exceptions. Only cases referenced in the code will be eligible for elevated pressures to be available at the Point of Delivery (meter outlet), and after all requirements of the governing Fuel Gas Code have been satisfied. This is applicable in both the NYC and Westchester territories.

4. The Company has the right to refuse service and make the customer change out the piping at customer / plumber's expense when the piping size is found to be inadequately sized.

C. Gas Service Installation Requirements

To provide prompt, safe and adequate gas service to our customers, Con Edison requires that the following conditions be met by the Customer or the Customer's agents:

1. New and replacement gas service piping shall be installed per Gas Specification G-8100. A second level inspection and backfill inspection with Con Edison shall be requested prior to backfill of the pipe. Detailed As-Constructed drawings shall be submitted by the Customer or the Customer's agent prior to any gas service piping being connected to the gas distribution system.

2. **Head of Service (HOS) Valve**

a) **New Service Installation** - Where the service head valve is located 6-feet or more above floor level, a chain operated valve or access platform shall be installed.

b) **Upgrading an Existing Gas Service -** A gas service head valve must be installed (where none exists) or replaced (where the existing valve is not a Con Edison approved type) when the following conditions exist:

- The gas service is SHUT-OFF upstream of the service head valve to perform work.
- The gas service head valve itself is being worked on.

c) **Installations in Specialized Areas** - In certain situations, the installation of a service may result in unique configurations that Con Edison is not familiar with inspecting (for example, service line piping installed under a pier, under a bridge, high up in the air, in areas of little access by company personnel, etc.). Con Edison is ultimately responsible for the operations and maintenance activities associated with all service line pipe; however, the financial burden of such responsibilities would fall to the customer. When the service installation results in a configuration in which Con Edison personnel are unable to inspect consistent with routine procedures or do not have the adequate training to inspect, then the customer will be required to perform these inspections in accordance with all federal, state and company requirements and submit those inspection results to Con Edison. Inspections include, but may not be limited to, leakage surveys and corrosion inspections.

In the event a service line pipe configuration meets the above mentioned criteria, additional information and detailed requirements will be provided to the customer.

3. **Gas Service Point of Entry (Sleeve/Sweep)**

a) The customer is responsible for the costs for any modification of the building or foundation wall including installation of a wall sleeve that may be required. See Gas Specification G-8096, “Sealing the Annular Space Between a Gas Pipe and a Wall, Casing Pipe, or Sleeve.”

b) Gas services are to be properly sleeved and vented per Gas Drawing EO-4890, “Service Pipe / Tubing and Service Sleeve through Vault, Open Areaway, Open Area under Stairs, Under Enclosed Area and Vaulted Basement”. If the Customer elects to build and/or add an extension over an existing gas service, the Customer will bear the full cost to sleeve and vent the existing gas service or the full cost to off-set same.

c) A Multi-Dwelling Residential/Commercial/Industrial customer is responsible for the costs to maintain and replace a sleeved elbow unit (if one exists.)

4. **Protection of Above Ground Service Pipe and Fittings**

a) Adequate protection devices shall be installed in areas where the service head valve, service regulator (if required), meter(s), and associated valves are subject to vehicular damage. See Gas Drawing 502163, "Bumper Installation.”

5. **Gas Trench**

a) The areas in which gas services are to be located shall be easily accessible and allow for safe working conditions. Dirt piles, debris, construction materials etc. are to be removed from the proposed gas service route and service trench. Trenches containing water must be pumped out by the customer before installation of the gas service pipe.

b) If the Customer’s contractor is excavating the gas service trench, the trench must:

1. Be excavated to ensure the gas pipe is installed perpendicular to the street and should not run at angles.

2. Provide minimum required clearance from other subsurface facilities (see Gas Specification

G-8100, “General Specification for the Installation of Gas Distribution Services”)

3. Be the required minimum depth and width (see Gas Drawing 309495, “Trench Excavation for Gas Mains and Services up to 350 psig”)

4. Distribution mains and services must be properly supported on undisturbed or well-compacted soil. All material used for backfill and pipe support must be free of materials that could damage the pipe or its coating. In a "rock area" a 4"-6" bedding of sand, 3/8" clean fill, or recycled screening backfill shall be used. (See Gas Drawing 309495)

c) If the trench is located within 3 feet of a live gas line and the Customer’s contractor is not qualified in task 70/71, they must call Con Edison to schedule an appointment for an operator qualified individual to witness excavation activities.

6. **Backfill**

a) A second level inspection and backfill inspection with Con Edison is required prior to backfill of the pipe.

b) Electronic markers (EMs) shall be installed on steel, PE plastic, and copper gas service pipe as per Gas Drawing 502664, "Installation of Electronic Markers on Gas Mains and Services" and noted on the as constructed drawing.

c) Backfill material around gas pipe shall be sand, 3/8” clean fill, or recycled screening backfill.

d) If the Customer’s contractor is not qualified in task 70/71, they must call Con Edison to schedule an appointment for an operator qualified individual to witness and document backfill activities.

e) If the Customer’s contractor is qualified in task 70/71, they must still call Con Edison to schedule an inspector to document backfill activities.

7. **Polyethylene (PE) Plastic Gas Service Pipe, Tubing, and Fittings**

a) All ***joiners*** of PE plastic pipe/tubing and fittings by butt fusion, electrofusion, or mechanical joints MUST:

1. Be Operator Qualified (OQ) and current with 12 month requalification (see Gas Specification G-8121, "Qualification of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services")
2. Join PE plastic pipe/tubing and fittings in accordance with the joining procedures outlined in Gas Specifications G-8123, “Heat Fusion Joining of Polyethylene Plastic Pipe/Tubing and Fittings for Gas Mains and Services,” IP-27, “Installation of Electrofusion Fittings on Plastic Pipe/ Tubing and Molded Fittings Using a Universal Electrofusion Processor” and Gas Specification IP-20, “Installation of Mechanical Fittings for Plastic Pipe and Tubing.”
3. Visually inspect all PE plastic joints ;
4. Mark all PE plastic joints with their contractor OQ # at 12 o’clock with a Company approved marker (e.g. silver Sharpie) adjacent to the joint; **AND**
5. Document all PE plastic joints, joiners, and associated tracking information on as-constructed drawings **AND** on the “Gas Operations PE Plastic Joint Tracking” form (or equivalent)

b) All PE plastic joints (butt fusion, electrofusion, and mechanical) must also be inspected by a second inspector who is Operator Qualified in covered task 52H to inspect PE plastic joints and in compliance with the 3-year requalification. Second inspectors are required to be independent of the fuser (aka- a non-crew-based inspection). The OQ # of the “second inspector” shall be marked adjacent to the joiners OQ # and also identified on the “Gas Operations PE Plastic Joint Tracking” form (or equivalent).

1. Con Edison offers second inspectors to perform this requirement. In order to schedule a second PE Joint Inspection, please make arrangements through your Con Edison representative. Second Inspectors will also document all PE joining information on Con Edison’s applicable mobile application.

c) To perform all other work associated with a PE plastic service (e.g., installation of pipe in trench, pressure test, install tracer wire, backfill, etc), the individual must either be Operator Qualified or under the direct observation of one who is Operator Qualified. “Direct observation” means that the Operator Qualified individual always remains in direct visual and verbal contact with the individual performing the task. See above Section 1. T for full OQ instructions.

d) See Gas Specification G-8104, "Polyethylene Pipe, Tubing, and Fittings for Gas Mains and Services” for Company approved PE plastic pipe, tubing, and fittings and Gas Specification. G- 100,298, “Valves for Gas Transmission and Distribution Systems” for Company approved PE plastic valves.

e) All PE plastic pipe, tubing, and fittings, must be inspected prior to installation to verify:

- No cuts, gouges, deep scratches, or other defects.
- PE plastic material is high density polyethylene (HDPE), PE3408/4710, manufactured per ASTM D2513, PE plastic pipe & fittings are not to be older than 10 years old.
  - For PE plastic pipe/tubing (yellow striped), check the print line.
  - For PE plastic fittings, check the sticker on the fitting.

See Gas Specification G-8122, “Inspection, Handling, Storage, and Transportation of Polyethylene (PE) Plastic Pipe, Tubing, and Fittings for Gas Mains and Services.”

f) A minimum #14 AWG yellow insulated copper tracer wire shall be taped to all direct buried PE plastic service pipe at 20 to 30 foot intervals. Bring the tracer wire to the top of the curb box or riser. Tracer wire may not be wrapped around the plastic pipe and contact with the plastic pipe must be minimized (i.e. just to the contacts for "taping intervals"). (See Gas Specification G-

8100)

g) PE plastic pipe/tubing shall **not** be installed in the following areas:

1. Above ground.

2. Where the temperature of the PE plastic pipe/tubing will be below -20°F or exceeds 100°F.

3. Within 35 feet of **any** steam facility (Company or private) or in any subsurface structure, inside of which, a steam facility is located.

4. In a subsurface vault or any below grade enclosure (**not** containing therein any steam facilities) unless it is completely encased in a gas tight metal pipe having adequate corrosion protection.

5. Where the soil is saturated with solvents, fuels (e.g. gasoline), or oils.

6. More than 3" beyond the inner face of the building wall (this includes a building's vaulted area) and the 3" (or less) of plastic pipe/tubing must be fully encased within a steel sleeve or existing service pipe. The plastic service pipe or tubing shall terminate at a transition fitting or service head adapter/basement tee.

h) All PE plastic joints, joiners, and second inspectors shall be marked and documented as per DOJT GAS6006, "Documentation and Inspection of Polyethylene (PE) Plastic Joints on Gas Mains and Services.

i) Qualification of new and existing joiners and second inspectors of Polyethylene (PE) plastic pipe shall be performed and documented by Con Edison or Northeast Gas Association (NGA) trained evaluators

8. **Steel Service Pipe**

a) To perform all work associated with installing steel service pipe (e.g., installation of pipe in trench, coating pipe, pressure test, backfill, etc.), the individual must either be Operator Qualified or under the direct observation of one who is Operator Qualified. "Direct observation" means that the Operator Qualified individual always remains in direct visual and verbal contact with the individual performing the task. See above Section 1.T for full OQ instructions.

NOTE: Welders performing welds on buried pipe must meet the Operator Qualification requirements in gas Specification G-1064 and follow the welding procedure in Gas Specification G-1065.

b) See Gas Specification G-8107, "Steel Pipe for Gas Mains and Services" for approved steel pipe and G-100,298, "Valves for Gas Transmission and Distribution Systems for Company approved metallic valves.

NOTE: All above ground outdoor service piping **shall** be steel.

c) Corrosion Control of Steel Pipe

- All buried or sleeved steel service pipe shall be factory coated as per Gas Specification G-8062, "Extruded Polyolefin Coating on Steel Pipe" or field coated as per Gas Specification G-8209, "Field Coating of Steel Gas Pipe and Fittings Installed Underground and in Subsurface Structures"

- All steel service piping, above ground and buried (before or after the gas meter), must be protected per the requirements in Gas Specification G-8205, "Corrosion Control of Buried Steel Gas Mains and Services."

- The cathodic protection of the steel service shall be checked prior to and after backfilling.

- Galvanized piping cannot be used for below grade installations and or be used as a sleeve for a gas pipe. Please refer to the appropriate specifications listed in this book for sleeved installation

requirements.

9. **Copper Tubing Service Pipe**

a) To perform all work associated with installing copper tubing service pipe (e.g. joining with mechanical couplings, installation of pipe in trench, pressure test, backfill, etc.), the individual must either be Operator Qualified or under the direct observation of one who is Operator Qualified. “Direct observation” means that the Operator Qualified individual remains in direct visual and verbal contact at all times with the individual performing the task

b) Protective bushings must be installed on the ends of the existing service pipe (after the pipe is cut, removed and reamed) and **prior** to insertion to protect the copper from damage.

c) The leading open end of the copper must be sealed prior to insertion.

10. **Pressure Testing of Service Pipe**

a) New and replacement gas service pipe shall be pressure tested, by the installer, as per Con Edison specification G-8204. Pressure testing from the head of service valve to the first fitting upstream of the meter shall be done, as per the following:
   - For services operating below 1 psig or services with service regulators supplying outlet pressures below 1psig, the segment of service line downstream of the service head valve shall be tested via an integrity test (performed by Con Edison).
   - For services with service regulators supplying outlet pressures of at least 1 psig, but not more than 40 psig, the segment of service line downstream of the service regulator up to the meter inlet valve(s) shall be pressure tested to a minimum of 50 psig.
     i. When such pressure test is related to repair, Oil to Gas Conversion, and/or replacement work, then prior to performing the pressure test, Con Edison must be notified in advance to schedule an operator qualified witness to be present during testing.
   - For services with service regulators supplying greater than 40 psig, the segment of service line downstream of the service regulator shall be tested to a minimum of 90 psig or 1-1/2 times the intended operating pressure, whichever is greater.
     i. When such pressure test is related to repair and/or replacement work, then prior to performing the pressure test, Con Edison must be notified in advance to schedule an operator qualified witness to be present during testing.

b) The test pressure must be maintained at or above the required test pressures for the following minimum times:
   - 2” diameter and smaller: 15 minutes
   - Greater than 2” diameter: 30 minutes

c) Note: all Fuel Gas Code requirements still apply.

d) Pressure Tests shall be documented within the Gas Meter Pipe Pressure Test Verification form (See Exhibit B).

D. Welding:

All welding on below grade gas service piping installed before and after an above ground outdoor gas meter set-up must be in accordance with Operator Qualification requirements. See above Section 1.T for full OQ instructions.

Separate and apart from operator qualification requirements, all welding on gas service piping must be performed in accordance with Con Edison's welding procedures, including but not limited to API 1104 and/or ASME Boiler and Pressure Vessel Code, Section IX welder certification requirements. See Gas Specifications, G-1064, G-1065 and G-.

All welders working on a Customer's distribution piping inside buildings must be qualified in accordance with the requirements of the local authorities having jurisdiction.

1. **New York City:**
   Welders installing gas distribution piping within buildings at any pressure shall comply with the following:

   a) Welders shall be qualified for all pipe sizes, wall thicknesses and all positions in accordance with the ASME Boiler and Pressure Vessel Code, Section IX. Requalification of welders is required on an annual basis and when requested by the commissioner.

   b) Welder qualification testing shall be performed by an approved agency and the inspector witnessing the test shall be an authorized AWS Certified Welding Inspector. Radiographic test specimens shall be evaluated by a radiographic inspector having a minimum radiography qualification of Level II in accordance with the ASNT, Document No. SNT-TC-1A, Supplement A.

   c) Copies of the certified welder qualification reports shall be maintained by both the approved agency and the licensed master plumber employing the welder(s) for at least six years and shall be made available to the department upon request.

   d) The approved agency shall submit certified welder qualification reports to the department upon successful qualification of a welder and when requested by the commissioner.

   e) The licensed master plumber employing the welder(s) shall submit a statement to the department including who welded the gas piping along with a copy(s) of the certified welder qualification report(s) witnessed by a representative of the licensed master plumber, at the time of the first roughing inspection.

   f) Certain portions of the service line have overlapping jurisdiction, where both con Edison specifications and the NYCDOB regulations would apply. For example: when there is an outdoor meter, the service line that extends after the outlet of the outdoor meter until it reaches the building. In these cases, the NYCDOB rules require welding in accordance with *ASME Boiler and Pressure Vessel Code,* Section IX. Con Edison has determined that ASME welding certification is compliant with federal and state pipeline safety regulations, and therefore, will be an acceptable form of welding for the plumber installed service line piping. NYC Fuel Gas Code sections 406.1.1.2 outlines Welding Requirements for piping after the outlet of the meters. Welding of piping after the outlet of the meter must be performed in accordance with *ASME Boiler and Pressure Vessel Code*, Section IX.

   g) **New York City Fuel Gas Code – Section 403.1.1**
   Pipe Size and Pressure Limitations – Welding Inside Building,

   See Chart:

PSIG	Gas Pipe Installation
In Excess of ½ psig - 5 psig	Gas distribution pipe operating size 4-inch or larger must be welded.
In Excess of 5 psig	All gas distribution pipes operating above 5 psig must be welded.
All welding of gas distribution pipe shall be subject to DOB special inspection (NYCFGC Section.403)	
All piping 4-Inch or larger operating in excess of 5 psig must be butt-welded, Subject to DOB special inspection and radio-graphed	
Threaded piping may be used up to 4-inch at pressure no greater than ½ psig.	

2. Westchester County:

Welders are required to follow the New York State Fuel Gas Code for welding on distribution piping.

a) The Customer, it's Agent or licensed Plumbing Contractor must submit a **"Welding Affidavit"** showing compliance with the local building codes in the Municipality where work was performed. The Company's **"Welder Affidavit"** form can be found on our Energy Services Resource web-site located at https://www.coned.com/en/small-medium-size-businesses/building-project-center/contractor-resources or refer to Exhibit - E.

E. Gas Meter Location

a. Building exterior should be complete with siding, brick etc., installed at the meter location prior to the installation of a gas service.

b. See Section 4 for detailed Meter requirements.

Metering equipment layout(s) and service installation(s) for commercial and industrial installations may vary. Gas Measurement Department Standards and Specifications will be used as a guide in final layout and installation. Refer to Appendix.

F. Corrugated Stainless Steel Tubing (CSST) Distribution Pipe:

1. **New York City:**

   a) Corrugated Stainless Steel Piping (CSST) installation is not permitted on distribution piping in New York City.

2. **Westchester County:**

   a) Corrugated Stainless Steel Piping (CSST) installation shall not be installed as buried service pipe between the meter outlet and building wall. CSST shall be installed in accordance with the requirements set forth in the Fuel Gas Code of New York State.

   b) In municipalities in Westchester that allow CSST, all manufacturers' installation guidelines and authorities having jurisdiction (AHJ) requirements shall be followed.

G. Below Ground Piping: Leakage Testing:

All of the customer's service piping and meter piping shall be tested in accordance with the following requirements:

1. All below grade piping, before the building wall, shall be pressure tested per the requirement of Gas Specification G-8204, "Pressure testing Requirements for Gas Mains and Services".
2. All buried piping shall be blocked, supported and held in place with sandbags for the leakage test and coating inspection.
3. The test medium shall be either air, inert gas for testing pressures up to 150 psig. Water may be used for test pressures exceeding 150 psig.
4. The pressure source shall be isolated from the piping prior to the start of the test.
5. All joints, fittings, valves or other potential leak sources shall be checked for leakage during the pressure test using leak detection solution (soap water).
6. Test duration times are to be measured after the test medium has stabilized.
7. Pressure readings shall be performed using a calibrated pressure gauge.
8. Prior to tie-in, Con Edison will pressure test buried pipe to the head of service/riser valve.

H. Meter Piping: Test Pressure and Duration:

1. For customer meter piping inside buildings in New York City:

Maximum Utilization Pressure	Test Pressure	Test Duration
Up to ½ psig	3 psig	30 Minutes
Over ½ psig to 5 psig	50 psig	30 Minutes
Over 5 psig to 15 psig	100 psig	1 Hour
Above 15 psig	100 psig or twice the maximum operating pressure but not less than 100 psig.	1 Hour

The above charts DO NOT represent test pressure for the portion of above ground distribution piping after the gas meter. For pressure testing requirements on gas piping after the gas meter, refer to NYC Fuel Gas Code and/or that of the local governing authorities/codes of the local municipality when working in Westchester.

2. The gas meter and associated gas regulating equipment **SHALL NOT** be installed prior to any pressure/leakage test. This equipment is to be leak tested at service line pressure.

I. Restoring Gas Service after a Repair:

In NYC a EWN or Gas Authorization to restore gas service must be submitted and received by Con Edison, Energy Services Group prior to restoring a gas service to a meter that was previously locked-off or isolated for inside customer piping repairs. In the event of an emergency situation, a valid EWN supplied by the Licensed Master Plumber from DOBNOW Build will be accepted in lieu of Gas Authorization in NYC. For Westchester a Blue Card will be required for gas restoration after repairs. All requests for service restoration shall detail the type of repairs made, location of repair and the gas equipment to be turned on.

All repairs on utility jurisdiction piping as defined in this book must be done by OQ Task 87 personnel.

Prior to restoring a gas service, an integrity test shall be performed by Con Edison to establish the customer's gas piping does not leak.

On service restorations for a high pressure (greater than 15 psig through 99 psig.) Building of Public Assembly (BOPA) turn-on where repairs have been made, the location shall be visited by an Energy Services representative to verify if the completed repairs require a Gas Approval (i.e. REQ-GA Approved or Blue Card) and **"Gas Integrity Test and Gas Turn-On Affidavit"** Exhibit - A prior to issuing a work authorization. A Gas Operations supervisor shall be present after inside repairs have been completed and prior to the turn-on of all elevated pressure piping upstream of the service regulator inside BOPAs.

On service restorations to either a building or a multi-dwelling (4 or more families) or a master- metered building with risers, in which in the licensed master plumber has corrected a warning tag condition, it is the responsibility of the building owner to provide **ALL** of the following for an acceptable integrity test:

a) An ***Approved Gas Authorization*** (old terminology Blue Card in NYC) or equivalent in Westchester, when required by local building code requirements.

b) A completed **"Gas Integrity Test and Turn-on Affidavit"** signed by a licensed plumber, including license number. The Company's "Gas Integrity Test and Turn-On Affidavit" form can be found on our Energy Services Resource web-site located at https://www.coned.com/en/small- medium-size-businesses/building-project-center/contractor-resources or refer to Exhibit – A

c) A final check list

d) OQ Affidavit if repair work, testing or purging involved utility jurisdictional piping.

e) A shut-off valve for each appliance, if there is no gas valve found, there will be no appliance turn-on.

No customer contractor is allowed to perform any repair work, test or purge on utility jurisdictional pipe, unless operator qualified and part of a DOT Drug & Alcohol Program.

I.1 Inside Service Line Inspections:

For customer's with indoor meters, Con Edison (or a qualified representative) is required to perform periodic safety inspections of that service line. In attempts to complete these inspections, Con Edison has communicated with our customers to make appointments; however, access in all cases has proved difficult. Refusal to grant access for these inspections can result in fees added to a customer's bill, termination of service, or a disallowance of a shut-off service to be returned. This inspection is above and beyond any required Local Law152 inspections in NYC.

Con Edison is requesting the assistance of our customers and the plumbing community in completing these safety inspections. When performing work on or in the vicinity of a gas service line, please take the time to complete a service line inspection (if qualified to do so via covered task 86). This inspection can be documented through a Con Edison developed mobile applicable. Instructions on the download and use of the mobile application can be found at: https://apps.apple.com/us/app/gas-piping-inspections/id1503237132 for Apple Users and is also available for Android Users in Google Play, please search for "Gas Piping Inspections - Con Edison."

Additionally, Con Edison is requiring the following be completed, prior to any turn-on requests being made to Con Edison. When performing any type of repair or modification work on the jurisdictional pipe up to the meter outlet (i.e.- task 86/87 work), prior to a turn-on request being issued, the plumber or his qualified employee must conduct a visual inspection for atmospheric corrosion of the service line and other abnormal operating conditions and correct any substandard conditions, to ensure a turn-on can proceed. Additionally, the plumber must make arrangements for the full-service line inspection to be completed, by Con Edison, on the day of turn on. The Meter Piping Affidavit has been updated to affirm the visual inspection has been conducted and access will be granted.

J. Restoring Gas Service to Buildings with Risers:

Master metered buildings where there is more than one riser and the risers are integrity tested individually, the gas in each riser shall occur immediately after an acceptable integrity of that riser off for the repair. Purpose is to prevent the possibilities of conditions changing after the test is performed and gas is introduced into the riser.

Prior to requesting a scheduled appointment the building owner or superintendent (agent) must provide to the company mechanic access to a minimum of two (2) apartments on each affected riser. One of these apartments must be the furthest apartment; the other shall be at the discretion of the company.

In each apartment accessed, the company will verify that:

a) Each appliance has a shut-off valve.

b) Visible piping is continuous and adequately supported up to the appliance valve.

c) All appliance valves are shut off and properly connected to appliances with standing pilots.

d) All appliance valves are open and properly connected to appliances with electronic ignition.

e) All appliance valves not connected to appliances are closed and plugged/capped.

f) All meter valves have been left open in premises which have meters in the apartments so that the integrity test is complete to the appliance valves. A lockable riser valve and a ⅛-inch diameter pressure tap downstream of, and in close proximity to the lockable riser valve, must be installed on any riser or branch that is off for repair. The ⅛-inch pressure tap is to be used to connect a manometer for the continuity test.

Any existing non-lockable riser valves can be left in place for risers not being repaired. It is ***STRONGLY*** recommended that lockable riser valve be installed on all risers in a building even if the riser is not being repaired. The purpose of the lockable riser valves is to make the gas turn-on easier, and to reduce the need for a **complete shutdown** if there is a leak in the future. Riser valves are not required for 1, 2, or 3 family-residential homes.

An existing drip leg with a lockable valve located downstream and in close proximity to the gas valve or a new ½-inch diameter reducer T fitting may be used in lieu of the ⅛-inch diameter pressure tap. If no riser valve or pressure tap fittings are present, contact supervisor for guidance.

g) Identification of the risers and gas shutoff valves shall be identified as required in section FGC 409 of the New York City Fuel Gas Code – Shutoff Valves. In NYC and Westchester each line shutoff valve shall be plainly marked with an identification tag attached by the installer so that the piping systems supplied by such valves is clearly identified. All building risers shall be identified (Ie. A, B, C, D etc.). The riser shutoff valve shall be properly identified to correspond to the riser that it will turn off.

K. Minimum Insulation Standards for Existing Dwellings Converting to Gas Space Heating:

h) Conversion to Gas Space Heating:

Existing one, two, three and four family homes converting to gas heating are required to meet the minimum insulation standards set by the New York State Public Service Commission.

Basic standards are:

- The roof or ceiling must have at least six inches of insulation or insulation with an R-value of 19 or greater. This requirement does not apply to dwelling having a flat roof provided that four or more inches of insulation are in place or if insulation can be installed only by cutting into the roof.
- Dwellings must have storm windows or thermal windows with multiple glazing. A storm window is not required on any window opening into a fire escape.
- All entrances must have storm or thermal doors.

i) Certificate of Compliance Requirement:

Gas service will not be provided to any premises subject to this minimum installation standard until an executed Certificate of Compliance has been furnished to Con Edison. The Company's **"Certificate of Compliance"** form can be found on our Energy Services Resource web-site located at https://www.coned.com/en/small-medium-size-businesses/building-project-center/contractor-resources or refer to Exhibit - F.

j) Waivers:

Con Edison may waive the requirements where the applicant can:

- Establish through two independent estimates or a heat loss survey, that the purchase price and installation charge (excluding interest charges) will be greater than seven times the anticipated annual savings to be obtained (based on the present cost of the fuel currently used in the building).
- Establish that the dwelling is a historical building.
- Establish that other measures have been taken so that the overall heat loss for the building envelope does not exceed the total heat loss which would result from conformance with the minimum insulation standards. A licensed architect or engineer must certify the heat loss calculation.

NOTE: Waiver requests must be submitted to Con Edison using the Company's form titled **"Request for Waiver - Minimum Insulation Standard"** located on the Energy Services Resource web- site located at https://www.coned.com/en/small-medium-size-businesses/building-project- center/contractor-resources or refer to Exhibit – G.

L. Emergency Natural Gas Generator:

a. Customer Emergency Power Equipment

The customer or customer's agent should electronically file through Energy Services Project Center at www.coned.com/en/small-medium-size-businesses/building-project-center for a gas service ruling. Energy Service will ensure all information is acceptable to service customer equipment and the natural gas generator.

In New York City, where a building is required to maintain emergency power equipment i.e., elevator bank, emergency lighting, fire pumps and the customer elects natural gas as the fuel source for the emergency generator, the customer is required to install a separate gas service and shut-off valve as per NYC Fuel Gas Code (Appendix E, Section E.6(5)). The Customer shall pay all costs associated for the second gas service under Excess Distribution Facility (EDF). See **"Rates and Terms of Service"** and "**Special Services Provided at Cost"** of this guide.

Additional requirements on Operator Qualification need to be followed when installing rooftop generators and or for storm hardening projects ie. elevated boiler or mechanical rooms utilizing gas. Please refer to the appendix M drawings for additional information and guidance.

b. Storm and Disaster Preparedness

When a customer request gas service for the purpose of supplying a generator for power during an electric system blackout, [storm damage or preparation for a major natural or accidental disaster declared by AHJ emergency officials] it will be used during an interruption of electricity service and duration will be completed when the electric system is returned to normal operation.

Energy Services representatives will be in contact with the customer-on-customer cost, billing service classification rates, service layouts, electric and gas procedures. It is important prior to purchasing any generating equipment to contact Con Edison so we can assist on the connection to both our gas distribution system and the electric grid network.

Where a customer elects to install a natural gas generator for electric power use during a storm and/or natural disaster preparedness and the existing gas service is no longer adequate, the Customer shall pay all costs associated with the installation including, if necessary, all costs for system reinforcement, gas mains and additional gas service. See **"Rates and Terms of Service"** and "**Special Services Provided at Cost"** of this guide.
See Gas Rate LEAF 38 PSC No. 9 III 3.H.

c. Con Edison's Review of Customer's Installation

Before the customer's emergency equipment is installed, the customer shall submit for Company review:

1. A one-line electrical diagram showing the proposed installation, its interconnection to the electrical service and the means used to prevent parallel operation. Con Edison reserves the right of field inspection to ensure compliance.

2. A written statement signed by the customer stating that the emergency facilities will be used only during an interruption of the company's electrical service, or a Company announced voltage reduction, and for necessary testing purposes. Customers using emergency generating equipment under other than the above specified circumstances will be required to take service classification that permits parallel operation.

M. Oil to Gas Conversion:

Natural gas is an efficient, safe, and reliable fuel source. It costs less than heating oil and is one of the cleanest-burning fuels available. Converting to natural gas will reduce greenhouse gas emissions and improve the air quality in your community. Help make a cleaner, greener New York. Choose natural gas today. Now is a great time to switch to clean, efficient natural gas.

Requirements:

Before you submit an application for gas service, we encourage you to obtain your property's internal conversion costs from a licensed professional.

If you decide natural gas is right for you, Con Edison recommends that you have a licensed professional submit your application for gas service.

Your application must include the following: (recent additions are marked with *)

- Addition of "Convert to Natural Gas" option as request type for all oil to gas conversions*
- Authorization from customer to submit this request*
- Property's block and lot number
- Requirement for a unique customer email address*
- Existing oil type (2, 4, or 6)
- The type of service you will require (firm, interruptible, or both)
- Property's point-of-entry (POE)
- Property's invoiced oil bills for the last 24 months must be submitted as an attached file*
- Boiler configuration for the installation of two or more boilers (e.g. lead lag, 100% redundant) *
- Contractors are now required to complete the load information screen. Load letter attachments are no longer accepted*

After your application has been submitted, you will receive an acknowledgement letter detailing the next steps in the process. Be sure to use the provided case number when making inquiries about your application. To learn more about converting to natural gas, including our new Area Growth initiative, refer to our website https://www.coned.com/en/save-money/convert-to-natural-gas/

NYC Clean heat Campaign http://nyccleanheat.org/

When converting from oil to natural gas it is a building rule requirement that your licensed heating specialist submit to the customer's AHJ a written report that masonry chimney has been inspected and upgraded to accommodate natural gas flue gases.

Building Code References:
New York City and State Fuel Gas Code – Masonry Chimney Utilized to Vent Boiler
NYCFGC - Section 501.3 and 503.5.3 titled: Masonry Chimneys.

N. ODOR FADE:

There are some important safety precautions that should be taken when working on or near natural gas equipment:
Natural Gas, which is mainly composed from methane, is odorless. Mercaptan used as an odorant, has a distinct rotten egg smell (mercaptan contains sulfur, carbon and hydrogen) and is added to natural gas to assist in the detection of leaks. Sometimes the odorant may not be detected by smell alone. Certain conditions may cause the odor to fade, to the point where it is no longer readily detectable. Odor fade occurs when the odorant in the gas is reduced due to physical and/or chemical processes including adsorption, absorption, and oxidation. Odor fade predominantly occurs with newly installed metal piping, but it can also occur with plastic piping**.** Odor fade is a serious concern, because if present, a gas leak would not be able to be detected through the smell of mercaptan.
Other factors that may cause odor fade include the size, length, and configuration of piping; the presence of rust, moisture, liquids or other substances in the pipe during storage and the construction process; gas composition, pressure, and/or flow. Intermittent, little or no flow over an extended period may also result in the loss of odorant until gas flow increases or becomes more frequent. These factors need to be considered in the design and construction of gas piping.
While Con Edison will provide adequate odorant up to the gas meter(s) outlet(s), it is the customer's responsibility to ensure odorant up to the end-use equipment. Some things to consider, in order to avoid odor fade, are:

- Installation of equipment that will provide a consistent demand for gas use, particularly in high-rise and larger buildings.
- Use of a consultant experienced in odor fade to provide additional support and guidance on eliminating odor fade.
- Ensure inside pipe diameter area is clean and free of foreign debris, rust, cutting oil and pipe dope.
- Ensure pipe caps are installed and the pipe is protected and covered if exposed to outside elements.
- Best practice is to store pipe indoors in a moisture-controlled environment away from damp/moist areas which could cause rust. Dehumidifiers/space conditioning may be utilized where practical to mitigate moisture content in the area where pipe is stored.

Requirements prior to Gassing In.

Buildings more than 9 stories and or greater than 25,000 square footage and those that have seasonal occupancy are required to adhere to the following conditions prior to gassing in after Gas Authorization has been received from the Authority Having Jurisdiction

Protect and New – Piping to be installed is to be new and protected from foreign material

Blowdown- Piping is to be blown clean from any foreign material and debris

Purge with Nitrogen – As required by the NYC FGC Section 406 or equivalent NYS code requirement

Pickle/Odorize – If Odor Fade is suspected or the building meets the criteria described above then the house piping must be pickled by a professional contractor and in line with the appropriate Building Code requirements prior to gassing in. Check with the local AHJ on permit requirements.

All OQ requirements to work on jurisdictional piping and Gas Qualification from the AHJ must be followed

It is recommended that the design of risers seeing minimal natural gas flow incorporate an approved and permitted constant burn appliance at the end to induce flow in otherwise low flow risers

If pickling/odorizing of the internal piping is required please follow the checklist below:

Odor Fade / Plumber Checklist

- **Phase 1 Con Ed to purge for 24 hrs. (2-12-hour days):**
  - Con Ed will introduce gas for 24 business hours to help correct odor issue on customer piping. If after 24 hours the odor fade still exists Con Edison will shut down and isolate the affected areas and continue with Phase 2 after communication with the building owner and/or plumber.

- **Phase 2 Con Ed to introduce gas for additional week (5 days / 12 hours per day)**
  List of information needed at this time to move forward:
  - Riser diagram / # of apartments per riser (Occupancy on Avg.)
  - Number of floors in building
  - Occupancy detail of the building, end use equipment, seasonal use?
  - Is there a constant burn device at the end of any riser? If yes, please supply additional information.
  - Letter of agreement for reimbursement of Con Edison accommodation billing rate
  - For occupied apartments building is required to turn off Appliance valve at stove, disconnect and plug the same. Plumber to provide affidavit of apartments locked off.

  If after the week of introducing gas and the odor fade still exists Con Edison will shut down and isolate the affected area and continue with Phase 3 after the developer/building owner and/or plumber have secured a third-party vendor to assist with the further conditioning of the affected piping.

- **Phase 3 Con Ed to assist Third party vendor with pipe odorization / pipe treatment**
  - Piping has been cleaned and any debris blown out followed by a Nitrogen purge done by the licensed master plumber.
  - An active NYCDOB/AHJ permit is required to perform this work.
  - Require FDNY / City Agency review
  - Con Ed to determine whether insurance sufficient (Legal)
    - Con Ed to be added to owner/developer insurance policy at full limits.
  - Certificate of insurance
  - Insurance to be primary and non-contributory, with waiver of subrogation.
  - Gas Accommodation Letter / Accommodation work request
  - written plan by the third-party vendor and plumber to be approved by Con Edison
  - Hold Harmless letter
  - Threshold needed to be met for adequate odorant at furthest appliance on riser as measured by Con Edison Odorator machine (.25-.5 reading)

When working with Natural Gas the following should be followed:

When existing gas piping has been removed from service for repairs or new piping has been installed, the affected section of piping must be cleaned[i] and purged with an inert gas prior to gassing in by Con Edison. All applicable safety and local codes must be followed when purging a line with an inert gas.

DO NOT purge the contents of a gas line into a confined space. Any purging of a gas line with an inert gas or natural gas should be done by venting the contents to the outside atmosphere away from potential ignition sources and people.

Always use gas detection equipment (combustible gas detector) during purging operations or when otherwise working on or around gas piping systems.

DO NOT rely on your sense of smell alone to detect the presence of natural gas.

Consult the National Fuel Gas Code (NFPA, Chapter 8), local Authority Having Jurisdiction codes, New York City Fuel Gas Code in NYC (Section 406 Inspection Testing and Purging), and all applicable laws and regulations for additional purging requirements, when purging a line with natural gas and/or an inert gas.

When installing gas appliances or equipment, the manufacturer's instruction manual should be followed in accordance with the applicable national, state, and local codes.

Please be advised that Con Edison provides this information solely as a service. You are responsible for working safely and understanding and complying with all applicable laws, regulations, and safety provisions when working on or near natural gas piping and equipment.

If an odor fade condition is suspected, call Con Edison immediately at 1-800-75-CONED (1-800-752-6633).

Important:

- Follow safe and code compliant plumbing practices.
- In NYC the purging of piping shall be in accordance with Sections NYC FGC 406.7.1 through 406.7.3

[1] Follow safe and code compliant plumbing practices.

0. NATURAL GAS DETECTORS:

Con Edison will be installing Natural Gas Detectors to help enhance gas safety in the communities we serve.
The Natural Gas Detector is a free device that monitors the air in the area where Con Edison's gas service pipe enters a customer's home or building.
If levels of natural gas indicate a potential leak, the Natural Gas Detector will beep loudly and sound the following audible alarm: “Danger. Gas leak explosion risk. Evacuate, then call 911.” It will also send an alert to Con Edison. Con Edison and the fire department will then respond and investigate. The alarm will continue to sound until Con Edison arrives and silences the unit.

For more information, please visit: https://www.coned.com/naturalgasdetector

SECTION 3 – Gas Pressure Regulator Equipment

A gas service line to a customer includes equipment to reduce the pressure from distribution pressure to the pressure required by the customer. Such equipment is specifically sized to meet the customer's needs. Con Edison will furnish the gas service regulator(s) for the installation of the regulator by the customer's licensed master plumber. Con Edison may install any regulator instrumentation lines. Where design conditions require external control piping or pilot regulators, only qualified Con Edison personnel (i.e. Gas Pressure Control) shall perform the installation.

A. General Installation Requirements:

NOTE: Services fed from Con Edison's low pressure distribution systems, which operate below twelve inches (12") WC, do not require gas pressure regulator equipment.

The following provisions apply:

- Delivery pressures to individual living spaces within multi-unit residential buildings shall not be greater than 7″ WC (¼ psig).
- If the customer is supplied from the Con Edison low pressure gas system and requires a higher pressure than the Con Edison gas system pressure providing service, the Customer may request Con Edison Gas Engineering approval for using a gas booster. If approved, the gas booster shall meet the requirements in **Gas Specification G-2040 "Requirements for the Installation of Gas Boosters, Micro-Turbines and Associated Protective Devices." In all other cases where Con Edison can provide the Customers required** delivery pressure **through the use of gas regulators,** on the Con Edison medium, intermediate, or high-pressure gas system, **then** gas boosters are not allowed.
- If the Customer is supplied from the Con Edison medium, intermediate or high-pressure gas system and requires higher pressure than the normal delivery pressure, elevated delivery pressure is required.
- Con Edison's delivery pressures to all customers are always as low as reasonably allowable.
- If a Customer requires elevated delivery pressure, documentation from the manufacturer of the equipment requiring elevated delivery pressure is required with the customer's load letter.
- Increments of elevated delivery pressure are 1/2 psig (14″ WC), 1 psig, 2 psig, and one psig increments thereafter.
- Refer to **Gas Drawing EO-17118, "Regulator Vent Installation"** for regulator vent requirements including sizing, location and tagging.
- If multiple meters and/or regulators are installed, refer to **Gas Specification G-703,** "**Requirements for Branch Lines Supplying Multiple Regulators and/or Meters"** for valve and pipe size requirements.

Normal Delivery Pressure

For Con Edison low pressure gas system customers, this pressure is a minimum of 4 inches of water column (WC). **Higher pressure will not be provided to compensate for inadequately sized customer fuel lines**. Exceptions to the 4 inches WC may be warranted for commercial or industrial customers who can demonstrate special fuel pressure needs and if no other reasonable alternative exists. Higher delivered pressure requires the prior approval of the company. In such cases, the customer shall provide written documentation on equipment specifications and fuel requirements.

B. Con Edison System Elevated Delivery Pressure:

Medium and High Pressure - For medium and high gas pressure system customers, this pressure is 5″ WC to 7″ WC (¼ psig).

Elevated Delivery Pressure - A Con Edison delivery pressure greater than 7″ WC (¼ psig) used by customer equipment.

C. Available Delivery Pressure

Elevated delivery pressures are available according to the gas main system operating pressure. Con Edison will determine the method of supply based on supply system capabilities.

- The minimum elevated delivery pressure is 1/2 psig (14" WC).

  In New York City, per NYCFGC Section 402.6, no gas distribution piping containing gas at a pressure in excess of 1/2 psig shall be run within a building for residential usage

Exceptions:

- Pressure not exceeding 5 psig (34.5 kPa gauge) is permitted for: commercial and industrial occupancies where fuel requirements for appliances exceed 4,000 cubic feet per hour (113.2 m3/h) and such large volume use is supplied through separate gas distribution piping.

- Gas pressure not exceeding 15 psig (100 kPa gauge) is permitted for appliances in excess of 100,000 cubic feet per hour (2830 m3/h) provided the gas distribution piping is installed as provided for in NYCFGC Section 404 and Appendix G are met.

- The use of pressure in excess of 15 psig (100 kPa gauge) shall be permitted for distribution piping provided all of the requirements of Section 406 and Appendix G, “High Pressure Natural Gas Installations” are met and subject to NYC Fire Department approval and sign-off.

- Inside gas meter piping operating at a pressure in excess of 15 psig shall comply with tNYCFGC Appendix E, “Meters and Gas Service Piping,” Section E.2.1.

- Dedicated gas piping is required for a combined heat and power (CHP) system that uses high-pressure gas. This is to prevent accidental tapping into an elevated pressure pipe that has other uses, such as domestic applications that operate at a lower pressure. Plans for such application shall have both NYC Building and FDNY approval.

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D. Requirements for Buildings in Flood Zones:

For buildings in flood zones with industrial meter sets or elevated pressure gas regulators, vent lines should be elevated so the terminus is 3’ above the FEMA base flood elevation (BFE). If this is not feasible, a Vent Line Protector (VLP) shall be installed on the vent line to prevent water intrusion.

- Refer to Gas Specification G-8217, “Flood-Prone Areas for the Installation of Gas Service Regulator Vent Line Protectors (VLP’s)” for location listings (by M&S Plate) where water intrusion protection devices shall be installed on vent lines of elevated pressure gas services in Category 3 hurricane flood prone areas.

- For those areas not listed in Gas Specification G-8217 where there is a potential for exposure to severe water or flooding, a water intrusion protection device should be considered for installation to prevent blocking of the service regulator vent line at Con Edison's discretion.

- All outside regulators and the outside terminus for inside service regulators shall have an approved vent line cap (peck vent) or water intrusion protection device aka vent line protector (VLP).

- Each Water Intrusion Protection Device shall:

    1. Terminate outdoors with VLP facing downward.

    2. Be weather and insect resistant.

    3. Not be covered or obstructed in any way that would prevent or interfere with the operation of the gas regulator.

    4. Have a minimum clearance of eighteen inches (18") from the final outdoor grade to the lower end of the protection device.

- Refer to Gas Specification G-699, "Installation and Inspection of Gas Service Regulator Vent Line Protectors (VLPs)" for proper sizing of device and properly matched 90 deg. elbow and pipe strap.

SECTION 4 – Gas Meter Equipment

The company reserves the right to designate or approve all gas meter locations. The size of gas metering and regulating facilities varies widely depending upon the gas-load needs of different commercial and industrial businesses. Due to the many determinants associated with meter and regulator selection, it is imperative that the Customer, or the Customer's agent, contact the assigned Con Edison Representative in Energy Services early in the projects engineering design phase to determine the exact requirements for specific gas meter installations, including meter location and space requirements. Gas meters and gas service regulators shall be selected by the Gas Measurement Section based on information provided by the customer or the customer's agent. Consulting with Con Edison early in the process may eliminate the need for changes to the gas metering facilities at a later date at Customer expense.

Installation of a gas meter(s) inside a building requires waiver approval by the company prior to a customer's gas line installation. If a waiver for an inside meter installation is granted, the meter shall be located as **near** as practical to the point of entry of the gas service in an area meeting venting and building code requirements of the local authority having jurisdiction. The gas service line valve (Head of Service Valve) shall be in an accessible location and **within 2 feet from the point where the gas service enters the building**.

Meters and Regulators are NOT to be located in a separate room from the Head of Service valve. Rotary meters should always have a screen in accordance with all applicable drawing(s).

Gas Specification G-48 – Gas Metering and Service Regulator Sizing - is provided for reference only. All projects must have a final equipment ruling from Con Edison before Meter Set Design and Construction Begins

The meter location shall be clean, dry and free of refuse, steam or chemical fumes and located not less than 3 feet from any source of ignition or any source of heat which might cause damage to the meter. Meters shall be adequately protected against extreme cold or heat and shall be readily accessible for reading and inspection. The area in which the meter is located shall be properly ventilated in accordance to local building codes.

For NYC consult Appendix E, Section E.4 of the NYC Fuel Gas Code for venting requirements. For Westchester check with local Authority Having Jurisdiction Venting Requirements.

For residential meter installations at apartments, condominiums, cooperatives and townhouses, as well as for certain commercial installations, gas meters are often "ganged" at a meter manifold at one location on the building. Allowance shall be made in the design of the building to provide adequate space to install multiple meters. Horizontal and vertical distances are defined per applicable Con Edison gas meter and regulator drawing(s). The location shall be reviewed with, and approved by, a company representative prior to scheduling the installation.

Applicants should consult Section 7 for specific gas meter specifications and drawings which provide dimensional and physical details of standard gas meter installations. For further information please contact your company representative.

A. Approved Locations for Gas Metering Equipment and Waiver Guidelines

For One to Three Family Homes gas will be supplied through outdoor metering and regulators. For all other buildings each meter and service regulator on new and replacement service lines must be installed outside of the building, unless it is impractical or unsafe to do so. All indoor installation waiver requests must be submitted to and approved, in writing, by Con Edison. The following describes the Con Edison policy regarding requesting a waiver for the Gas Tariff requirement that gas meters be installed in an outdoor location. Requests for a waiver may be made on buildings according to the following guidelines:

Submitting Waiver Request related to Con Edison Gas Metering Location:

To request a waiver, the Customer should submit:

1. Outdoor Waiver Form – See Appendix, Exhibit J
   Including reasons for the waiver (refer to criteria list below).

2. Plot plan of the building if available for existing buildings, required for new buildings.

3. Plan/Instructions for providing Con Edison representatives 24/7 access to gas metering facilities.

Below are Waiver Guidelines for gas metering locations associated with New Business, Major Renovations, and Oil-to-Gas Conversions in addition to planned gas service replacements.

- Local building codes impede outside metering location (e.g. zoning).
  (Must Indicate Designation_____)

- Landmarks Preservation Commission Status - Landmark and Historic District façades.
  (Must provide documentation)

- Space constraints or physical barriers impede outside metering location.
  (E.g. building line/property line same, emergency egress or ADA compliance)

- Security designation, sensitive buildings/structures designated by official agencies.
  (Must provide documentation from issuing agency)

- Customer refuses to provide consent for outdoor metering, and agrees to pay for any required inspections;

  An inspection fee for an indoor meter and service line piping will apply unless the inspection is performed pursuant to another inspection program.
  (e.g., NYC Local Law No. 152, Periodic Inspection of Gas Piping System)

  4 family and greater: $358.62
  (See Gas Tariff Leaf 44 effective 2/1/2017)

Notes:

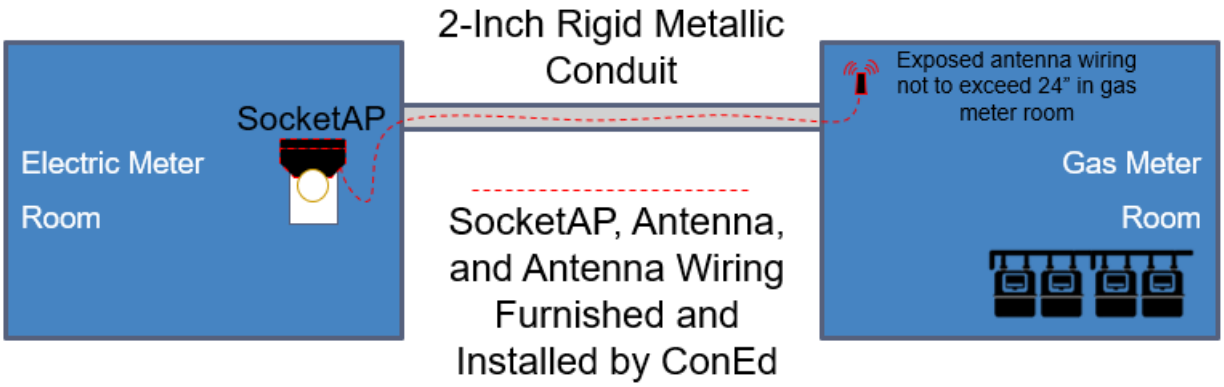
A. Installation of gas service regulators and metering associated with a high-pressure gas service is not subject to the above exemption criteria and will be located outside unless unsafe or impractical to do so and will be assessed on a case-by-case basis. Upon Gas Engineering High Pressure designation, Con Edison will conduct an additional Project Case detailed review and analysis to including safety and practicality for an outdoor location.

B. Installation of inside meters will be as near as reasonably practical to the point of service line entrance (exterior wall) and requires plan for 24/7 accessibility for Con Edison.

C. Waiver requests for outdoor meter locations are not required when construction is in progress and/or when NYC DOB plan-sets are Pre-Filed prior to February 1, 2017.

D. Active building construction and buildings with final DOB approvals will proceed as-designed.

E. For new Construction Only, installation of inside meters, within buildings of at least 50,000 Gross Square Feet and/or 5 stories tall, requires a 2" fire sealed, proofed and approved conduit from the closest electric meter room to accessible location in the gas meter room. The conduit shall be reserved for Con Edison's use for meter communications. Conduits must be installed as required by local building code and all other requirements by the authority having jurisdiction.



F. Meters must communicate with each other and, ultimately, to access points (AP) or socket access points (Socket APs) using a mesh radio frequency network. All Socket Access Points (Socket AP) act as the communications link to transfer meter data back to Con Edison.

a. Outdoor Installations:

1. Gas meters and associated equipment installed outdoors that may be subject to vandalism as determined by Con Edison, must be protected by a 6 feet high lockable fence, chain-link or equivalent. The fence must be equipped with a double hasp lock to allow access by Con Edison and the customer.
2. All outdoor industrial sets must be protected by a 6 feet high lockable fence, chain-link or equivalent. The fence must be equipped with a double hasp lock to allow access by Con Edison and the customer.
3. Gas meters, regulators and associated gas piping that may be subjected to vehicle damage must be adequately protected. Pipe posts or bollards shall be installed by the customer. Certain installations may require more substantial protection at the discretion of Con Edison.
4. Gas meters may be placed to within one foot under, over or to either side of an electric meter.
5. Although not desirable and should be avoided, gas meters may be placed under windows provided no other suitable location is available.
6. Gas regulator vent pipes must be placed at the greatest horizontal distance and a minimum of 18-inches where practical, from any opening which would allow vented gas to enter the building.
7. Installation of a gas service regulator vent line protector (VLP) is required on new and existing gas service regulator (indoor and outdoor) vent outlet terminus.

b. Indoor Installations (Requires Waiver and Approval):

1. After written approval from Con Edison has been received, the indoor meter must be installed as near as practicable to the point of entrance of the gas service pipe.
2. Gas meters, regulators and associated gas piping that may be subjected to vehicle damage must be adequately protected. Pipe posts or bollards shall be installed by the customer. Certain installations may require more substantial protection at the discretion of Con Edison.
3. Gas meters **may not** be placed within three feet (3') of either side of an electric meter. Gas meters may not be placed under or above an electric meter. If field conditions prevent the obtaining of the 3-foot clearance required, it is permissible to erect a barrier between the electric and gas meters provided all other normal clearances for gas and electric meter installations are met. The barrier should be a permanently fixed, fire resistant partition or wall such as 3/8-inch sheetrock on either side of a frame made from 2-inch x 3-inch lumber, extending from floor to ceiling and 24-inches out from the wall. Other materials may be accepted but must be submitted to the company for approval before erecting.
4. In a meter room or other space that is adequately ventilated, dry and free from corrosive vapors, not subject to extreme temperatures or to extreme temperature variations.
(See ventilation requirements for large general, mix-used buildings as per 2014 NYC Fuel Gas Code, Appendix E).
5. Gas meters must be kept way from flues, un-insulated steam pipes or other sources of heat in boiler room.
6. Gas meters are to be installed in an accessible location in accordance with the requirements of Con Edison and the Authorities Having Jurisdiction (AHJ). A clear space, as designated by Con Edison, shall be provided around this equipment.
7. Installed at a horizontal distance of at least ten feet (10') from the cellar termination of a stairway. Where the width of the building is such that the required ten-foot distance cannot be obtained, the maximum distance practicable from such stairway termination shall be maintained and suitable protection may be required.
8. At a clear distance of at least five feet horizontally or vertically from any high-pressure tanks containing liquid or gas, or combination thereof, under a pressure in excess of 15 psig.

c) Prohibited Locations for Service and Metering Equipment Outdoors and Indoors:

Service head valves, meters, pressure regulators, and associated equipment shall not be located:

1. In a designated boiler or fire pump room of a multi-family or commercial building.
2. Gas meters may be not be installed within three feet (3 ft.) of sources of ignition including burners, electric panel boxes or machinery.
3. Where they could become a hindrance, obstruction or exposed to mechanical damage.
4. In sleeping quarters, toilets, bathrooms, washrooms, unventilated closets, stairways and stair landings.
5. Indoors on walls of elevator or dumbwaiter shafts, over doorways.
6. Under water pipes or other pipes which may be subject to sweating.
7. In any recess or enclosure unless its design and location have been approved by Con Edison.
8. Gas piping shall not be installed within six inches of electric meter equipment.

Relocation of existing gas meters located WITHIN a tenant space.

- The customer at their expense may relocate an existing gas meter from the tenant space to an approved location within the building or to an approved outside space.
- Whenever an existing gas service riser is shut down and needs to be replaced the customer at their expenses must relocate the existing gas meters from the tenant space to an approved location within the building or an approved outside space.
- Whenever a building is going to undertake a major renovation where the gas piping systems are going to be replaced the customer at their expense must relocate the existing gas meters from the tenant space to an approved location withing the building or to an approved outside space.

Notes:

Where gas is supplied to 12 or more apartments, a master meter and regulator set, consisting of a twin set of meters and a twin set of regulators shall be installed. Follow Gas Specification G-48 section 6.2 referenced in this book.

The customer at their expense shall install an approved gas meter(s) as listed in the appropriate specifications in this book.

If individual gas meter(s) are replaced it shall be the responsibility of the individual meter account holder to close out their existing gas meter account.

Please contact Con Edison for further guidance on the location of the meters and the applicable rate.

d) General Installation Requirements:

1. Where the customer's high-pressure gas service requires a gas meter room it is the responsibility of the applicant (customer agent, architect, professional engineer, project manager) to meet the local municipal building and fire code. Documentation of an accessible sign off from the authority having jurisdiction shall be required prior to installing gas meter equipment.
2. The Customer shall provide at all times a clear passage for deliveries and removal of gas meter(s) to a gas meter location in a building. For those instances where large gas meters are required the customer shall provide elevators, lifts or ramps of adequate strength and openings of adequate size for the passage of gas meter(s).
3. When facing the piping for a gas diaphragm meter, the gas service riser should be to the left and the Customer owned piping to the right of the meter. For rotary gas meters, refer to applicable gas meter drawing specifications.
4. **Existing Gas Meter Installation/Replacements and Upgrading**
    - Whenever gas is interrupted to any existing gas service or individual gas meter and there is no gas meter bar installed the customer at their expense shall install an approved gas meter bar as listed in the appropriate specification of this book
    - Whenever gas is interrupted to any existing gas meter and the entire gas line is to be replaced the customer at their expense shall replace the existing gas meter bar with an appropriate gas meter bar as listed in the appropriate specification in this book.

- Whenever gas is interrupted to any existing gas meter and the line is subject to repair or modification the Company may require the customer at their expense to replace the existing gas meter bar with an approved gas meter as listed in the appropriate specification(s) in this book. The Company will make that determination when the ruling for the case is issued to the customer's licensed master plumber. If a minor repair is completed under the emergency procedure and gas is inspected, tested and restored by company personnel the gas meter bar need not to be replaced.
- Whenever gas is interrupted to any existing gas meter and the gas piping system is subject to only an integrity or pressure test the Company will not require the customer to replace the existing gas meter bar. Check with the local AHJ and permit requirements on the replacement of existing appliance valves when required.
- All bypass meter bars are to be properly supported. It is the responsibility of the installing contractor to install plugs or caps on any open-ended pipe or fitting on any gas installation to ensure the integrity of that system. This includes plugs on both the line and load side of the gas meter bar.
- Al of the work listed above requires the individual working on utility jurisdictional piping to be DOT Task 87 OQ qualified. All gas meter bars must be properly supported and installed withing the guidelines listed in the appropriate specifications. It is the responsibility of the installing contractor to install plugs or caps on an open-ended pipe or fittings to maintain the integrity of that system. This includes plugs on both the line and load side of the gas meter bar.
- If a gas meter inlet control valve is found closed but not locked it is the responsibility of the licensed master plumber to notify the utility immediately and wait on site to provide access for the corresponding utility personnel. Please contact Con Edison for further guidance for any additional information. The work scope should be determined prior to commencement of any work.

5. In a building where two or more customers are to be supplied from a single service, the meters should be grouped and located in designated meter room.
6. Information on space requirements for service and metering equipment should be obtained in advance from the company, while building or alteration plans are in the preliminary stage and before any construction work is started.
7. Where more than one service pipe supplies any building or units within a building or premises, no connection shall be made between piping systems on the load side of the meter.
8. Where the customer's service piping supplies two or more buildings, each outdoor branch of the service pipe shall have its own outdoor shut-off and the piping must be catholically protected according to code standards.
9. Supports for pressure regulators and meter piping shall be securely fastened in a manner acceptable to Con Edison. Con Edison will not accept nails, wood plugs or dowels as a means of fastening such supports.
10. If multiple meters and/or regulators are installed, refer to Gas Meter Specification G-703, Titled "Requirements for Branch Lines Supplying Multiple Regulators and/or Meters" for valve and pipe size requirements.
11. For Utility Jurisdictional piping only. Galvanized piping and fittings in existing installations will be allowed to remain only if the scope of work does not impact their immediate location. All repair work is to be done in accordance to all Con Edison specifications and subject to all inspections and approvals from the Con Edison field representatives and Authority having Jurisdiction. Galvanized piping is not allowed for new installations on Utility Jurisdictional piping work.

Indoor meter utility jurisdiction is from the POE to the outlet of the meter and may include pipes and fittings that are customer owned. Outdoor utility jurisdiction is to the outside of the foundation wall.
Customer owned piping is everything after the outlet of the gas meter for indoor meters and everything downstream of the foundation wall for outdoor meters.
If a determination of the condition of galvanized piping/fittings is needed (i.e., Corrosion Level), GDS will make the final determination.

New York City (See NYCFGC, Appendix E, Paragraph E.2.1)

Inside gas meter piping operating at a pressure in excess of 15 psig, shall comply with the following;

a) Where such piping is greater than 4 inches in diameter, the meter piping shall be installed in a properly ventilated meter room of three (3) hour fire rated construction.

b) The maximum distance * measured from the outlet service head valve to the farthest regulator that reduces the pressure to below 15 psig shall be limited as per Table 1:

Table 1

Service Line Valve Size	Maximum Distance (Linear Feet of Pipe)
Through 2-Inch Pipe Size	4 Feet
Over 2-Inch through 4-Inch Pipe Size	8 Feet
Over 4-Inch through 8-Inch Pipe Size	15 Feet
10-Inch Pipe Size and Larger	20 Feet

NOTE: Measurement to be taken in linear feet of pipe (including elbows and offsets) from the outlet of the service head valve to the inlet of the farthest regulator. In the case of industrial type regulator installations (i.e. parallel runs of two stages of regulation), the measurement shall be taken to the inlet of the farthest second stage regulator.

c) Where these maximum distances cannot be met, refer to Table 2:

Table 2

Footage (Linear Feet of Pipe) In Excess of Above Requirements	Additional Requirements
Up to 5 Feet	The meter room shall have 3 hour fire rating construction and adequate ventilation.
Over 5 Feet through 10 Feet	Above requirements plus a combustible gas detection alarm system.
Over 10 Feet through 15 Feet	Above requirements plus controlled inspection by the customer or his representative as required by the New York City Building Code.
Over 15 Feet through 20 Feet	Above requirements plus explosion venting per NFPA 68 and NFPA 69 or alternative ventilation acceptable to the Commissioner and automatic shutoff devices.
Over 20 Feet	Above requirements plus suitable fire protection as approved by the Building Commissioner.

NOTE: In new gas installations made in existing buildings, the above requirement shall be used to the extent feasible. Alternative designs may be considered, approved and certified by the Office of the NYC Building Commissioner.

Westchester County

Piping systems inside buildings, in excess of 5 psig shall comply with one or more of the conditions specified in:

a) Section 402.6 of the - “Fuel Gas Code of New York State”.

b) Gas Meter Piping:

In NYC and Westchester County, all meter piping (piping from head of service valve to meter outlet) shall meet the following welding requirements:

Con Edison Meter / Regulator	Type of Drawing	Welding Requirements
308657, 361100, 361571, 361693, 384872, 502164, 514590 and 514486	Industrial	Except for where flanged components are called for, all meter piping (piping from the head of service valve to meter outlet) shall be butt welded. All butt welds from the head of service valve to the regulator closest to meter shall be radiographed. For customer operating pressures exceeding 5 psig, all meter piping shall be radiographed.
507003, EO-16511, 507002	Large Commercial	All meter piping (piping from the head of service valve to meter outlet) greater than 4 inches in diameter shall be welded. Elevated delivery pressure piping shall be radiographed.
EO16390, 514789	Turbine, Low Pressure	All meter piping (piping from the head of service valve to meter outlet) shall be butt welded.
All other meter and regulator drawings	Residential / Small Commercial	None.
G-703	Multiple Meters and / or Regulators	Meet the welding requirements for the specific Con Edison meter/regulator in this Section.
If meter piping (piping from the head of service valve to meter outlet) **not** requiring welding by Con Edison is welded by Customer, it shall be pressure tested in accordance with the Yellow Book, Section 2H to ensure the adequacy and safety of meter piping.		

c) Identification of Customer's Piping:

In buildings where two or more customers are to be served from a single gas service, the portion of the building supplied through each meter must be permanently identified at the gas meter. In multi-tenant buildings, the designation at each meter shall be the same as the permanent designation of the apartment, store, office, or loft etc. which the gas meter serves. Stenciled letter characters ¾-inch to 1½-inches in height is recommended.

d) Aesthetics:

Outdoor gas metering is a requirement. Con Edison understands that maintaining an aesthetically appealing exterior is critical for builders, developers and residential customers, where a new buyer's decision between similar homes can be decided on curb appeal. Energy Services will work with builders, developers and gas customers by assisting in the selection and planning of the layout of gas metering equipment.

The specifications for outdoor gas meter and regulator installations allow for low profile installations with a few restrictions. Customers can install a gas meter a minimum of six inches from the bottom of the meter to finished grade. On a meter installation with a gas pressure regulator, installation requires a minimum finished grade clearance of 18 inches between the gas meter and the relief vent outlet terminus.

Painting of the equipment is allowed if the meter dials, vent screen and relief device of a regulator are maintained free from paint.

Screen the metering equipment with shrubbery, a fence or a trellis.

The option is available to enclose the gas meter and regulator equipment in a meter closet or a cabinet.

Enclosing the equipment is possible as long as it remains properly ventilated and the spacing requirements are maintained. Consult with a Customer Service Representative in the planning stage and prior to purchasing and/or installing an enclosure.

The Company reserves the right to require:

- Protective enclosures (typically a fence), if warranted by the physical conditions of the site.
- Concrete pad (for certain larger meter installations).
- Free-standing support bracket, if not able to attach the company's equipment to the building wall.

When a fence is required, it shall be provided with a 6' high lockable fence, chain-link or equivalent. The fence shall be equipped with a double hasp lock to allow access by Con Edison and the customer. In lieu of the chain link fence, the customer may provide another form of suitable enclosure if approved by the company. The customer is responsible for keeping the area within the enclosure readily accessible and free from debris, weeds, brush, snow, etc.

e) Gas Meter Seals:

Gas Meters and associated equipment are sealed and/or locked to prevent tampering. No persons, except a duly authorized employee of Con Edison, shall be permitted to break or replace a seal or lock, or to alter or change a meter, its connections or location, or to alter a gas pressure regulator.

f) Removal of Con Edison's Equipment during Building Alteration:

When necessary for building alterations and upon suitable advance written notification to the company, Con Edison will shut off service and remove meters and pressure regulators to protect them from damage and to expedite such alterations. Meters and pressure regulators shall be re-installed under conditions governing new installations.

g) Demolition:

No building demolition shall commence until Con Edison's meters and regulators have been removed and the gas service has been cut off outside of the structure to be demolished.

h) Installation of Gas Service Regulator Vent Line Protection Device:

Water intrusion protection devices shall be installed on vent lines of gas services designed at elevated pressures (new and existing) installed within Category 3 hurricane flood prone areas. Refer to **Gas Metering Specification G-699** titled **"Installation and Inspection of Vent Line Water Intrusion Protection Devices"** for installation requirements. Refer to **Gas Engineering Specification G-8217** titled **"Flood-Prone Areas for the Installation of Gas Service Regulator Vent Line Protectors (VLP's)"** for location tables listing the current designated flood-prone areas (By Gas M&S Plate).

NOTES:

- Where the installation of a VLP is impractical, the vent shall be raised to a minimum of three feet (3') above the Base Flood Elevation (BFE) provided on the Federal Emergency Management Agency (FEMA) maps.
- In areas outside of Category 3 hurricane flood prone areas where there is a potential for exposure to severe water and/or flooding, a water intrusion protection device will be considered for installation to prevent blocking of the gas service regulator vent line at Con Edison's discretion.

- Each water intrusion protection device shall:
  i. Be weather and insect resistant.
  ii. Not be covered or obstructed in any way that would prevent or interfere with the operation of the gas service regulator.

i) Commercial & Industrial Customer Equipment Interaction with Con Edison Gas Regulator & Gas Meter:

The following types of Customer boiler and generator equipment are known to have an adverse effect on Con Edison's gas regulator and meter with possible safety and billing implications:

- High efficiency modulating boilers
- High efficiency boilers
- Any equipment with negative pressure combustion systems
- Pulse boilers
- Any equipment with solenoid and/or snap acting valves that shuts down immediately
- (Quickly) instead of modulating or ramping down
- Any equipment with equipment control system that shuts down immediately (or too quickly) instead of modulating or ramping down
- Any equipment using spark ignition

If the Customer installs any of the above types of equipment, valves, or controls, the Customer must do the following to ensure that Con Edison's regulators and meters operate correctly and safely:

1. If equipment manufacturer's literature requires or recommends the installation of additional regulators, governors, control valves or other devices, they shall be installed per the manufacturer's recommendations for each piece of equipment. The equipment shall be installed using the piping sizes recommended for the equipment.
2. If equipment manufacturer recommended regulators, governors, control valves or other devices do not correct issues that impact the operation of Con Edison's regulator or meter, the manufacturer's representative shall be consulted. The Customer will work with the equipment manufacturer and configure the equipment as necessary to ensure that it does not adversely affect the operation of Con Edison's gas regulation and metering equipment.
3. If Con Edison deems that their regulators and meters are working properly, it is the customer's responsibility that their equipment works with Con Edison'
4. If the above actions do not correct adverse interaction with Con Edison's regulation and metering equipment, Con Edison will shutoff and safety tag equipment until corrected. Any expenses incurred above are at the Customer's

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Reserved for future use.

SECTION 5 – Distributed Generation (DG)-New Technology

Combined Heat and Power Technology uses one fuel source to simultaneously produce both heat and electricity using highly efficient systems. Energy is supplied in the form of electricity, heat and hot water. This can produce savings and can cut the amount of energy needed from a utility company. CHP systems also improve our environment by lowering the demand on New York City's and Westchester's electrical grid – helping local power plants be more efficient by reducing our carbon emissions. While CHP systems may use a variety of fuel or renewable sources, this guide addresses turbines and reciprocating engines which use natural gas to generate electricity. Turbines and reciprocating engines capture waste heat, but they generate electricity differently. A mechanical engineer skilled in CHP systems can recommend the appropriate system type for a specific building. **It is recommended that you do not purchase any CHP equipment until a complete evaluation has been made.**

A. Fuel Source and Pressure:

This guide only addresses CHP systems that utilize natural gas as the fuel source. Some cogeneration systems require elevated gas pressure to operate efficiently. Different zones within the City are supplied with different pressure, and different city agencies have varying standards for what constitutes high-pressure. The infrastructure investment required to deliver adequate volumes of natural gas to your building may make a CHP system impractical.

A CHP system which uses high-pressure gas requires dedicated gas piping to prevent accidental tapping into an elevated pressure pipe that has other uses, such as domestic applications that operate at a lower pressure. Plans for such application shall have both NYC Building and FDNY approval. Refer to the New York City Construction Codes, the New York City Fire Code, and the rules and regulations of the New York City Department of Environmental Protection for complete information. Consult with a New York State licensed professional engineer with expertise in CHP systems if you are unclear on how to proceed

B. Installing a Natural Gas-Fueled CHP System:

Con Edison's Energy Services website provides the resources necessary to process requests for new, additional, removal or relocation of gas service provided by Con Edison. Customers can also access existing requests through the Project Center. Con Edison will assign a Customer Project Manager (CPM) to the application. The CPM will act as the single point of contact throughout the permit process. A gas customer should expect the following steps:

1. Notification: Con Edison must be notified before the purchase of a CHP unit by the Customer or his/her Agent
2. Load Letter: Developers are now required to complete the load information screen in project center
3. Gas Specifications: Con Ed will inform the applicant of the required gas specs to follow for service.
4. Planning Group Meeting: All parties involved should meet to discuss all construction aspects of the project. Timelines and milestones should be agreed upon by all parties
5. CPM Follow-up: The CPM will follow up with the owner, consultant and contractor with a complete package so the project can be worked.
6. Gas Meter Authorization: The CHP unit requires a dedicated gas connection line, and a separate meter is necessary to apply for the Cogeneration Rate.
7. A Department of Buildings' gas authorization is required for all new gas meters and associated piping.

SECTION 6 – Customer Responsibility

General – Customer Piping Adequacy and Safety of Installation

Con Edison reserves the right to withhold service or discontinue service until the Customers shall have been authorized by the authorities having jurisdiction over the same; and the Con Edison further reserves the right to withhold its service, or discontinuance its service, whenever such installation or part thereof is deemed by the Con Edison to be unsafe, inadequate, or unsuitable for receiving Con Edison gas service, or to interfere with or impair the continuity or quality of the Con Edison service to the Customer or to others. Con Edison has a "warning tag" procedure in accordance with 16 NYCRR Part 261 Piping beyond The Meter, to cover hazardous conditions found on a Customer's premise. It is the Customer's responsibility to correct such deficiencies before a gas service will be restored.

A. Liability:

1. **Continuity of Supply:**
   Con Edison will endeavor at all times to provide regular and uninterrupted supply of service, but in case the supply of service shall be interrupted or irregular or defective or fail from causes beyond its control or through ordinary negligence of employees, servants or agents Con Edison will not be liable therefor. Con Edison may, without liability therefore, interrupt service to any Customer or Customers in the event of emergency threatening the integrity of its system if, in its sole judgment, such action will prevent or alleviate the emergency condition.

2. **Customer's Equipment:**
   Neither by inspection or non-rejection, nor in any other way, does Con Edison give any warranty, expressed or implied , as to the adequacy, safety, or other characteristics of any structures, equipment, wires, pipes, appliances or devices owned, installed, or maintained by the Customer or leased by the Customer from third parties.

3. **Company Equipment and Use of Service:**
   Con Edison will not be liable for any injury, casualty or damage resulting in any way from the supply or use of gas or from the presence or operation of the Company's structures, equipment, wires, pipes, appliances or devices on the Customer's premises, except injuries or damages resulting from the negligence of the Company.

4. **Selection of Service Classification:**
   Con Edison will endeavor to assist a Customer in the selection of the Service Classification which may be in most favorable to the Customer's requirements, but in no way can Con Edison make any warranty, expressed or implied, as to rates, classifications or provisions favorable to the future service requirements of the Customer.

B. Repairs after the Indoor Meter - Leakage of Gas / Warning Tag Condition:

The customer shall give immediate notice to Con Edison of any leakage, damage or escape of gas. When a hazard, gas leak, condition involves the customer's gas piping and/or equipment is found, our mechanic will disconnect, shut off the effected gas piping/equipment. When the owner or no other occupant will provide signature to the warning tag, Con Edison shall communicate a written follow-up letter describing the condition, which must be corrected/repaired to the billing customer.

The letter will explain what is needed on the Customer's part to restore gas service. Alterations, repairs and the gassing-in of the affected gas piping and equipment are to be made by a qualified gas equipment service company and/or a licensed plumber. Con Edison recommends the customer contact us for a safety inspection to verify the repair and that no further action is required.

1. Corrosion Inspections - Interior gas service line is subject to periodic utility and NYC inspection. Con Edison has updated its warning tag to identify level of corrosions and requirements. The utility inspection covers the piping from the Head of Service Valve to the meter. Under NYC Local Law LL152 NYC inspections of interior gas piping will be required for dwellings with the exception of R-3 occupancy buildings. Always check current NYC and AHJ requirements for corrosion inspections. All corrosion repairs before and after the meter require permits and Gas Authorization for service restoration from the permitting authority. Work on Utility Jurisdictional piping to be done by Licensed Master plumber with OQ Task 87.

C. Gas Booster and Jeweler Torch Safety – May Induce Back-Pressure and Suction:

1. **Scope**

When the nature of the customer's utilization equipment may induce back-pressure or suction in the piping system carrying Con Edison's gas supply, the customer shall install suitable protective devices, follow the manufacturer's installation instructions and be in compliance with the applicable Gas Specification G-2040, "Requirements for the Installation of Gas Boosters, Micro-Turbines and associated system protective devices" for gas boosters and Gas Specification G-2041 for the requirements for the installation of gas utilization equipment that mixes pressurized oxygen with natural gas jewelry torch equipment before gas can be authorized to specified customer equipment.

2. **Gas Booster may produce excessive suction causing gas service "poor pressure" condition**

Excessive suction may be produced if positive displacement type boosters, piston type pumps or centrifugal fan type boosters, which are capable of developing pressure 4-inch water column or more, are started with the meter inlet or service valve closed or restricted. In such installations check valves and a low-pressure electrical switch, which will stop the pump or booster, shall be installed.

For gas booster installation requirements refer to Gas Specification G-2040, "Requirements for the Installation of Gas Boosters, Micro-Turbines and associated system protective devices".

Where the installation of the low pressure gas switch near the gas service point of entry is impractical or prohibitive due to the location of the gas service head valve relative to that of the gas booster, the switch may be installed at an alternate location if approved by the booster manufacturer or authorized representative, and the local Gas Distribution Services (GDS) Department. Please consult with your Energy Services Department prior to deciding on where to locate the low pressure gas switch

3. **Where protection is required on jeweler torch**

Protection is required whenever an installation uses pressurized air or oxygen that might accidentally or otherwise cause air or oxygen to enter the gas piping. Whenever air or oxygen is mixed with gas, and the mixing takes place in the usual enclosed type-mixing tee before the burner nozzle, a check valve is required. The check valve must be installed and maintained by the customer/contractor *(See Approved Equipment / Table 24)*. They are to be visible, accessible and located downstream of the meter and as close to the utilization equipment as practical. Torches must have flame arrestors installed in their supply lines. Customer/contractor is to contact Con Edison when this application is to be used.

D. Signage for Multiple Gas Services:

When more than one service pipe supplies any building or units within a building or premises, visible signage shall be provided, installed, and maintained by the customer both inside and outside the building to indicate the location of the other service(s). All signs shall be made of durable, weatherproof material, minimum size 8½" wide x 5½" high. Outside signs shall be permanently mounted on the building directly over or as close as possible to the gas service point of entry and/or curb valve location.

Example Text:

Second Gas Service Located 27 Feet Right of Left Wall on West 57 Street

Second Gas Service Located 34 Feet Left of Right Wall.

Inside signs shall be permanently mounted near each service point of entry, preferably on the

wall over the head of service valve. The wording shall indicate the Street/Avenue from which the service pipe enters, as well as identifiable locations with the building. Example: Second Gas Service Located on Lexington Avenue Side in Storage Room.

The appropriate wording, measurements and location for the signs can be discussed and approved by your Energy Service Representative.

Sample Signage (Installed and Maintained by Customer)

Second Gas Service Located 27 feet Right of the Left Wall On W.57th St**.**	Second Gas Service Located 34 feet Left of the Right Wall

Section 7 - Reference Material

Abbreviations

AHJ	Authority Having Jurisdiction
AGA	American Gas Association
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
BTU	British thermal unit
BTUH	British thermal unit per Hour
CCF	Hundred Cubic Feet
CF	Cubic Foot
CFH	Cubic Foot per Hour
CHP	Combined Heat and Power
CWI	Certified Welding Inspector
DOB	Department of Buildings
DOT	Department of Transportation
kWh	Kilowatt hour
MBTUH	Thousand British Thermal Units per Hour
MCF	Thousand Cubic Feet
MCFH	Thousand Cubic Feet per Hour
MMBTUH	One Million British Thermal Units per Hour
NYCFGC	New York City Fuel Gas Code
PSC	Public Service Commission
PSIG	Pounds per Square Inch Gauge
UL	Underwriters Laboratories
WC	Pressure in Inches of Water Column

Definitions

Appliance
Any device that utilizes natural gas as a fuel or raw material to produce light, heat, power, steam, refrigeration or air conditioning.

Areaway
A space below grade, adjacent to a building, enclosed by walls but open to the outside air.

British thermal unit (Btu)
The quantity of heat required to raise the temperature of one pound of water one degree of Fahrenheit from 58.5 to 59.5 degrees Fahrenheit under standard pressure of 30 inches of mercury at or near its point of maximum density.

Building
A structure that stands alone or is cut off from adjoining structures by firewalls as defined by the municipality or the authority having jurisdiction with no openings or penetrations with doorways to be protected by approved fire doors.

By-Pass
An auxiliary piping arrangement, generally to carry gas around specific equipment or an integral section of a piping system. A by-pass is usually installed to permit passage through the line while adjustments or repairs are made on the section that is by-passed.

Butt-Welding
Type of weld where two pieces of metal are joined by fastening their ends together without overlapping.

Cathodic Protection
Installation of Magnesium anodes, insulating fittings and effective coating on buried steel pipe to minimize galvanic corrosion activity.

Certificate of Inspection
Blue Card: Certification issued by a municipal authority, or any other agency legally authorized to regulate or inspect the customer's installation or equipment.
Affidavit: Certification by a plumber that the required pressure test has been performed for the required time period.

Combustible Material
Any material such as wood, paper, sheet rock, fibers or other materials that will smolder, ignite or burn when adjacent to or in contact with heat producing appliances, vent connectors, gas vents, chimneys o hot water pipes.

Combustion Air
Air supplied to an appliance specifically for the combustion of fuel.

Commodity Cost
The cost of the natural gas or electricity commodity and related charges to deliver it to the marketplace.

Company
Consolidated Edison Co. of NY, Inc., its subsidiaries and our agents.

Contractor
An individual, or group of individuals licensed by the authorities having jurisdiction retained by the customer to perform plumbing work.

Cubic Foot of Gas (Standard)
The most common unit of measurement of gas volume. The amount of gas that occupies one cubic foot of space when a temperature of 60 degrees F, and under pressure equivalent to that of 29.92 inches of mercury.

Customer
A present customer or an applicant for the company's natural gas service.

Customer's Agent
Architects, Engineers, Contractor's, Excavators, Builders, and Developer who are acting on behalf of a customer or applicant

Daily Average Send-Out
The total quantity of gas delivered for a period of time divided by the number of days in the period.

Dekatherm
A unit of heating value equivalent to 10 therms or 1,000,000 Btu's.

Demand
The rate at which gas is delivered to or by a system, part of a system, or a piece of equipment, expressed in cubic feet or therms or multiples thereof, for a designated period of time called the demand interval.

Direct Vent Appliance
An appliance that is constructed and installed so that all air for combustion is obtained from the outside atmosphere and all flue gases are discharged to the outside atmosphere.

Distribution
The delivery of natural gas through pipeline systems to an end-user.

Distribution Piping (aka- Customer Piping)
Refers to all piping from the meter outlet to customer equipment or appliances. However, on an outdoor meter set, the distribution piping would start at the point of service termination, at the building wall.

Elevated Pressure Gas supplied to a customer's equipment at pressures greater than 7" W.C. (0.25 PSIG).

Expense
Includes all labor material and other applicable charges including overheads involved with the work to be performed.

Fan Assisted Appliance
An appliance with a venting system designed to remove flue or vent gases by mechanical means that may consist of an induced draft portion under non-positive static pressure or forced draft portion under positive static pressure.

Firm Service
Delivery of gas to a customer on a continuous basis with no anticipated interruptions.

Fire wall
A wall or portion that is rated and intended to retard the spread of fire or products of combustion. Fire walls must be in accordance with NYS and Local Building Codes.

Fuel Line
The piping that is installed after the company's meter or regulator that connects the customer's appliances and equipment to the gas supply. Fuel lines are the responsibility of the customer.

Gas Main or Main Extension
The piping system owned by the company that is used for the distribution of gas that is (a) located within the limits of any public highway or on a private right of way or (b) is used to supply gas to two or more gas service.

Gas Meter Room
A gas meter room is space within a municipal building occupancy classification group that is solely used to house the natural gas meter and regulator equipment. Residential occupancy is exempt from building code requirement as the gas meter is available for continuous supervision.

Gas, Natural
A naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found in porous geologic formations beneath the earth's surface, often in association with petroleum. The principal constituent is methane.

Gas Service
The piping and accessory equipment owned by the company that is connected to the gas main and installed on a customer's property to supply gas to a residence or business.

Grid
The layout of a gas distribution system in which pipes are laid in both directions in the streets and frequently connected at intersections.

House Riser, Gas
The principal vertical pipe that conducts the gas from the meter to the different floors of the building.

Inches of Water Column
A unit of measuring pressure (1 psig = 27.7" WC).

Input Rate
The rate at which natural gas is supplied to an appliance. It may be expressed in Btu per hour (Btuh), thousands of Btu per hour (MBtuh); in cubic feet per hour (cfh); or thousands of cubic feet per hour (Mcfh); in therms (th) or dekatherms (Dth) per hour.

In Service
A term used to indicate equipment is connected to the system and fulfilling its designated function.

Interruptible Service
Low priority service offered to customers under schedules or contracts which anticipate and permit interruption on short notice, generally in peak-load seasons, due to system supply or capacity limitations that threaten a local distribution company's ability to continue to serve its firm customers and higher priority users. Customers taking interruptible service generally have alternate energy sources to supply their service, for example, boilers which are capable of consuming fuel oil in additional to natural gas.

Loads (Connected)
The total sum of the rated BTUH input of all connected gas equipment. Can also be expressed in total cubic feet per hour (CFH).

Load
The amount of gas delivered or required at any specified point or points on a system; load originates primarily at the gas consuming equipment of the customers. Also, to load a pressure regulator is to set the regulator to maintain a given pressure as the rate of gas flow through the regulator varies.

Make-Up Air
The volume of either outside or inside air that is supplied to a space to replace air consumed by the gas burning appliances, exhausted or otherwise removed from the space.

Mechanical Exhaust Appliance
An appliance with a venting system designed to remove flue or vent gases by mechanical means utilizing induced draft under non-positive pressure or forced draft under positive pressure.

Meter Bar
A specialized item of hardware that functions as a connecting device between the gas service line and the gas meter. Newer meter bars on updated specification are of the bypass kind for utility use

Meter, Gas
An instrument installed by the company to measure the volume of Natural Gas delivered to a customer.

Meter Piping
Also known as, extension service pipe from the first fitting inside the building and the gas utility meter. Customer's plumber is responsible to meet all company specifications, procedures and drawing requirements. A NYC Meter Piping Pressure Test Verification form will be required.

Multiple Occupancy Building
A structure, including row houses, enclosed within exterior walls of fire rated wall construction, erected and formed of component structural parts and designed to contain four or more individual dwelling units for permanent residential occupancy.

Odorant
Mercaptan, added to natural or LP gas in small concentrations to impart a distinctive odor. The odorant helps identify leaks on pipe and raises public awareness.

Additional information relating to Odor Fade

- Adsorption: Adsorption occurs in the gas phase and is the process by which a molecule or particle is physically attracted and adheres to a surface. Gas phase odorant molecules are usually adsorbed onto metal surfaces. This prevents the odorant from flowing through the pipeline with gas that was originally odorized.
- Absorption: Absorption is the filling of pores in a solid and is a different process from adsorption. This is more common in plastic piping.
- Oxidation: Steel gas piping is produced in steel mills. As a result of the production process the interior walls of new steel pipe can contain very reactive iron oxide compounds, which will react with mercaptan. Odor fade is more pronounced in new steel pipe of various diameter and lengths.

Operator Qualification (OQ)
OQ is a regulation of the Office of Pipeline Safety of the U.S Department of Transportation (DOT). DOT's Operator Qualification (OQ) regulation 49 CFR 192 subpart N, requires operators to develop and maintain a qualification program for individuals performing covered tasks relating to gas work with oversight from the gas utility. There is no exception to this rule all required cover tasks and regulation is to be followed and will be strictly enforced by the utility.

Pipeline
All parts of those physical facilities through which gas is moved in transportation, including pipe, valves, and other appurtenances attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies.

Plastic Pipe
Pipe made of medium or high-density polyethylene.

Plastic Tubing
Same as plastic pipe except that it is usually of smaller diameter and sized on the same system commonly used for copper tubing.

Pressure Regulator
A device placed in a gas line for reducing, controlling and maintaining the natural gas pressure required by the customer.

Project Center
On-line application for customers, contractors or any other interested party who wish to initiate a service request, view case status and receive email notifications on service request milestones upon key milestone completion from Con Edison's Energy Service Organization. The application is designed to provide an interactive, self-service tool. Jobs successfully initiated through Project Center will automatically initiate a case with Con Edison and proactively notify the applicant via e-mail when key milestones have been completed.

Point of Delivery
Is defined as the outlet of the meter. For inside meter installations this is the end of utility jurisdiction. For outdoor meters joint jurisdiction exists from the outlet of the meter to the building wall

Primary Air
The combustion air that mixes with the gas before it reaches the burner.

Qualified Installer
An individual who is qualified by Con Edison or an authority acceptable to Con Edison.

Radial
A distribution system with one source of gas supply. Also known as a one-way feed.

Secondary Air
The air externally supplied to the flame at the point of combustion.

Service Head Valve
The valve located at the head of the service. If the gas meters are outside, the service head valve is located on the riser. When gas meters are inside, the service head valve is located at a point just inside the building wall.

Service Pipe
All piping, tubing and fittings that transport the gas from the main to:

- For inside meter(s) – the outlet of the meter
- For outside meter(s) – outside the building wall

System Type - Distribution
Generally, gas mains, gas services, and gas equipment that carry or control the supply of gas from the point of local supply to and including the gas sales meters. The Con Edison gas system operates at various pressures as indicated below:

Normal
Con Edison low pressure gas system customers, this pressure is a minimum of 4-inches of water column (WC). For medium and high gas pressure system customers, this pressure is 5-inches WC to 7-inches WC (¼ psig).

Elevated
Con Edison delivery pressure greater than 7-inches water column (WC) used by customer equipment. 7-inches WC (¼ psig)

Therm - A unit of heating value equivalent to 100,000 British thermal units (Btu).

Transportation Customer
A customer who uses a local distribution company's natural gas pipeline and distribution system but buys the natural gas commodity from a different supplier.

Vent Line Protection Device (VLP)
A device for preventing the flow of water into a gas service regulator vent installed in designated flood-prone areas.

Governing Codes

Customer's piping and installations are to be installed in accordance with and approved by the authorities having jurisdiction and to comply with Con Edison specifications. If there is a conflict of rules, the company will make a final decision applicable to the situation.

Applicable codes are listed below.

1. **ANSI Z-223.1/NFPA 54 National Fuel Gas Code**
   AGA Distribution Center
   P.O. Box79230
   Baltimore, MD 21279-0230

2. **Codes, Rules and Regulations of the State of New York**
   Title 16 Parts 230, 255, 261, and 753

3. **Department of Transportation Title 49 CFR Part 192 & 199**

4. **ANSI B31.8 "Gas Transmission and Distribution Piping System"**

5. **Manual of Planning Standards for School Buildings — The New York State Education Department**

6. **The New York State Uniform Fire Prevention and Building Code**

7. **NYC Fuel Gas Code**
   New York City Fuel Gas Code
   http://www2.iccsafe.org/states/newyorkcity/FuelGas/FuelGas-Frameset.html

8. **New York City Fire Code**
   New York City Fire Department
   http://www1.nyc.gov/site/fdny/about/resources/code-and-rules/nyc-fire-code.page

9. **Northeast Gas Association Operator Qualification Compliance Program Written Plan**

10. **Northeast Gas Association (NGA) Plastic Pipe Joining Manual**

11. **Gas Rates & Tariffs General Rules III**
    3. (A) (B) "Installation of Mains and Services" Leaf 28 to 38.2. Special Service Performed by the Company for Customers at a Charge is explained in Gas Rates and Tariffs General Rules IV (1) (2) (3) Cost and Special Services

Applicable Gas Specifications and Drawings

Note: Check with your Con Edison Representative to ensure that you have the latest copy of the specification listed below *

Spec. No. or Dwg. No.	Title	Rev #	Last Review Date *
G-695	Supporting Gas Service Regulator and Meters	2	03/19/19
EO-511327	Installation of Class 250 TC Diaphragm Gas Meter – Indoors	1	10/6/20
G-316 aka EO-7420-B	Installation of Class 500TC to Class 1000TC Diaphragm Gas Meters – Indoors	22	05/08/19
G-413 EO-14158	Installation of Gas Service Regulators - Indoors (1" to 2")	29	8/17/21
EO-7043	Pipe Type Saddle Support for Gas Regulator Installations	3	01/13/06
308657	Installation of Parallel Fisher 2″, 3″, & 4″ EZR and 1098 Regulators with Turbine Meter Indoors and Outdoors 50,000 CFH and Larger*	10	03/19/19
361571	Installation of Line Pressure 3" to 8" Turbine/Rotary Meters with Parallel 2" Regulators Indoors and Outdoors 15,000 CFH to 150,000 CFH*	6	03/14/19
361693	Installation of Parallel 2″ Regulators with Turbine Meter Indoors and Outdoors 10,000 CFH to 60,000 CFH*	5	03/14/19
EO-17118	Regulator Vent Installation	4	02/13/15
384872	Installation of B-838 Gas Regulator Unit – Indoors	1	04/14/15
EO-13977-C	Installation of Meter Piping for Class 3,000R (2”) to 23,000R (4”) Rotary Gas Meters – Indoors	15	04/14/15
365531	Installation of Meter Piping for Twin Class 3000R (2”) to 23,000R (4”) Rotary Gas Meters-Indoors	2	04/14/15
G-8096	Sealing the Annular Space between a Gas Pipe and a Wall, Casing, or Sleeve	9a	08/22/16
G-8209	Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures	6a	10/03/19
G-690 EO-16310-B	Method of Securing Lock-Wing Cocks	6	07/02/19
EO-4718	Bonding of Compression Couplings and Valves on Steel Mains and Services	12	12/03/10
EO-4890-A	A Service Pipe/Tubing and Service Sleeve through Vault, Open Areaway, Open Area under Stairs, Under Enclosed Area and Vaulted Basement	16	01/03/19
EO-12790-B	Rigid Sleeved Elbow Unit 1” to 16” Up to 99 PSIG Max. Operating Pressure	14	07/15/10
EO-16546-B	Installation of Flexible Sleeve Elbow Unit where Service Enters from Beneath Building - Pressure not Exceeding 99 PSI	2	06/08/15
EO-14134-C	Thermit Weld Process for Attaching Wire to Pipe or Fitting	9	01/28/14
EO-16390-B	Installation of Low Pressure Gas Turbine Meters	8	03/14/19
EO-16511-B	Installation of Meter Piping for Class 3000R-TC to Class 23,000R-TC Rotary Meters- Outdoors	16	8/17/21
EO-16585-A	Installation of Meter Piping for Class 250TC Diaphragm Gas Meters - Outdoors (2 – Sheets)	17	8/17/21
361100	Installation of Parallel 2" Regulators with Rotary Meter Indoors and Outdoors 10,000 CFH to 50,000 CFH	5	03/14/19
EO-16629-A	Installation of Steel Gas Service Piping (2 Sheets)*	5	06/19/18
EO-16641-A	Installation of Plastic (Direct Burial or Insertion) Gas Service Piping (4 Sheets)*	6	11/29/18
EO-16886-B	Installation of Multiple Class 250TC Gas Meters – Indoors (2 – Sheets)	5	11/24/15
G-425 EO-9580-A	Adaptation of Existing Gas Meter Piping Installation for Change in Meter Size (2 Sheets)	8	08/24/06

Applicable Gas Specifications and Drawings

Spec. No. or Dwg. No.	Title	Rev #	Last Review Date *
G-2040	Requirements for the Installation of Boosters, Micro-Turbines and Associated System Protective Devices	11	04/26/18
G-2041 359667	Requirements for the Installation of Gas Utilization Equipment that Mixes Pressurized Oxygen with Natural Gas.	2a	02/28/17
G-702	Inspection, Testing, and Maintenance of Company-Owned Automatic Temperature Control Equipment.	2a	02/25/15
G-703	Requirements for Branch Lines Supplying Multiple Regulators and/or Meters.	1	04/09/14
G-699	Installation and Inspection of Gas Service Regulator Vent Line Protectors (VLPs).	3a	03/21/16
G-8217	Flood-Prone Areas for the Installation of Gas Service Regulator Vent Line Protectors (VLPs).	2a	04/15/16
G-11837	Investigation of an Inside Gas Leak or Odor Call and Issuance of a Warning Tag.	27b	04/15/16
G-414 EO-14166	Installation of Twin Gas Regulators Indoors (1” – 2”).	28	8/17/21
502163	Bumper Installation.	0	01/07/14
502164	Outdoor Installation of B-838 Gas Regulators – 2” x 4” Flanged for Class 11000TC – 38000TC Rotary Meters.	2	03/14/19
G-704	Gas Meter and Regulator Installation Requirements.	2a	03/17/17
EO-16726-A	Installation of 2 to 6 Unit Prefabricated Meter Sets for Outdoor Class 250TC Meters – Indoors or Outdoors (2 Sheets).	12	8/17/21
G-100,276	Insulating Kits for Flanges on Steel Gas Pipelines.	7	09/11/15
507002	Installation of Meter Piping for Class 23000R (6”) to 56000R (6”) Rotary Gas Meters – Indoors.	4	05/16/16
507003	Installation of Meter Piping for Twin Class 23000R (6”) to 38000R (6”) Rotary Gas Meters – Indoors.	0	04/14/15
G-8094	Gas Equipment for Dual-Fuel Interruptible Service under Classification No.12 Priorities AB, C, D, and E	9a	04/28/14
506175	Installation of Meter Piping for Class 500TC to 1000TC Diaphragm Gas Meters – Outdoors (2 – Sheets).	6	8/17/21
514789	Installation of Outdoor Low Pressure Gas Turbine Meter	0	03/17/17
514590	Installation of Parallel Regulators with Turbine Meter Outdoors 10,000 CFH and Larger	0	12/06/16
514486	Installation of Parallel Regulators with Rotary Meter Outdoors 10,000 CFH to 50,000 CFH	0	11/29/16
EO-7421-B / G-317	Installation of Twin CL-250TC Diaphragm Gas Meters - Indoors	21	07/12/18
506214	Installation of Twin Class 500TC to Class 1000TC Diaphragm Gas Meters – Indoors	2	05/08/19

Applicable Gas Specifications and Drawings

(Contact Energy Service Representative. for latest available file for Spec. or Dwg. No. listed below)

Spec. No. or Dwg. No.	Title	Rev #	Last Review Date
IP-27	Installation of Electro-fusion Fittings on PE Plastic Pipe/Tubing and Molded Fittings using a Universal Electro-fusion Processor.	10	10/03/19
IP-20	Installation of Mechanical Fittings for Plastic Pipe and Tubing.	9a	12/07/17
EO-6799	Protective Covers for Gas Main and Service Installations.	-c9	09/29/17
EO-1181	General Specification for Backfilling of Trench & Small Openings.	7	10/14/16
EO-8085	General Specification for Backfill and Bedding Material for Excavations.	9	11/30/13
309495	Trench Excavation for Gas Main & Services up to 350 PSIG.	8	09/12/19
502664	Installation of Electronic Markers on Gas Mains and Services	2	10/04/19
	2016 NGA Plastic Pipe Joining Qualification Program		12/21/15
	Bulletin: Inspection of Exposed PE Plastic Joints		05/29/15
EO-13911	Installation of 4"-36" Welded End Ball Valve and Valve Box	12	11/20/13
EO-16629-A	Installation of Steel Gas Service Piping	5	06/19/18
EO-16641-A	Installation of Plastic (Direct Burial Or Insertion) Gas Service Piping	6	11/29/18
EO-4718	Bonding of Compression Couplings and Valves on Steel Mains and Services	12	12/03/10
EO-4890-A	Service Pipe/Tubing And Service Sleeve Through Vault, Open Areaway, Open Area Under Stairs, Under Enclosed Area, And Into Vaulted Basement	16	01/03/19
EO-6799-C	Protective Covers for Gas Main and Service Installations	9	09/29/17
G-100,298	Valves for Gas Transmission and Distribution Piping Systems	7a	09/26/17
G-1064	Shielded Metal Arc Welding Requirements for Welding Steel Pipe and Fittings	22b	02/26/18
G-1065	Qualification of Welders and Welding Procedures	24	06/05/18
G-8003	Transportation, Handling and Storage of Steel Pipe for Gas Mains and Services	14b	03/23/16
G-8062	Extruded Polyolefin Coating on Steel Gas Pipe	9	09/16/19
G-8096	Sealing the Annular Space Between a Gas Pipe and a Wall, Casing Pipe, or Sleeve	9a	08/22/16
G-8100	General Specification for the Installation of Gas Distribution Services	15a	01/17/19
G-8104	Polyethylene Pipe, Tubing and Fittings for Gas Mains and Services	14a	03/22/16
G-8107	Steel Pipe for Gas Mains and Services	17	09/10/18
G-8121	Qualification of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services	18a	02/08/18
G-8122	Transportation, Handling and Storage of Polyethylene Plastic Pipe and Fittings for Gas Mains and Services	12b	05/04/17
G-8123	Heat Fusion Joining of Polyethylene Plastic Pipe/Tubing and Fittings for Gas Mains and Services	20a	02/08/18
G-8201	Electrical Spark Inspection of Coating on Steel Pipe	4	11/12/19
G-8204	Pressure Testing Requirements For Gas Mains and Services	9a	03/27/19
G-8205	Corrosion Control of Buried Steel Gas Mains and Services	13	11/12/19
G-8209	Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures	6a	11/12/19
G-48	Gas Meter and Service Regulator Sizing	13	12/14/18
514203	Outdoor Installation of Twin Gas Regulator 1” to 2” Body	4	8/17/21

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Reserved for future use

Approved Gas Service Equipment Tables

Condition of Approval

The equipment listed in the following section has been approved by Con Edison for use in connection with gas service installations within the company's service territory.
Providing a list of approved equipment does not relieve the customer from ascertaining that the equipment meets Con Edison's specifications and also the requirements of the AHJ. Con Edison, by testing and/or approving gas service equipment, gives no warranty, expressed or implied, as to the adequacy, safety or other characteristics of the equipment, fitting or device, and assumes no responsibility with respect there to. The information contained in the tables provided will be revised from time to time. It is the responsibility of the customer to ensure the information is the most current available. Contact your assigned Con Edison Commercial Services Representative for updates.

A. Special Installation Requirements

Con Edison will provide information regarding installation requirements for all high- pressure services larger than 2-inches. Elevated pressure of ¼ PSIG or 7-inches WC and higher, if available, requires Con Edison supplied service regulator that reduces gas main pressure to customer utilization equipment design pressure.

NOTE: The following applies to valves listed in Tables 1 – 4.

Wrench operated valves up to and including 4-inch must be of tamperproof construction

* For design operating pressures not exceeding 1 psig.

** For design operating pressures greater than 1 psig.

*** Rockwell equipment of the specified catalog or figure number is acceptable.

**** Figure 1796 and 1997, the manufacturer recommends changing existing non-tamperproof cap screw and replacing them with tamperproof cap screws at field site. The vendor's change out recommendation instructions must be followed completely in order to maintain material warranty

Table 1		
PLUG VALVES FOR SERVICE HEAD INSTALLATION Reference Specification: G-100,298		
Manufacturer		**Nominal Size**
Dresser Industries Inc.	175 GTO-0007-161	¾”
	175 GTO-0011-161	1”
	175 GTO-0012-161	1 ¼”
	175 GTO-0013-161	1 ½”
	175 GTO-0006-161	2”
	350	2”, 3”
Nordstrom Valves Inc.***	142-T(Threaded End)	¾”, 1”, 1 ¼”, 1 ½”, 2” *,3” *, 4” *
	143-T(Flanged End)	2”**, 3” **, 4” **, 6”**, 8”**
	149, 169 w/ Hand Wheel	6”, 8”, 10”, 12”
Walworth Company ****	1796 T	1”, 1 ¼”, 1 ½”, 2”
	1797 F	3”
	1707 F, 1727 F w/ Hand Wheel	6”, 8”, 10”, 12”

Table 1-A		
PLUG VALVES FOR BRANCH LINES Reference Specification: G-703		
Manufacturer	**Catalog or Figure Number**	**Nominal Size**
Dresser Industries Inc.	175 GTO-0007-161	¾”
	175 GTO-0011-161	1”
	175 GTO-0012-161	1 ¼”
	175 GTO-0013-161	1 ½”
	175 GTO-0006-161	2”
Nordstrom Valves Inc.***	142-T(Threaded End)	¾”, 1”, 1 ¼”, 1 ½”, 2” *,3” *, 4” *
	143-T(Flanged End)	2”**, 3” **, 4” **, 6”**, 8”**
	149, 169 w/ Hand Wheel	6”, 8”, 10”, 12”
Walworth Company ****	1796 T	1”, 1 ¼”, 1 ½”, 2”
	1797 F	3”
	1707 F, 1727 F w/ Hand Wheel	6”, 8”, 10”, 12”
	1718 w/o Hand Wheel	6”, 8”, 10”, 12”

For Table 1-A, Approved Head of Service Plug Valves from Table 1 may also be used.

Table 2		
BALL VALVES FOR METER AND REGULATOR INSTALLATION Reference Drawings: 308657, 361100, 361571, 361693		
Manufacturer	**Catalog or Figure Number**	**Nominal Size**
Ballomax	2BMF285RP	2”
	3BMF285RP	3”
	4BMF285RP	4”
Kerotest	72566896	2”
	72566904	3”
	72566912	4”

Table 3		
PLUG VALVES FOR METER AND REGULATOR INSTALLATION Reference Drawings: 365531, EO-16390-B, EO-16511-B,EO-16585-A, EO-16726-A, G-413 (aka EO-14158), G-414 (aka EO-14166), G-641 (aka EO-13977-C)		
Manufacturer	**Catalog or Figure Number**	**Nominal Size**
Dresser Industries Inc.	175 GTO-0004-161	**¾”**
	175 GTO-0011-161	**1”**
	175 GTO-0013-161	**1 ½”**
	175 GTO-0006-161	2”
Nordstrom Valves Inc. *	142 (Threaded End)	1”, 1 ½”, 2”, 3”, 4”
	143 (Flanged End)	3” **, 4” **
	165	4”, 6”
	169	8”
Walworth Company *	1796	1”, 1 ½”, 2”
	1749-F	2”, 3”, 4”
	1700	4”
	1700-F	4”, 6”
	1707-F	8”, 10”
	1718 w/o Hand Wheel	6”, 8”, 10”, 12”

For Table 3, Approved Head of Service Plug Valves from Table 1 may also be used.
* Lubricated valve with port
** For design operating pressures greater than 1 PSIG.

Table 4		
METER VALVES (Lock-Wing Locks) Reference Drawings: EO-16585, G-316(aka EO-07420), G-317(aka EO-07421, G-425 (aka EO-9580)		
Manufacturer	**Catalog or Figure Number**	**Nominal Size**
Dresser Industries Inc	Style 275 (Lock Wing Lock)	¾”, 1”, 1 ¼”
Mueller Company	P-10-1 Shur-Stop	
	805002	¾”
	805006	1”
Mueller Company	H-11118-B	¾”, 1”, 1 ¼”, 1 ½”, 2”
A.Y. McDonald [1]	560 P	¾”, 1”, 1 ¼”, 1 ½”, 2”
Jomar	T-175 LW (Lock Wing Ball)	¾”, 1”, 1 ¼”, 1 ½”, 2”

[1] - Only approved for use on low pressure distribution piping (<12” WC)

Table 5		
METER BARS Note: A meter valve (lock wing cock) is required before the meter bypass bar		
Manufacturer	**Catalog or Figure Number**	**Nominal Size**
A. Y. McDonald (Bypass Meter Bars)	6410-FFE-W 1”X1”X1” (Con Edison specific model)	1” X 1” X 1” X 20lt; 6” centers for Class 250 meters with horizontal inlet and outlet; Includes integral meter bypass and swivels
	6312-FFE-W 1”X1”X1” (Con Edison specific model)	1” X 1” X 1” X 20lt; 6” centers for Class 250 meters with rear center inlet and vertical outlet; Includes integral meter bypass and swivels
	6480-CCDM-V 1-1/4”X1-1/4” (Con Edison specific model)	1-1/4” X 1-1/4” X 30LT: 8-1/4”” centers for Class 500 meters with horizontal inlet and outlet; Includes integral meter bypass and swivels
	6480-CCDL-V 1-1/2”X1-1/2” (Con Edison specific model)	1-1/2” X 1-1/2” X 60LT: 11”” centers for Class 1,000 meters with horizontal inlet and outlet; Includes integral meter bypass and swivels
Richards Mfg. Co. (Manifolds)	339-0176-NB (2 Meter Manifold for A. Y. McDonald 6312)	Double Multi-meter Manifold: Header 22” long: 1.5” Diameter: For indoor/outdoor install of CL250 gas meters 2 unit meter sets. Each set to include plug and caplug
	339-0184-NB (3 Meter Manifold for A. Y. McDonald 6312)	Triple Multi-meter Manifold: Header 22” long: 1.5” Diameter: For indoor/outdoor install of CL250 gas meters 3 unit meter sets. Each set to include plug and caplug
UPSCO, Inc. (Manifolds)	UAMB-00003548 (2 Meter Manifold for A. Y. McDonald 6312)	Double Multi-meter Manifold: Header 22” long: 1.5” Diameter: For indoor/outdoor install of CL250 gas meters 2 unit meter sets. Each set to include plug and caplug
	UAMB-00003547 (3 Meter Manifold for A. Y. McDonald 6312)	Triple Multi-meter Manifold: Header 22” long: 1.5” Diameter: For indoor/outdoor install of CL250 gas meters 3 unit meter sets. Each set to include plug and cap lug
R.W. Lyall (Manifolds)	CE4521259 (2 Meter Manifold for A. Y. McDonald 6312)	Double Multi-meter Manifold: Header 22” long: 1.5” Diameter: For indoor/outdoor install of CL250 gas meters 2 unit meter sets. Each set to include plug and caplug
	CE4521260 (3 Meter Manifold for A. Y. McDonald 6312)	Triple Multi-meter Manifold: Header 22” long: 1.5” Diameter: For indoor/outdoor install of CL250 gas meters 3 unit meter sets. Each set to include plug and caplug

Table 6			
SWIVELS			
Manufacturer	**1” x 20 Light**	**1 ¼” x 30 Light**	**1 ½” x 60 Light**
American Meter Co.	01195 P014	2290 P016	01195 P028
A.Y. McDonald	4815-511	4815-547	N/A
Central Plastics	008-1200	010-30 1250-008	N/A
Hitachi Metals America	20 S1	----------	----------
Richards mfg. Co.	OS-1-1-20LT	OS-1 ¼-1-30LT	OS-1 ½-1-60LT
Offset	1”	1”	1”
Overall Length	3 ½”	3 ½” – 3 ¾”	3 3/8” – 5 3/8”

Table 7			
SWIVEL CAPS			
Manufacturer	**P/N for 1”x 20 Light**	**P/N for 1 ¼”x 30 Light**	**P/N for 1 ½”x60 Light**
American Meter Co.	21737 P061	21737 P081	21737 P141
A.Y. McDonald	4815-507	4815-543	N/A
Central Plastics	015-0068	015-0070	007-0016
Hitachi Metals America	20 N	---------	---------
Richards mfg. Co	N20LT	N30LT	N60LT

Table 8		
VENT CAPS for REGULATOR and VENTED SLEEVE INSTALLATIONS		
Manufacturer	**Catalog or Figure Number**	**Nominal Size**
UPSCO, Inc. 22-24 Central Street Moravia, NY 13118-3425	UVA-E-3/4, UVA-E-1	¾”, 1”
	UVA-E-2	2”
	UVA-E-3	3”
	UVA-E-4	4”
Advanced Engineering Corp.		¾”, 1”
Richards Manufacturing Co. 517 Lyons Avenue Irvington, NJ 07111-4717	GV-3/4	¾”
	GV-1	1”
Carolina Mouldings Inc.	RV-250	¾”, 1”
Control Associates	Y602-23, Y602-25	¾”, 1”

Table 9		
METER ELBOWS		
Manufacturer	**Catalog or Figure Number**	**Nominal Size**
UPSCO, Inc. 22-24 Central Street Moravia, NY 13118-3425	90 DEG. Meter Elbow	1” x 6” x 8” 1” x 4 ½” x 14”
Advanced Engineering Corp.		
Richards Manufacturing Co. 517 Lyons Avenue Irvington, NJ 07111-4717		

Table 10 COMPRESSION END FITTING / BOLTED COUPLING for STEEL PIPE Reference Specification: G-100,285		
Manufacturer	**Style**	**Description**
Dresser Mfg. Division *	90 Universal (Restraint)	¾", 1", 1 ¼", 1 ½", 2"
	711 (Restraint)	3", 4", 6", 8", 10", 12"
	38 or 40	10", 12"
Smith Blair	Style EZ	3", 4", 8"
	Standard IPS Coupling	10", 12"

Table 11 INSULATING COUPLING (STRAIGHT) Reference Specification: G-100,285		
Manufacturer	**Style**	**Description**
Dresser Mfg. Division *	90 (Seal)	¾", 1", 1 ¼", 1 ½", 2"
	39 and 711	3", 4", 6", 8", 10", 12"
Norton-McMurray Mfg., Co. (NORMAC)	Style 1 **	¾", 1", 1 ¼", 1 ½", 2"
Smith Blair	Style EZ	3", 4", 6", 12"
	Standard IPS Coupling	10", 12"

Table 12 REDUCING COUPLING (CONDUCTIVE) Reference Specification: G-100,285		
Manufacturer	**Style**	**Description**
Dresser Mfg. Division *	90 Universal l (Restraint)	1" x ¾", 1 ¼" x ¾", 1 ¼" x 1",
		1 ½" x 1 ¼", 1 ½" x 1",
		1 ½" x 1 ¼", 2" x 1"2" x 1 ¼", 2" x 1 ½"
		2" x 1 ½"

Table 13 ELBOWS (45 and 90 DEGREE) Reference Specification: G-100,285		
Manufacturer	**Style**	**Description**
Dresser Mfg. Division *	90 Universal (Restraint)	1", 1 ¼", 1 ½", 2"
	69 (Restraint)	3"

***Yellow-marked band on Dresser product for Identification "Seal & Restraint"**
****With 1/8" Steel Allen Hex Socket Pipe Plug**

Table 14 INSULATING ADAPTERS & UNIONS Reference Specification: G-100,291		
Manufacturer	**Style**	**Description**
Dresser Mfg. Division	90	Male Insulok Adapter ¾", 1", 1 ¼", 1 ½", 2"
Mueller Company	P-5-12 700830	Insulated Union, NTP both Ends, 2"

Table 15	
SLEEVED ELBOW UNIT	
Manufacturer *	**Description**
The Ben Yuter Company, Inc. 799 Broadway, Suite 310 New York, NY 10003-6811	90 Degree Gas Service Elbow Unit w/ Seamless Steel Pipe Sleeve ¾", 1", 1 ½", 2" 3"
Richards Manufacturing Co. 517 Lyons Avenue Irvington, NJ 07111-4717	

***** The manufacturers listed in Table 15 are suppliers of the sleeved elbow unit for the listed sizes. Prior approval is required by con Edison to fabricate sleeves not listed and must be done in accordance to **Drawing Specification EO- 12790** titled **"Rigid Sleeved Elbow Unit 1" to 16" up to 99 psig max Operating pressure"**

Table 16	
FLOOR SUPPORT BRACE	
Manufacturer	**Description**
Compuflex, Inc. PO Box 56 Hudson, NY 12534-0056	1.9" ID x 6" OD for 1" Sleeved Elbow Unit 2.875" ID x 6" OD for 1 ½" Sleeved Elbow Unit

Table 17		
RISER BENDS (STEEL SERVICE PIPE)		
Manufacturer	**Drawing**	**Description**
UPSCO, Inc. 22-24 Central Street Moravia, NY 13118-3425	10450	¾", 1", 1 ½" Coated w/ a Con Edison approved coating.

Table 18		
FLANGE INSULATING KITS		
Manufacturer	**Model**	**Nominal Service Pipe size**
PSI Company	Linebacker	2", 4", 6", 8"
GF Central Plastic	Jock	
Note: Refer to Purchase & Test Specification G-100,276 for Gasket Info (Sold Separately)		

Note: A written approval must be obtained from Gas Operations (Corrosion Control) for the purchase of competitive products.

Table 19			
THERMIT WELD EQUIPMENT			
Manufacturer	**Model No.**	**Pipe Size**	**Description**
CADWELL Distributed by: Corrpro Co. Stuart Steel Protection Corp.	CAHAA-1GA CAHAA-1G	¾" thru 3 ½" 4" thru 12"	Mold(Welder) for attaching wire
	CAB-133-1H	¾" thru 12"	Adapter Sleeve for use on wire sizes AWG No. 14 thru No. 10 Solid
	CAT-320	¾" thru 12"	Flint gun for igniting welding powder
THERM-O-WELD Distributed by: Corrpro Co. Stuart Steel Protection Corp. Continental Industries Inc.	M-101	¾" thru 3 ½" 4" thru 12"	Mold(Welder) for attaching wire sizes AWG No. 14 thru No. 6 Solid
	A-200	¾" thru 12"	Adapter sleeves for use on wire sizes AWG No. 14 thru No. 10 Solid
	15-P	¾" thru 12"	Standard Therm-O-Weld power
	A-309 P	¾" thru 12"	Flint gun for igniting welding powder

Table 20		
DUAL-FUEL CHANGEOVER CONTROLS		
Manufacturer	**Model Cat No.**	**Description**
SPC Temperature	929120-00	Temperature Controller

Table 21		
ANODELESS RISER BENDS (PLASTIC SERVICE PIPE) **Reference Specification: G-8104**		
Manufacturer	**Model or Type No.**	**Description**
PERFECTION PIPE aka Honeywell	75199	1” IPS THRD x ½” CTS .090” Wall Thickness
	75607	1” IPS THRD 1” CTS .090” Wall Thickness
	79055	1 ½” IPS THRD 1 ¼” CTS .090” Wall Thickness
	79782	1 ½” IPS THRD 1 ¼” CTS .151” Wall Thickness
	79437	1” IPS THRD x 1” IPS, SDR-11
	78302	2” IPS THRD x 2” IPS, SDR-11 (Bracket Included)
	78512	3” IPS THRD x 3” IPS, SDR-11
	79912	3” IPS FLG x 3” IPS, SDR-11
	79964	4” IPS THRD x 4” IPS, SDR-11
	79965	4” IPS FLG x 4” IPS, SDR-11
RW Lyall & Co, Inc.	Con Edison 090040-A	1 ½” IPS THRD x 1 ¼” CTS .090” Wall Thickness
	Con Edison 070030-A	1” IPS THRD 1” CTS .090” Wall Thickness
	Con Edison 050010-B	1” IPS THRD x ½” CTS .090” Wall Thickness

Plastic Pipe to be in compliance with Gas Specification G-8100, Section 11 – Appendix F

Table 23 GAS BOOSTER EQUIPMENT			
Item	**Manufacturer**	**Type / Model No.**	**Size**
Service Head Valve	See Table 1		
Gas Meter Valve	See Table 3		
Low Pressure Gas Switch	Karl Dungs Inc. Eclipse ASCO Mercoid Controls	GML-A4-4-4 AETECH 10036962** SE32D / TA31A11** PRLE-153-P1**	¼" ¼" ¼" ¼"
Vent	See Table 8		
Check Valve	Eclipse	Series 1000	½" – 4" THRD 3" – 8" FLGD
	Etter Engineering	ECV	2" – THRD 3"-4" 6" - FLGD

****- Indicates explosion proof model**

Table 24 PROTECTIVE EQUIPMENT for COMPRESSED OXYGEN and NATURAL GAS MIXTURES			
Manufacturer/Distributor	**Type/Model or Part No.**	**Description**	
Check-All Valve Mfg. Co. Distributed By: Valley Technical Sales One Hollywood Avenue, Suite 2A Ho-Ho-Kus, NJ 07423-1445 201.670.8070	Universal Low-Pressure Check Valve Type – Style UN-3 For ½" – 2" Sizes	2"	UN-3-200-BB-1/8
		1 ¼"	UN-3-125-BB-1/8
		1"	UN-3-100-BB-1/8
		¾"	UN-3-075-BB-1/8
		½"	UN-3-050-BB-1/8
Harris Flashback Arrestor*	Model 88-5FBT p/n 4301650	Torch Mounted	
	Model 88-5FBT p/n 4301651	Regulator Mounted	
Western Flashback Arrestor*	Flashback Arrestor Set p/n FA-10	Torch Mounted	
	Flashback Arrestor Set p/n FA-30	Regulator Mounted	
Smith Flashback Arrestor*	Smith Oxygen & Fuel Gas Pair p/n H754	Torch Mounted	
	Smith Oxygen & Fuel Gas Pair p/n H754	Regulator Mounted	

*** - To be used with G-Tech TB-15 or TB-30 Torch Booster Reference G-2041**

Table 25 (Effective 8-15-2015) Y-Strainer Reference Drawings: EO-16511, G-413 (AKA EO-14158), G-414 (AKA EO-14166), 384872, 502164		
Manufacturer	**Catalog or Figure Number**	**Nominal Size**
Titan Flow Control, Inc. (currently available through IMAC Systems, Tullytown, PA)	* YS-61-CS	2"
* YS-61-CS Y-strainers are modified to Con Edison's engineering specification which includes: flanged carbon steel body; raised face flanges; natural gas rated washers; no blow-off plug; no gauge tap plugs; and a 40 mesh reinforced straining element.		

Table 26		
BLEED RINGS FOR INDUSTRIAL REGULATOR INSTALLATION Reference Drawings: 514590, 514486		
Manufacturer	**Catalog or Figure Number**	**Nominal Pipe Size**
Aitken	Standard Raised Face Bleed Ring ANSI 150# Carbon Steel A105/A516 Grade 70 1-1/2” Thick ½” NPT Bleed Connection	2”
		3”
		4”
Jamison	Standard Raised Face Bleed Ring ANSI 150# Carbon Steel A105/A516 Grade 70 1-1/2” Thick ½” NPT Bleed Connection	2”
		3”
		4”

Gas Integrity Test & Turn-On Affidavit – New or Repair

Exhibit-A

This certifies that the gas piping in the building (downstream of the meter) indicated below has successfully passed a leakage test as prescribed by the local authority having jurisdiction.

_____
(Building Address / City or Town / Zip Code)

Complete All Sections That Apply **Gas Authorization No.** _____

Lockable valves and test ports installed / exist at the base of each riser. **YES** **NO** (Circle One)

Gas Turn-On requested for the following equipment (Specify below);

Contact Information for Immediate Building Access:_____Phone:_____

	RISER LOCATION	GAS END USE (eg. Cooking, Heating, Hot Water, Dryer, etc)	Meter Location	No. of Apts
Location #1				
Location #2				
Location #3				
Location #4				
Location #5				
Location #6				

Contractor to Check Appropriate Corrective Condition:

I have repaired and tested,

_____Leak at gas equipment (specify unit or equipment)_____

_____Control Valve **_____Pilot Valve** **_____Appliance Valve**

_____Hood Draft **_____Appliance Regulator** **_____Flue Connection**

_____Other (Specify) and provide details for above items checked_____

_____

_____

This certifies that all gas piping is complete and continuous up to the appliance, including appliance control valves, or end of use equipment in affected apartments or areas. **YES** **NO** (circle one)

It is also certified that in the affected area(s):

- All areas containing gas utilization equipment (e.g. boiler room, laundry room) have been inspected and that the equipment gas valves have been closed. **YES** **NO** (circle one)
- All apartments containing gas appliances have been inspected and the appliance valves have been closed. **YES** **NO** (circle one)
- All open-ended valves, stubs test connections, purge connections, or any other piping or fittings which could be left open, have been closed gas tight with a threaded plug or cap. For premises which have meters in the apartments, the meter valves have been left open, so that the integrity test is complete up to the appliance valves. **YES** **NO** (circle one)

In addition, I accept responsibility for the gas-in of any end of use equipment or appliances not gassed-in by Con Edison and identified above for turn-on. **YES** **NO** (circle one)

_____
(Plumbing Contractor Company Name / Address / Telephone #)

_____
(Plumber's Signature / License # / Date)

Gas Meter
Piping
Pressure Test Verification

(**Note:** This Affidavit does NOT replace Gas Authorization)

Exhibit-B

AFFIDAVIT

This certifies that the gas meter piping installed between the gas service head valve and the gas meter connection.

Located at:_____

Lot No:_____

Block No:_____

Owner:_____

Has successfully passed a leakage test for_____hour(s) at pressure of_____psig

On _____ (See instructions from section 2.C.10)

(Date)

For services with service regulators supplying outlet pressures of at least 1 psig, when repair/replacement work is conducted:

The Con Edison operator qualified pressure test witness (name, employee #):

TEST PERFORMED BY

Plumber's Signature:_____

License No.:_____

Plumber Contractor:_____

Accepted for Con Edison By: _____

Date:_____

Note: Form is to be used for company documentation by the performing plumber of record for all oil-to-gas conversion, natural gas generators, upgrades and or swing over work, certification, new business installations, repairs, or replacement work, etc.

Inside Service Line Inspection

This certifies that for any type of repair or modification work on the jurisdictional pipe up to the inside meter outlet (i.e.- task 86/87 work), a visual inspection has been completed with applicable corrections made, and arrangements have been made for access to be granted, in order for Con Edison to complete a full service line inspection on the day of turn on.

OQ-ed Plumber's Name/ITS #:_____

Plumber's Signature:_____

License No.:_____

Operator Qualified Affidavit

Exhibit - B.1

Case Contractor Company Name:_____

Case#_____

Licensed Master Plumber (LMP) Company Name: _____

LMP# _____

Employee 1-Name/OQ # (i.e. ITS #):_____

Employee 2 Name/OQ # (i.e. ITS #):_____

Employee 3 Name/OQ # (i.e. ITS #):_____

I attest that that all work on Con Ed jurisdictional gas piping, which required OQ, on premises of:

(Address):_____

Owner:_____

has been performed by the operator qualified person(s) listed above, who's OQ (ITS) profile(s) was linked with the License Master Plumber # listed on this case at the time the work was performed.

Please select at least one of the following:

☐ **Above Ground Outdoor / Indoor exposed pipe (CT86/87)**

☐ **Below Ground - Plastic Pipe (Appendix A)**

☐ **Below Ground – Steel Pipe (Appendix B)**

Proof of such qualification(s) shall be attached to this affidavit.

Signature: _____ Signature(s):_____

LMP Contractor OQ Employee(s)

Print Name: _____ Print Name:_____

Date:_____ Date(s):_____

Exhibit-C

conEdison Consolidated Edison Company of New York Inc.
4 Irving Place, New York, N.Y 10003

GAS SLEEVE INSTALLATION AFFIDAVIT FORM

Gas Sleeve diameter: ☐ *in inches* *Sleeve Length:* ☐ *in feet*

Case Number (from the project center): MC# ☐

Job Name: ☐

Customer: ☐

Address: ☐

Contractor Name: ☐

Plumbing License No: ☐

This certifies that the sleeve described above has been installed according to the requirements and specifications listed in the Con Edison Yellow Book (Gas) and the specifications listed in this Customer Service Procedure and as a minimum meets the following criteria: *check all that apply below*

Sleeve meets all the specification requirements and is properly sealed ☐
Sleeve is vented if required per the required specification and local code ☐
Sleeve is installed at the location as specified by Con Edison ☐
Sleeve pictures display required measurements per instructions ☐

Gas Sleeve must extend 4 inches on the exterior wall and 1”-2” on the interior wall and must be watertight

Completed by:_____ Date:_____

This Page Reserved for Future Use

Welder Affidavit

Exhibit-E

The Customer, it's Agent or licensed Plumbing Contractor must submit a "Welding Affidavit" showing compliance with the local building codes in the Municipality where work was performed on customer distribution piping.

Contractor's Name_____
Address_____

This certifies that all welding on customer gas piping on premises
Located at:_____
Lot No:_____
Owner:_____
Has been performed by a welder who has previously been qualified in accordance with the stated welding requirements and all welding has been performed according to those requirements.

Date_____ Signed _____
Welder

_____
Plumbing Contractor

_____
LIC No

_____
Owner

Accepted for the Company by:_____

Date:_____

Consolidated Edison Company of New York, Inc
Certificate of Compliance

Exhibit-F

Dwelling Converting to Gas / Electric Heating
One of the following certificates shall be completed and signed:

a) I _____
(Owner)
am aware that the Minimum Insulation Standards for Standards for Dwellings converting to Gas / Electric Space Heating requires my house to have storm doors, storm windows and at least R-19 (usually six inches) roof insulation.

I certify that my building at _____
(Location)
Meets those requirements or that I have obtained a waiver and understand that should my building be found not in compliance, a 25 percent surcharge on my Company Bill may be imposed or gas / electric service may be disconnected.

The undersigned attests that all statements and representations contained in this certificate are true and accurate.

_____
Signature of Owner

_____
Address

b) I have inspected the building at _____
(Location)
Owned by _____ and certify that it meets the requirements of the Minimum Installation Standards for Dwellings Converting to Gas / Electric Space Heating.

The undersigned certifies that a properly executed copy of this certificate will be delivered to the owner and further attests that all statements and representations contained in this certificate are true and accurate.

_____ _____
Date Signature of Contractor

Accepted for the Company By: _____

_____
Date

Request for Waiver
Minimum Installation Standard

Exhibit-G

As the owner of the existing

- ☐ 1 Family Residence
- ☐ 2 Family Residence
- ☐ 3 Family Residence
- ☐ 4 Family Residence

At _____
(Location)

I request a waiver from Con Edison of the Minimum Installation Standards for Existing Building Converting to Gas or Electric Space Heating issued by the New York Public Service Commission for the following reason(s):

☐ Compliance with the Standards will result in a payback period of greater than seven years. (Two estimates are attached)

☐ The dwelling is a historical building.

☐ The overall heat loss of the building does not exceed the total heat loss which would result from conformance with the Minimum Insulation Standards. (An Engineering Certificate is attached)

_____ _____
(Signature of Owner) (Date)

_____
(Address)

Received by Consolidated Edison Company of New York, Inc.

_____
(Name and Title of Representative)

_____
(Date)

Consolidated Edison
Co. of New York, Inc.
4 Irving Place
New York NY, 10003

Interim and Final Gas Checklists

Exhibit-H

Dear Customer/Contractor:

Thank you for your interest in natural gas. In addition to any applicable local, city, state or federal codes, Con Edison has certain requirements that you must comply with in order to obtain gas service from us.

We have revised our **Interim Gas Checklist** and **Final Gas Checklist**, which are now two separate documents. Please note the requirements have changed. Included are additional requirements for customers who are converting from oil to natural gas. These checklists are tools which will assist you in complying with our requirements and help avoid delays in your project and/or failed Con Edison inspections.

Following completion of your associated work and our receipt of a completed Interim Gas Checklist, we will make arrangements with you/your contractor to perform an inspection of the work. In addition, we will perform a second inspection following our receipt of your completed Final Gas Checklist and the associated work.

As always, we appreciate your interest in gas and the opportunity to work with you on your project. Please feel free to contact us if you have any questions or concerns.

INTERIM GAS CHECKLIST (REQUEST FOR INSPECTION)

Further Action Required for Completion of Oil to Gas Conversion Work

Job Address:_____ **Borough:**_____ **Case No:** _____

Contractor Name:_____ **Phone No:**_____

Please indicate "Y" in the applicable box for completed items and "N/A" where items do not apply.

		To be Completed by Contractor			For Con Edison Use Only
Action Description		**Yes**	**No**	**N/A**	**Pass / Fail**
Sweep / Wall Sleeve installed and grouted flush					
Customer's trenches meet all requirements (depth, clearance, bed of sand, etc.)					
Customer pipe installed between property line and building line Pipe properly installed; tracer wire/marker balls installed; OQ cards submitted; PE Joints peer-checked and marked					
Underground steel piping is properly coated and cathodically protected (between property line and building line)					
As-Constructed Drawings submitted (with PE Plastic Joint Tracking Form, if applicable)					
Swing-over piping installed					
Pressure test affidavit for swing-over pipe					
Con Edison Hold Harmless Letter signed by customer					
Contractor is properly Operator Qualified (OQ) to perform this work, and has submitted all required OQ documentation to Con Edison					
OIL TO GAS CONVERSION WORK	Con Edison Natural Gas Commitment Letter signed by customer				
	Any required payments (other than security deposit) (e.g. customer contribution, accommodation costs, EDF costs)				

Please scan and upload this completed form and any associated documents into your case via Project Center at *https://apps.coned.com/esweb/login.aspx*.

FINAL GAS CHECKLIST (REQUEST FOR INSPECTION)

Further Action Required for Completion of Oil to Gas Conversion Work

Job Address:_____ Borough:_____ Case No:_____

Contractor Name:_____ Phone No.:_____

Please indicate "Y" in the applicable box for completed items and "N/A" where items do not apply.

		To be Completed by Contractor			For Con Edison Use Only
Action Description		**Yes**	**No**	**N/A**	**Pass/Fail**
City Cert./Municipal Affidavit Issued (#)					
Pressure testing affidavit					
Certificate of compliance					
Welder affidavit					
Customer's trench properly backfilled (with warning tape)					
Gas integrity test and turn-on affidavit					
Gas booster equipment installed					
Volume correctors are required for all turbine meters and all elevated pressure rotary and diaphragm meters					
Volume corrector location meets all clearances					
Turbine meters and rotary meters larger than 16M require temperature well downstream of meter					
Proper signage displayed for multiple gas services					
Adequate air supply for gas equipment ANSI Z223-1					
Ventilation as required in section IV in Gas Yellow Book					
Regulator vents must be located minimum of 18" from grade to center line of pipe and also 18" away from any intake vents or other locations where gas can enter a building					
Metering location meets all clearances					
Meter bar level, supported and part supplied marked					
Head of Service that is higher than 6 ft. require valve operator, permanent ladder or platform					
Load piping tied to meter bar					
Outdoor piping painted					
Gas piping sleeved and caulked between building and distribution piping					
All risers & appliances have appropriate isolation valves installed and accessible					
Any provision for future extension of distribution pipe must have a lockable (by Con Edison) isolation valve, with a plug/cap on the outlet of the valve.					
Vented gas appliances connected & ready to operate					
Commercial equipment on castors must have restraining chain installed					
Heating/AWH flue pitched & connected to chimney					
Heating/AWH flue checked for proper draft					
Vehicle protection bumpers installed					
Appropriate insulated/non-insulated couplings or flange kits installed					
OQ Affidavit: Contractor who performed the work was properly Operator Qualified (OQ) and has submitted all applicable OQ documentation to con Edison					
OIL TO GAS CONVERSIONWORK	Application for Service signed by Customer				
	Any required security deposit payments				

Please scan and upload this completed form and any associated documents into your case via Project Center at *https://apps.coned.com/esweb/login.aspx*.

PE Joint Visual Inspection Form

Note: Please schedule inspections through your Con Edison representative

Exhibit-I

GAS OPERATIONS PE PLASTIC JOINT TRACKING

M&S _____ **TICKET/ LEAK #** _____ **LOCATION** _____ **LAYOUT #** _____

JOINT #	DATE JOINED	JOINER ID #	SECOND INSPECTOR* ID #	PREFAB FUSE (YES/NO)	JOINT TYPE	PIPE SIZE (INCHES)	JOINT SUBTYPE	PIPE OUTLET SIZE (INCHES)	FUSION MACHINE ID #	HEATING IRON ID #	FACER ID #	Reviewed By	

JOINT TYPE:	JOINT SUBTYPE:
BF= Butt Fusion SF= Branch Saddle Fusion	M = Manual, H = Hydraulic
EF= Electrofusion,	C = Coupling, TT = Tapping Tee, SS = SPA Saddle, RP = Repair Patch
MJ= Mechanical Joint	BF = Bolted Fitting, NFF = Nut Follower, SEF = Stab-End Fitting, CF = Compression Fitting

PIPE SIZE ("): 0.5, 1, 1.25, 1.5, 2, 3, 4, 6, 8, 10, 12, 16, 18, 20, 24, 30, 36

OUTLET PIPE SIZE ("): 0.5, 1, 1.25, 1.5, 2, 3, 4, 6, 8, 10, 12

JOINT # : M (Mains), A (Main Tie-In), S (Service), T (Service Transfer), R (Service Reconnect), C (End Cap)

All plastic Joints must have two signatures

** Second Inspectors are for visual inspections of plastic joints*

Comments:

REV 6, 03/29/2018

Outdoor Gas Meter Waiver Form

Exhibit-J

Consolidated Edison Company of New York, Inc.
4 Irving Place
New York NY 10003

Outdoor Meter Waiver Request Form

Customer Name: _____

Service Address: _____

Case ID #: _____

Please mark all applicable options:

☐ Local building codes impede outside metering location (e.g. zoning)
(Must indicate designation) _____

☐ Landmarks Preservation Commission Status – Landmark and historic district façades
(Must provide documentation)

☐ Space constraints or physical barriers impede outside metering location
(e.g. Building line/property line same, emergency egress or ADA compliance)

☐ Security designation, sensitive buildings/structures designated by official agencies
(Must provide documentation from issuing agency)

☐ Customer refuses to provide consent for outdoor metering, and agrees to pay for any required inspections

Please note the following:

- *Placement of high pressure regulators is not subject to the above exemption criteria and in accordance with the codes and regulations of the State of New York, will be located outside unless safe or impractical to do so and will be assessed on a case-by-case basis.*
- *Customer meter installation guidance for inside meter installation requires the meter to be installed as close as reasonably practical to the exterior wall and provide for ready accessibility for Con Edison. Customer must provide the space for metering equipment as determined by the company.*
- *No exception will be granted for new 1-3 family residential homes*

Contact Information for 24/7 Meter Access

Name(s): _____

Phone Number(s): _____

Other: _____

Customer Signature: _____ Date: _____

I understand I am obligated to update this information within 48 hours of any changes.

Exhibit K

MINIMUM OUTDOOR GAS METERING SQ. FOOTAGE REQUIREMENTS

Spec. No. or Dwg. No.	Meter Drawing Title	Location Pressure System	Minimum Outdoor Footprint Required
308657	Installation of Parallel Fisher 2″, 3″, & 4″ EZR and 1098 Regulators with Turbine Meter 50,000 CFH and Larger	Indoor/Outdoor Medium/High	22'(L) x 8'(D) x 7'(H) for 6" 24'(L) x 8'(D) x 7'(H) for 8" 30'(L) x 8'(D) x 7'(H) for 12"
361100	Installation of Parallel 2" Regulators w/ Rotary Meter 10,000 CFH to 50,000 CFH	Indoor/Outdoor Medium/High	14'(L) x 8'(D) x 7'(H)
361571	Installation of Line Pressure 3" to 8" Turbine/Rotary Meters with Parallel 2" Regulators 15,000 CFH to 150,000 CFH	Indoor/Outdoor Medium/High	30'(L) x 8'(D) x 7'(H)
361693	Installation of Parallel 2″ Regulators with Turbine Meter 10,000 CFH to 60,000 CFH	Indoor/Outdoor Medium/High	22'(L) x 8'(D) x 7'(H)
365531	Installation of Meter Piping for Twin Class 3000R (2") to 23,000R (4") Rotary Gas Meters	Indoor Only Low/Medium/High	8'(L) x 5'(D) x 7'(H)
34872	Installation of B-838 Gas Regulator Unit	Indoor Only Medium/High	6'(L) x 4'(D) x 7'(H)
502164	Installation of B-838 Gas Regulators – 2" x 4" Flanged for Class 11000TC – 38000TC Rotary Meters	Outdoor Only Medium/High	6'(L) x 4'(D) x 7'(H)
506175	Installation of Meter Piping for Class 500TC to 1000TC Diaphragm Gas Meters	Outdoor Only Low/Medium/High	4'(L) x 3'(D) x 7'(H) CL500 5'(L) x 3'(D) x 7'(H) CL1000
506214	Installation of Twin Diaphragm Gas Meters Class 500TC to Class 1000TC	Indoor Only Low/Medium/High	7'(L) x 5'(D) x 7'(H)
507002	Installation of Meter Piping for Rotary Gas Meters Class 23000R (6") to 56000R (6")	Indoor Only Low/Medium/High	10'(L) x 4'(D) x 7'(H)
507003	Installation of Meter Piping for Twin Rotary Gas Meters Class 23000R (6") to 38000R (6")	Indoor Only Low/Medium/High	9'(L) x 6'(D) x 7'(H)
514486	Installation of Parallel 2" Regulators w/ Rotary Meter 10,000 CFH to 50,000 CFH	Outdoor Only Medium/High	8'(L) x 4'(D) x 7'(H)
514590	Installation of Parallel Regulators w/ Turbine Meter Outdoors 10,000 CFH and Larger	Outdoor Only Medium/High	13'(L) x 4'(D) x 7'(H) for 2" Reg. 4" Mtr. 14'(L) x 4'(D) x 7'(H) for 2" Reg. 6" Mtr. 17'(L) x 4'(D) x 7'(H) for 2" Reg. 8" Mtr. 18'(L) x 4'(D) x 7'(H) for 3" Reg. 8" Mtr. 22'(L) x 4'(D) x 7'(H) for 3" Reg. 12" Mtr. 23'(L) x 4'(D) x 7'(H) for 4" Reg. 12" Mtr.
514789	Installation of Outdoor Low Pressure Gas Turbine Meter	Outdoor Only Low	7'(L) x 4'(D) x 7'(H) for 4" 8'(L) x 4'(D) x 7'(H) for 6" 10'(L) x 4'(D) x 7'(H) for 8" 15'(L) x 4'(D) x 7'(H) for 12"
EO-7421-B	Installation of Twin Diaphragm Gas Meters Class 250 TC	Indoor Only Medium/High	6'(L) x 4'(D) x 7'(H)
EO-13977-C	Installation of Meter Piping for Rotary Gas Meters Class 3,000R (2") to 23,000R (4")	Indoor Only Low/Medium/High	10'(L) x 4'(D) x 7'(H)
EO-14158	Installation of Gas Service Regulators (1" to 2")	Indoor Only Medium/High	4'(L) x 3'(D) x 7'(H)
EO-14166	Installation of Twin Gas Regulators (1" to 2")	Indoor Only Medium/High	7'(L) x 5'(D) x 7'(H)
EO-16390-B	Installation of Low Pressure Gas Turbine Meters	Indoor/Outdoor Low	21'(L) x 7'(D) x 7'(H)
EO-16511-B	Installation of Meter Piping for Class 3000R-TC to Class 23,000R-TC Rotary Meters	Outdoor Only Low/Medium/High	5'(L) x 4'(D) x 7'(H)
EO-16585-A	Installation of Meter Piping for Class 250TC Diaphragm Gas Meters	Outdoor Only Low/Medium/High	1 Meter - 4'(L) x 3'(D) x 7'(H) 2 Meter - 5'(L) x 3'(D) x 7'(H) 3 Meter - 7'(L) x 3'(D) x 7'(H)
EO-16726-A	Installation of 2 to 6 Unit Prefabricated Meter Sets for Class 250TC Meters	Indoor/Outdoor Low/Medium/High	4 Meter - 6'(L) x 3'(D) x 7'(H) 6 Meter (3 Over 3) - 4'(L) x 3'(D) x 7'(H) 6 Meter (T Conf.) - 8'(L) x 3'(D) x 7'(H)
EO-16886-A	Installation of Multiple Class 250TC Gas Meters	Indoor Only Low/Medium/High	13'(L) x 4'(D) x 7'(H)
EO-511327	Installation of Class 250TC Diaphragm Gas Meter	Indoor Only Low/Medium/High	4'(L) x 4'(D) x 7'(H)
G-316 Aka EO-7420	Installation of Class 500TC to Class 1000TC Diaphragm Gas Meter	Indoor Only Low/Medium/High	4'(L) x 5'(D) x 7'(H)

Ways to Pay your Bill

Exhibit-L

Our fast, efficient, and convenient payment options make it easy for you to do business with us.
In addition to the options listed below, please visit http://www.coned.com/customercentral/paymentoption.asp to see what option works best for you.

In Person

Customer Service Walk-In Centers are open Monday through Friday from 8:30 a.m. to 5 p.m.

- **Bronx**
  1775 Grand Concourse (Between 174th & 175th streets). Mon-Fri 8:30am-5pm. Exact Payments only
- **Brooklyn**
  One Metrotech Center (at Jay Street) @ National Grid. Mon-Fri 8:30am-5pm Exact Payments only
- **Manhattan**
  122 East 124th Street (at Park Avenue)
  Mon-Fri 8:30am-5pm. Exact Payments only
- **Queens**
  89-67 162nd Street, Jamaica @ National Grid. Mon-Fri 8:30am-5pm. Exact Payments only
- **Staten Island**
  1140 Richmond Terrace (at the corner of Bard Avenue). Mon-Fri 8:30am-5pm. Exact Payments only
- **Westchester**
  Food Bazaar Supermarket
  1 Bogopa Plaza, Mt. Vernon (corner E.3rd St & S.3rd Ave).
  Mon- Fri 8:30am-5pm. Exact Payments only

e* bill: Good for you, good for the environment!

e*bill is a free and easy way to receive, view, and pay your Con Edison bill online while protecting the environment. More than a million customers now pay or receive their energy bills electronically—saving more than 112,000 pounds of paper and more than 1,300 trees, and preventing the release of more than 6,300 pounds of greenhouse gases each year. Use the green calculator located at www.payitgreen.org and see how receiving and paying your bill electronically helps reduce your carbon footprint.

Direct Payment

With nothing to mail, no checks to write, and no stamps to buy, Con Edison's Direct Payment Plan saves you time and money. It's easy, simple, free, and convenient.

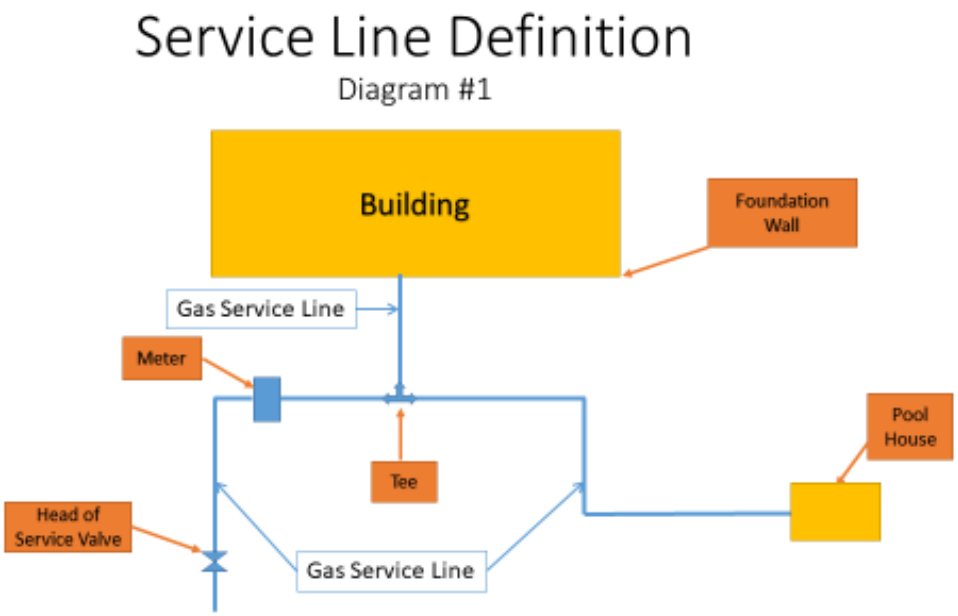
Pay-by-Internet

If you have a bank account and access to the Internet, you can use the Pay-by-Internet program. The program is a secure and free way to transmit payment directly from your account.

Gas Service Line scenario sketches

Exhibit-M

Color Key:
= Gas Service Line
= Customer Piping

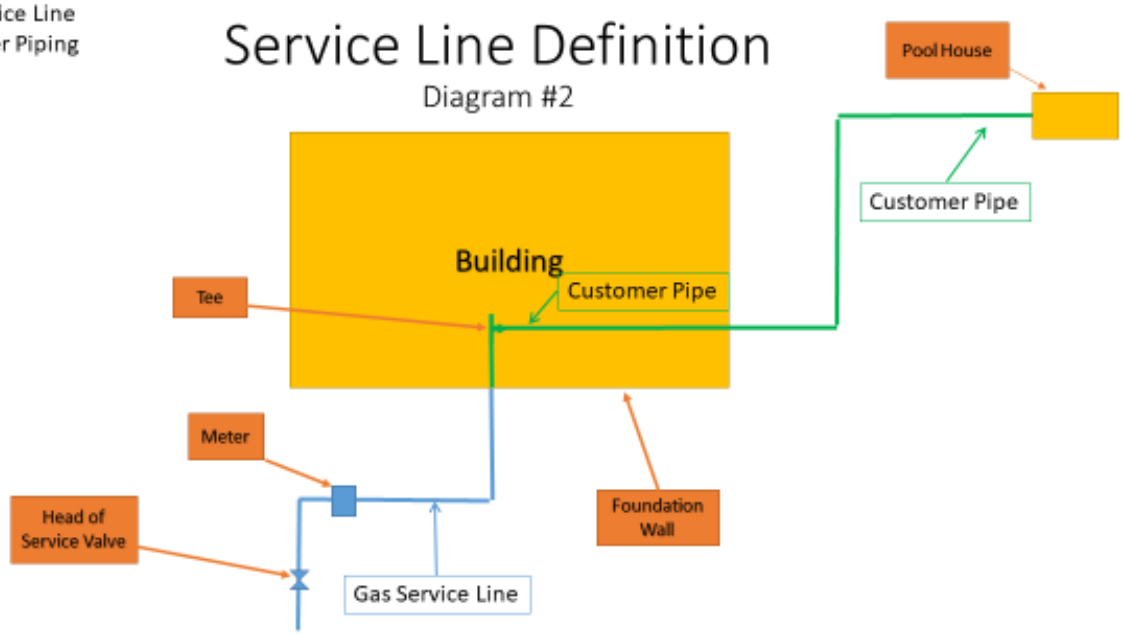


Note: The purpose of this diagram is to depict the jurisdiction of Gas Service Line vs. Customer Piping. It does not identify areas along the Gas Service Line for which the customer is responsible, per Con Edison's tariff agreements.

Color Key:
= Gas Service Line
= Customer Piping

Service Line Definition

Diagram #2

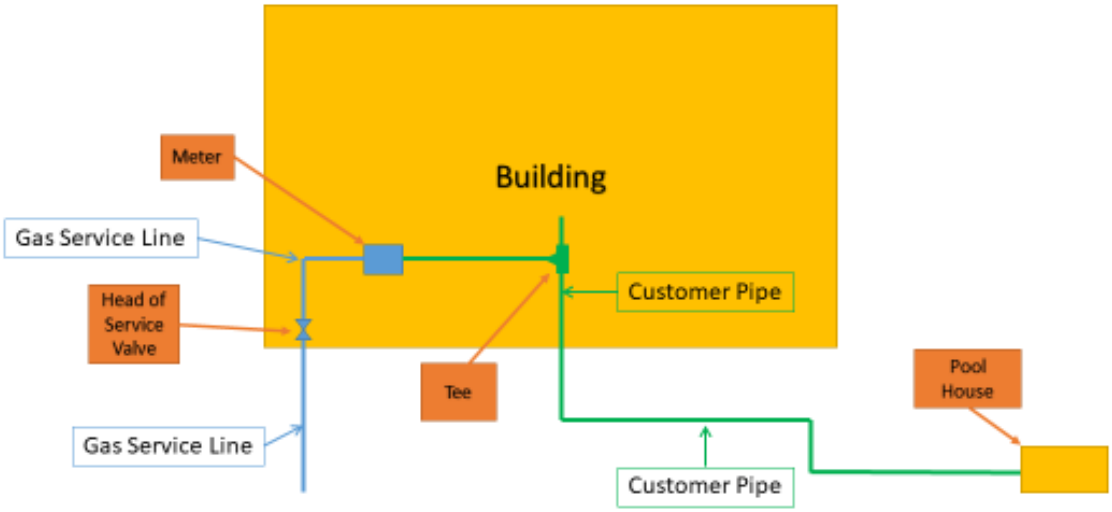


Note: The purpose of this diagram is to depict the jurisdiction of Gas Service Line vs. Customer Piping. It does not identify areas along the Gas Service Line for which the customer is responsible, per Con Edison's tariff agreements.

Color Key:
= Gas Service Line
= Customer Piping

Service Line Definition

Diagram #3

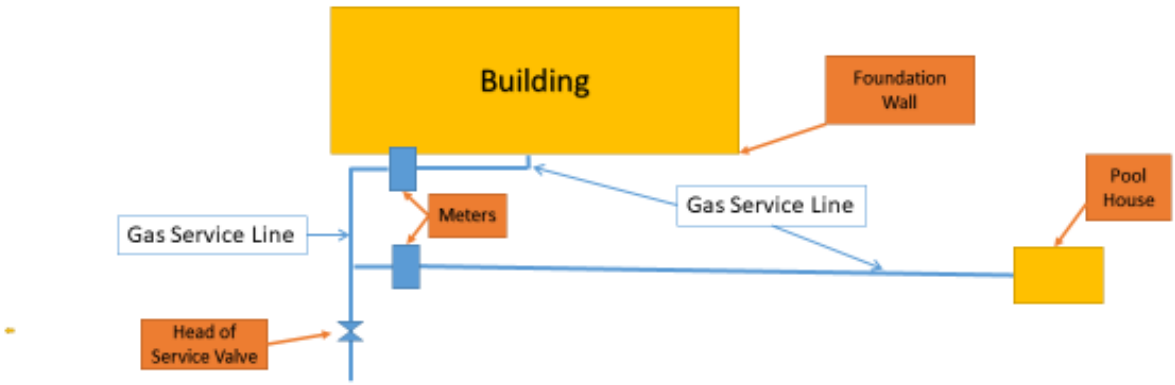


Note: The purpose of this diagram is to depict the jurisdiction of Gas Service Line vs. Customer Piping. It does not identify areas along the Gas Service Line for which the customer is responsible, per Con Edison's tariff agreements.

Color Key:
= Gas Service Line
= Customer Piping

Service Line Definition

Diagram #4

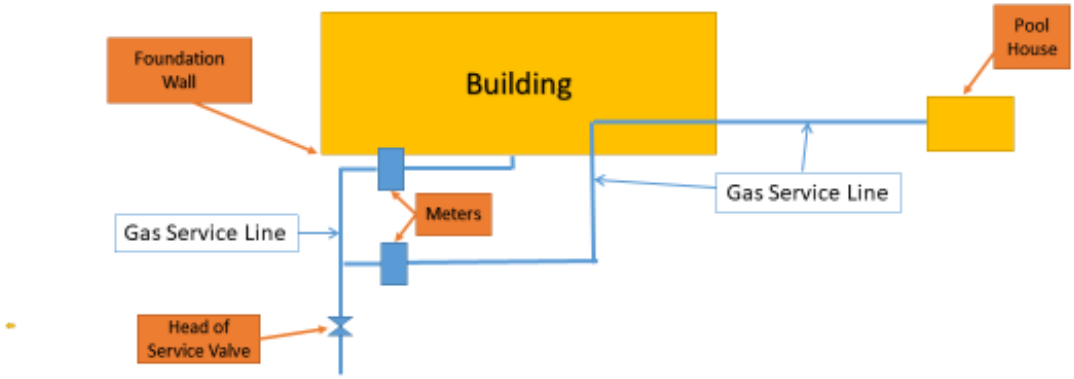


Note: The purpose of this diagram is to depict the jurisdiction of Gas Service Line vs. Customer Piping. It does not identify areas along the Gas Service Line for which the customer is responsible, per Con Edison's tariff agreements.

Color Key:
= Gas Service Line
= Customer Piping

Service Line Definition

Diagram #5



Note: The purpose of this diagram is to depict the jurisdiction of Gas Service Line vs. Customer Piping. It does not identify areas along the Gas Service Line for which the customer is responsible, per Con Edison's tariff agreements.

CT87 is **not** required for the piping inside of the building. This pipe is subject to NYC Fuel Gas Code or other AHJ jurisdiction requirements outside of NYC. **For final connection at the meter – CT87 is required.**

Diagram 6: below grade piping, with indoor meter

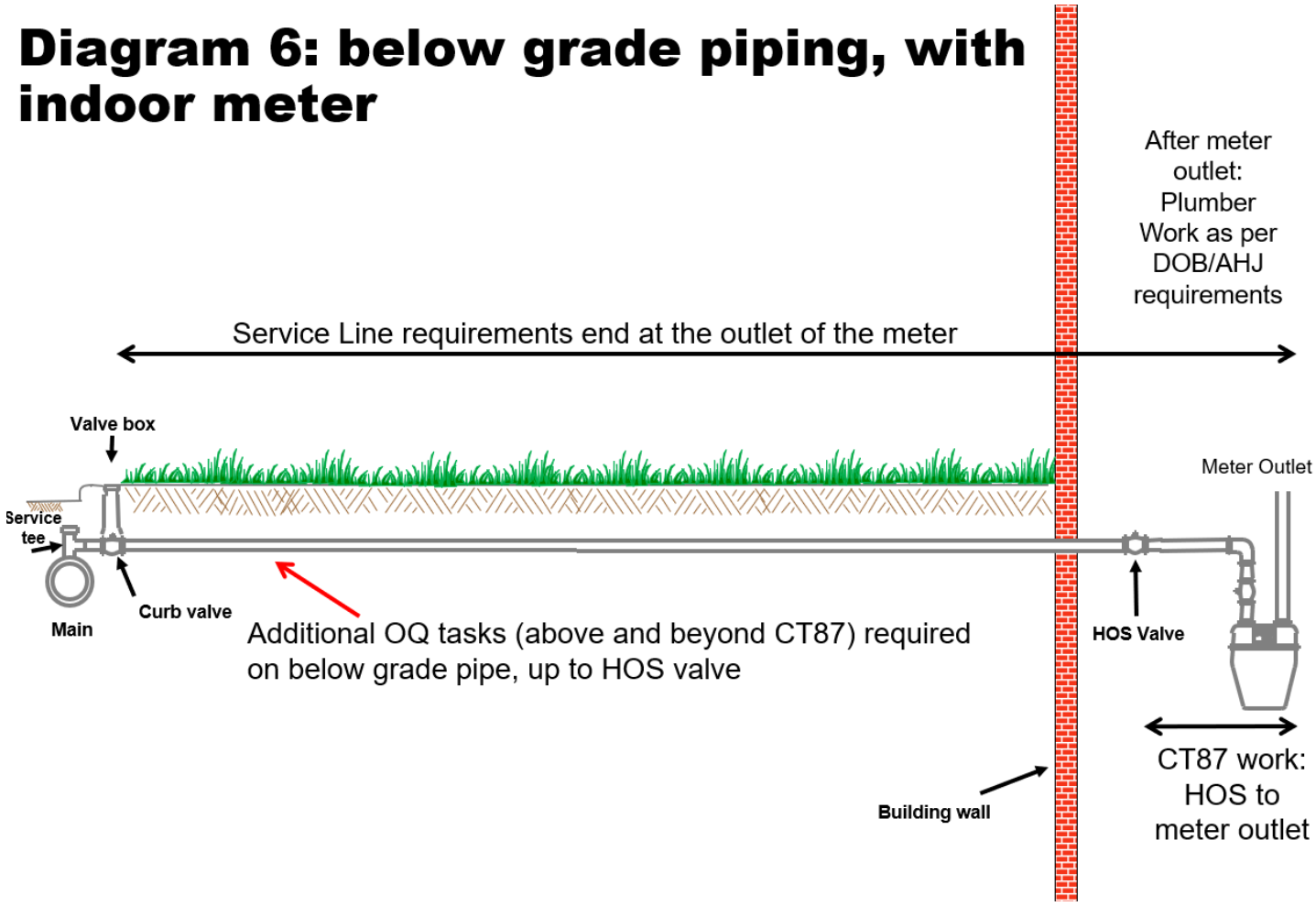


Diagram 7: below grade piping, with outdoor meter

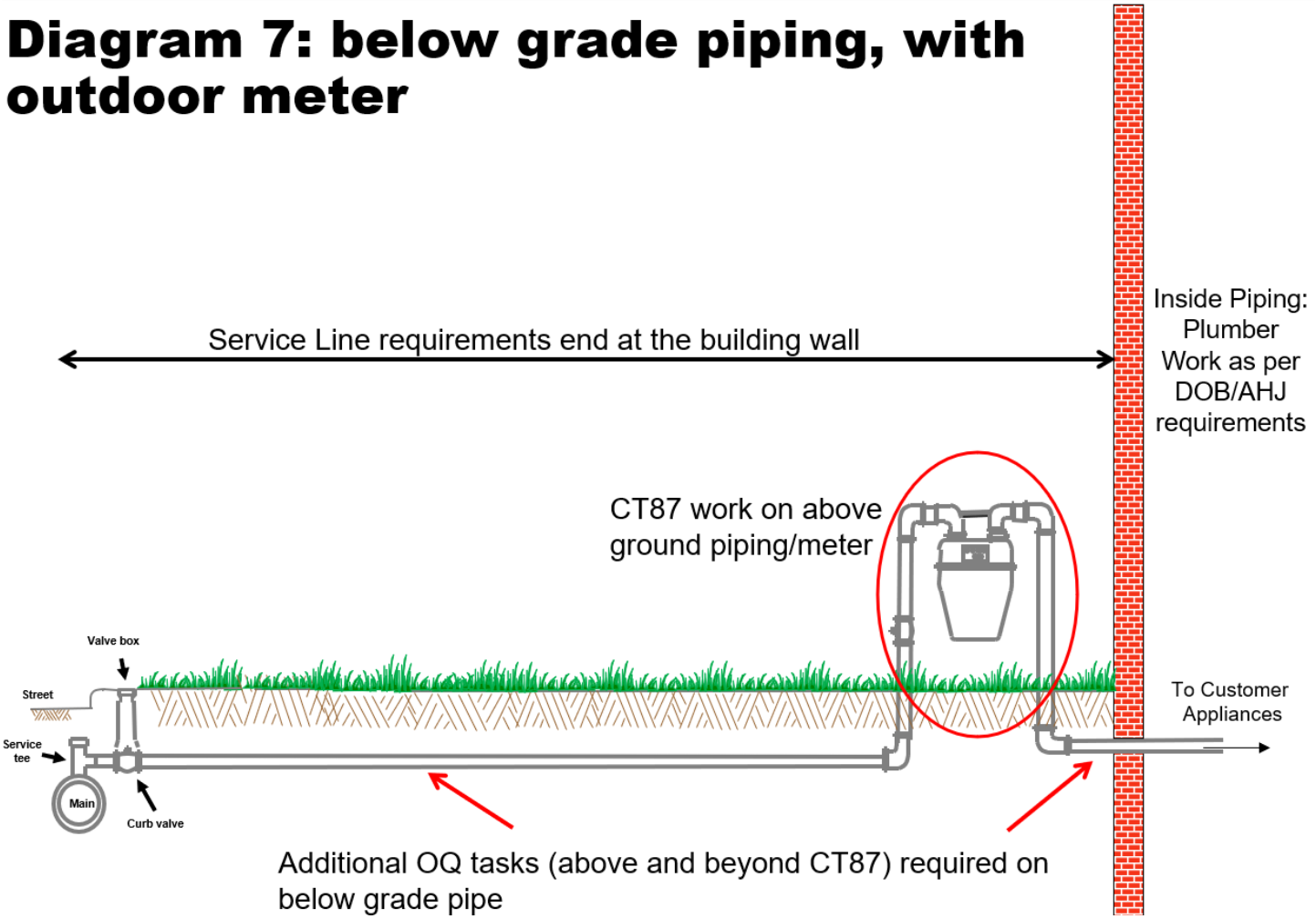


Diagram #8

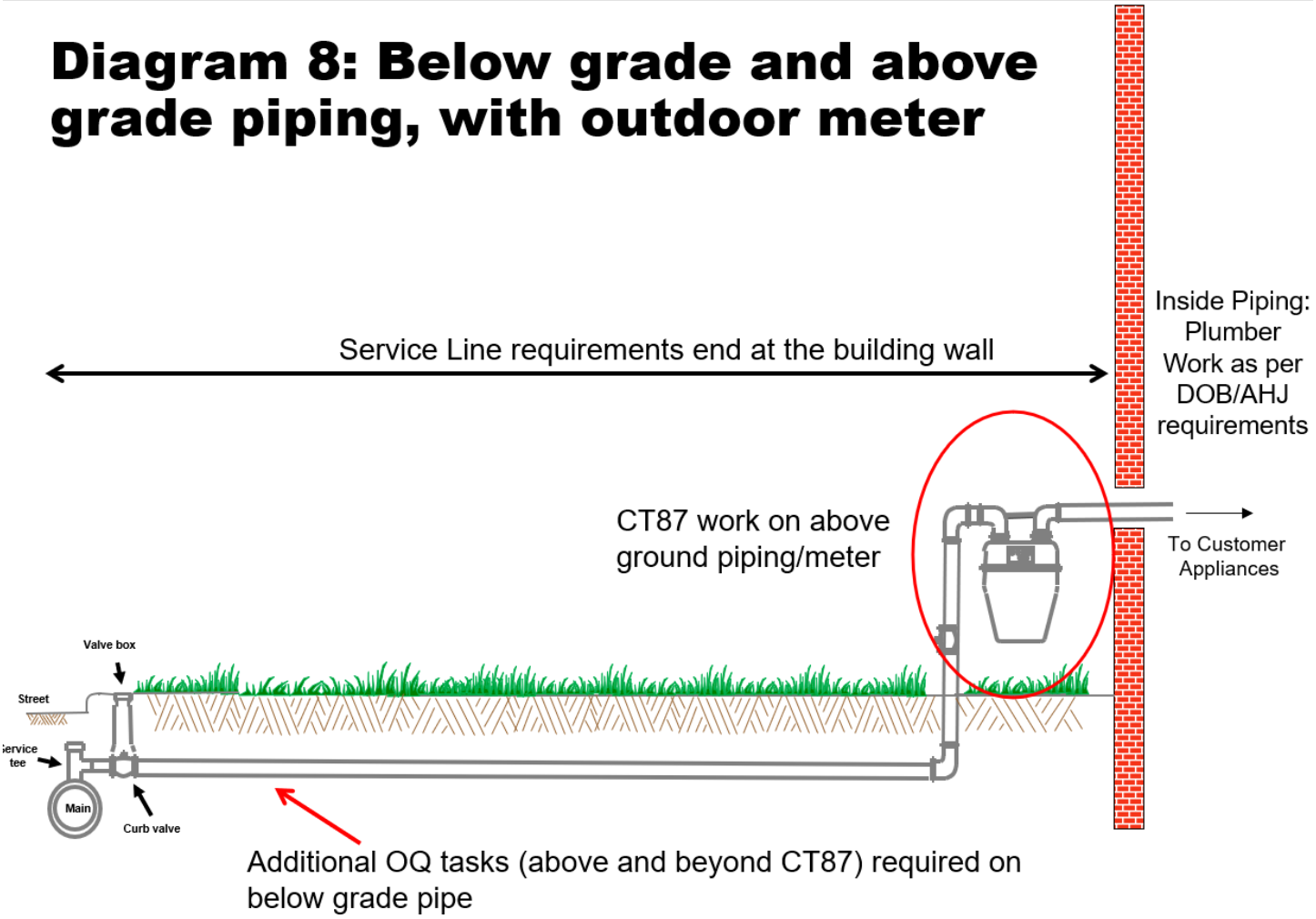


Diagram 8: Below grade and above grade piping, with outdoor meter
Service Line requirements end at the building wall
Inside Piping: Plumber Work as per DOB/AHJ requirements
CT87 work on above ground piping/meter
To Customer Appliances
Valve box
Street
Service tee
Main
Curb valve
Additional OQ tasks (above and beyond CT87) required on below grade pipe

The Following drawings (Drawings 9-15) are to be used as reference to Utility Jurisdiction piping and OQ requirements when installing Generator or storm hardening projects. All below grade piping must comply with all applicable con Edison specifications including cathodic protection where required in addition to all the OQ – Below Grade Requirements

Diagram #9
Additional below grade requirements apply

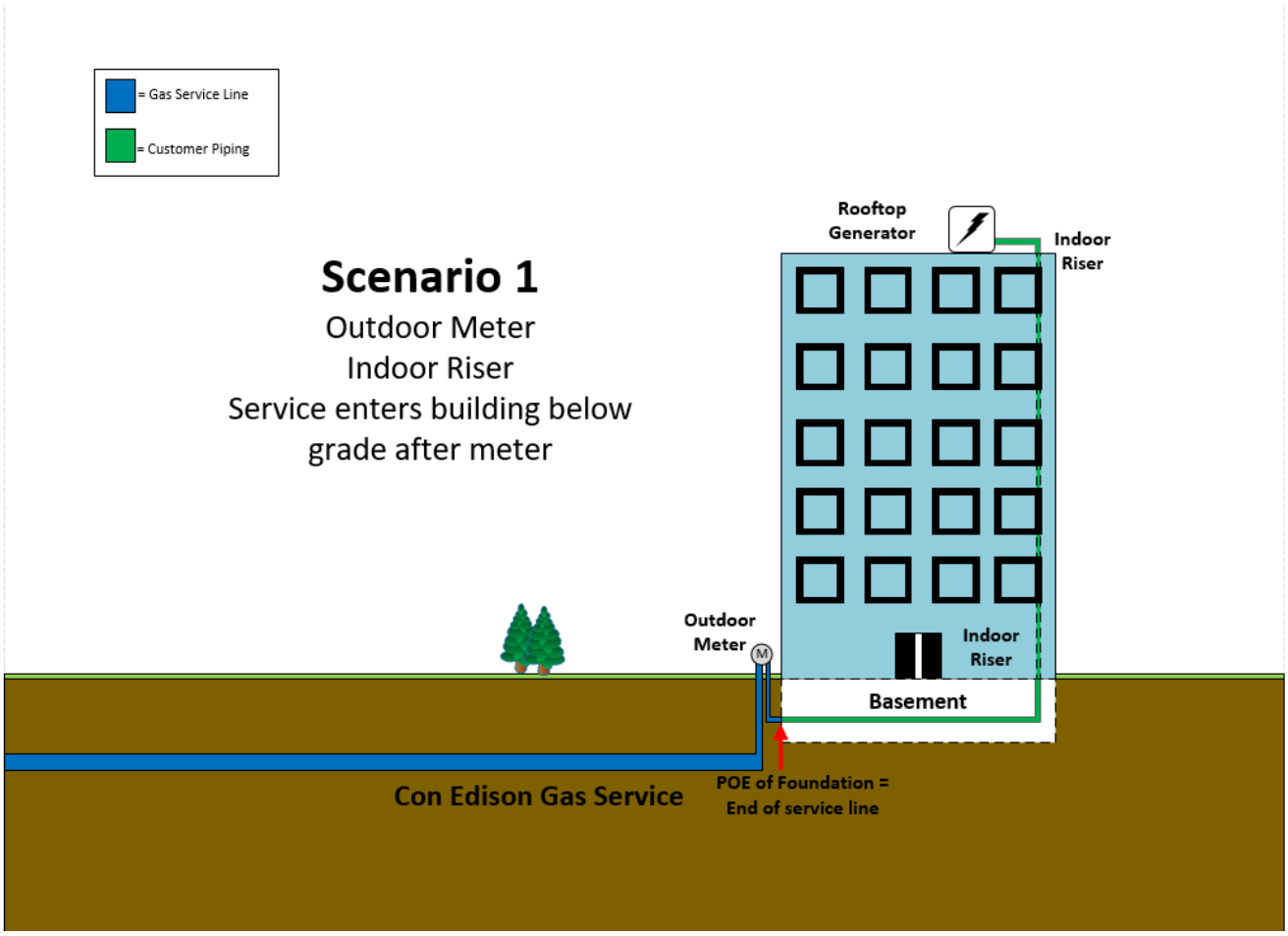


Diagram #10

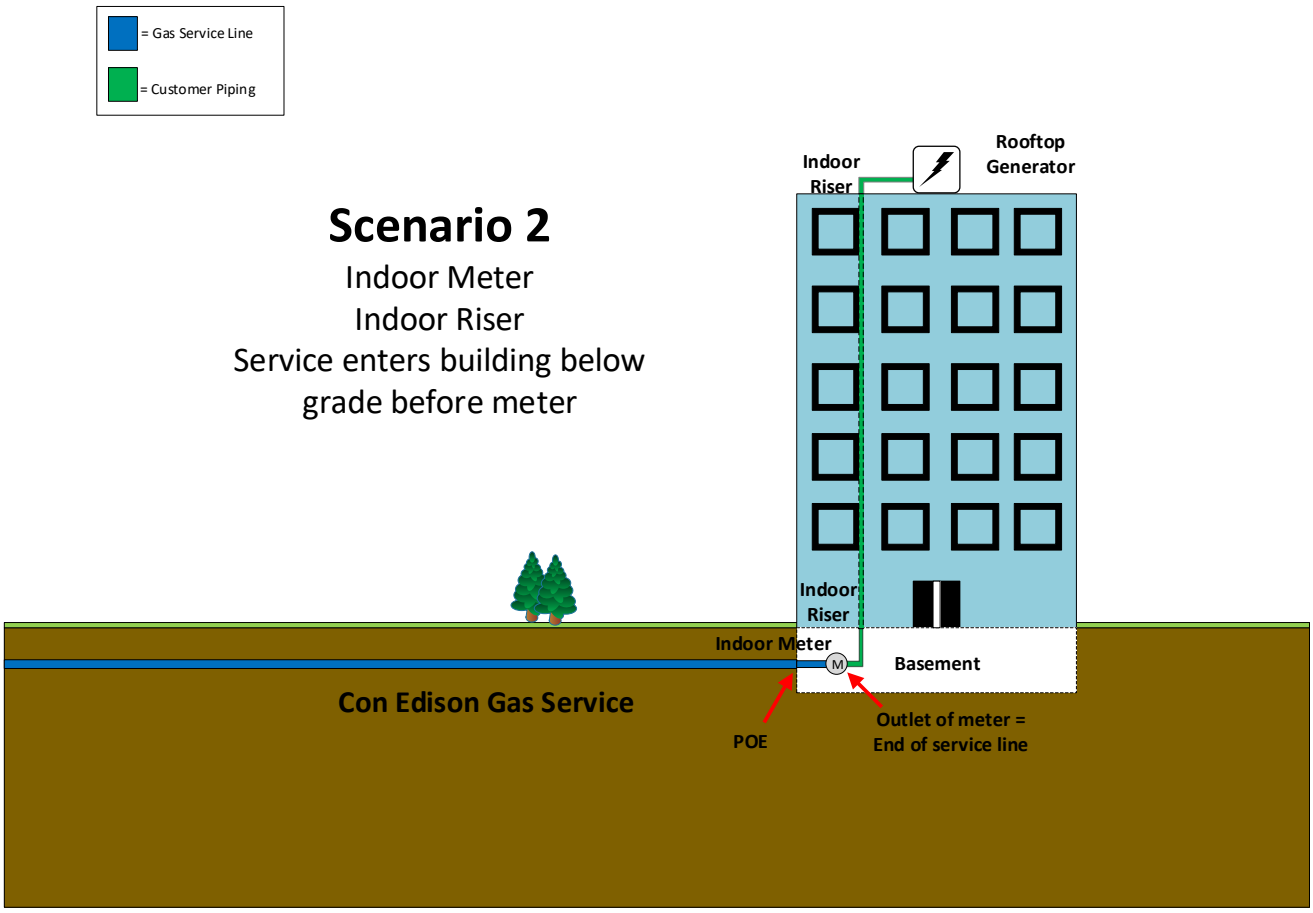

= Gas Service Line
= Customer Piping
Scenario 2
Indoor Meter
Indoor Riser
Service enters building below grade before meter
Indoor Riser
Rooftop Generator
Indoor Riser
Indoor Meter
Basement
Con Edison Gas Service
POE
Outlet of meter = End of service line

Diagram #11
Additional below grade requirements apply

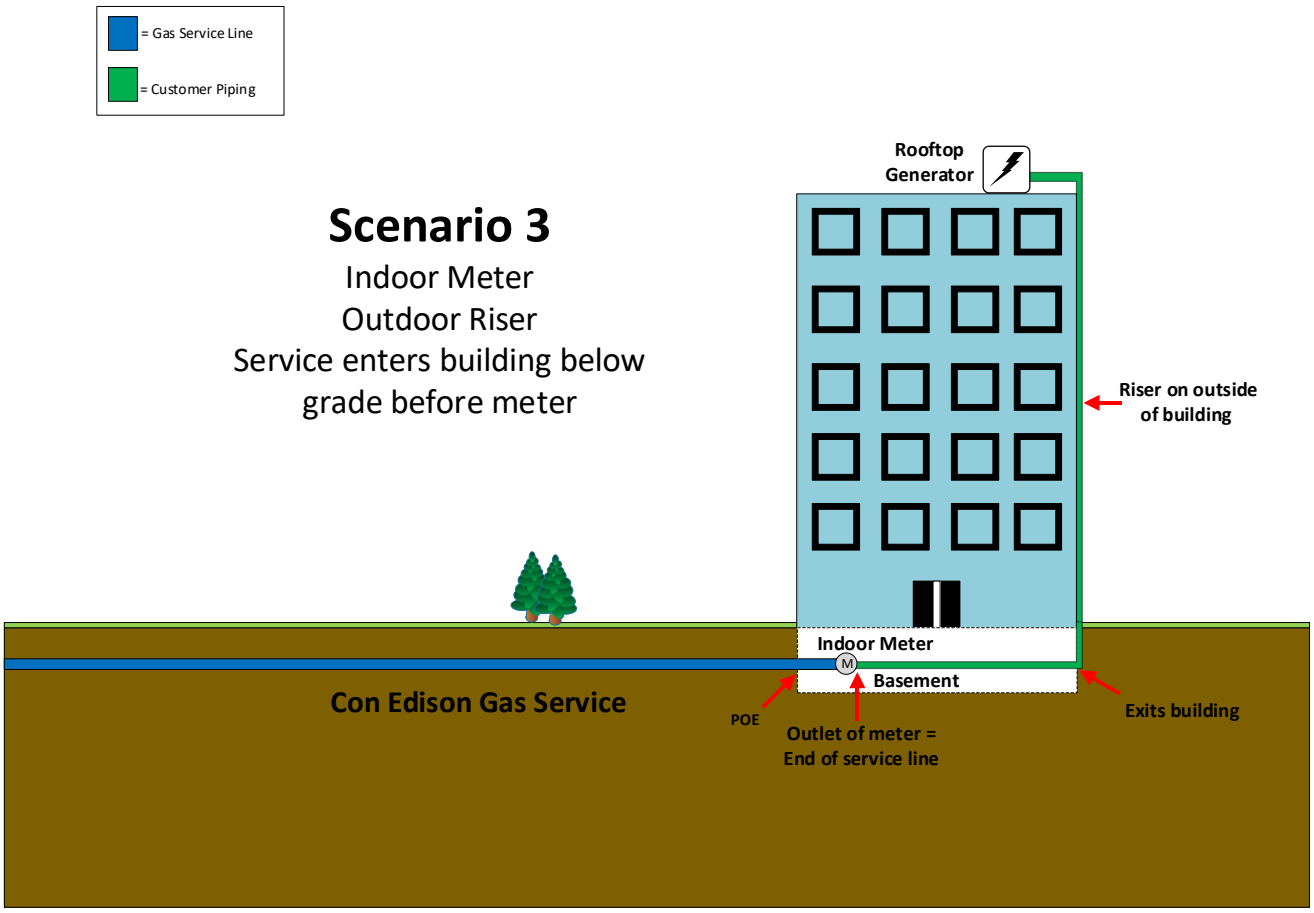


Diagram #12
Additional below grade requirements apply

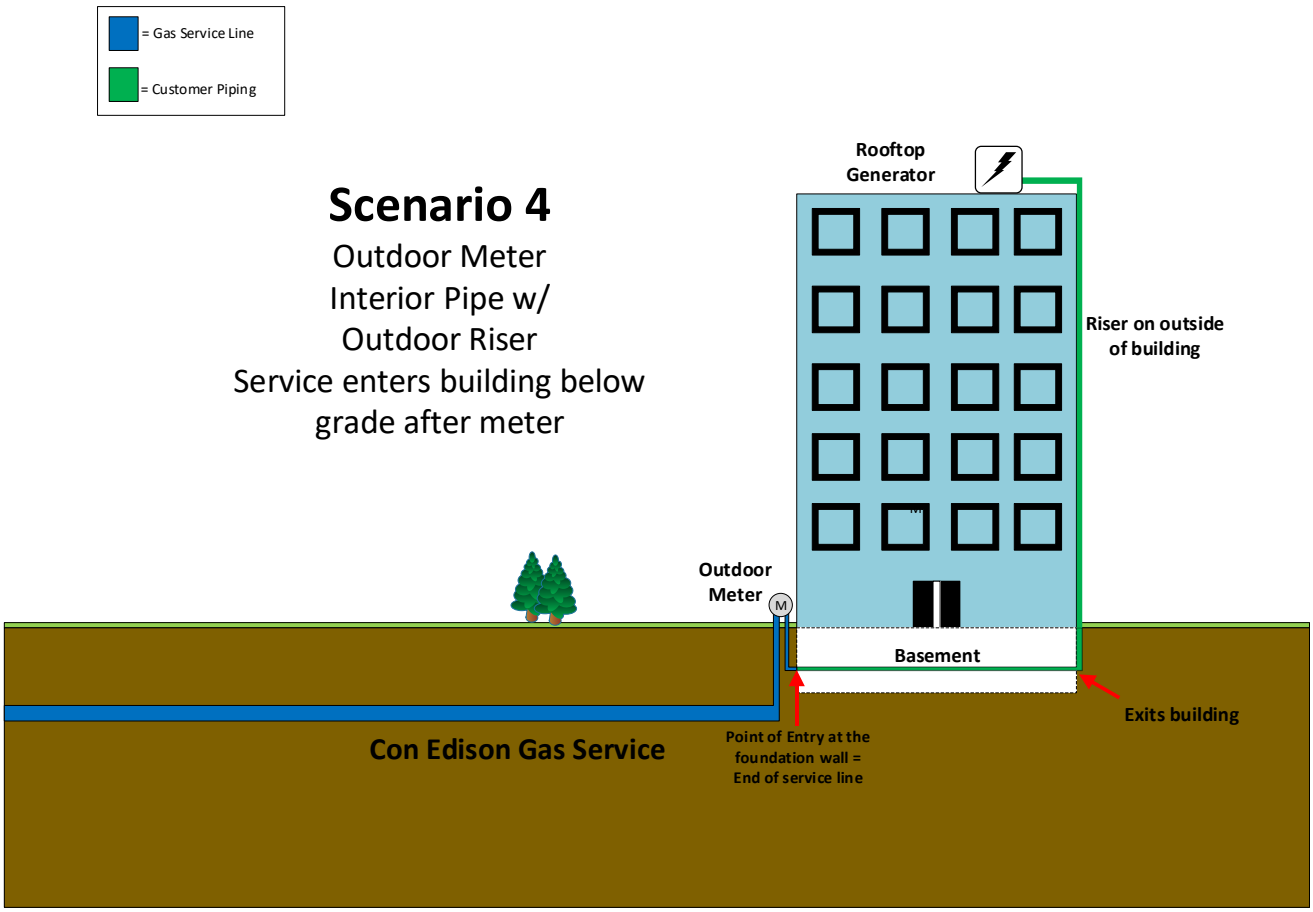


Diagram #13
Additional below grade requirements apply

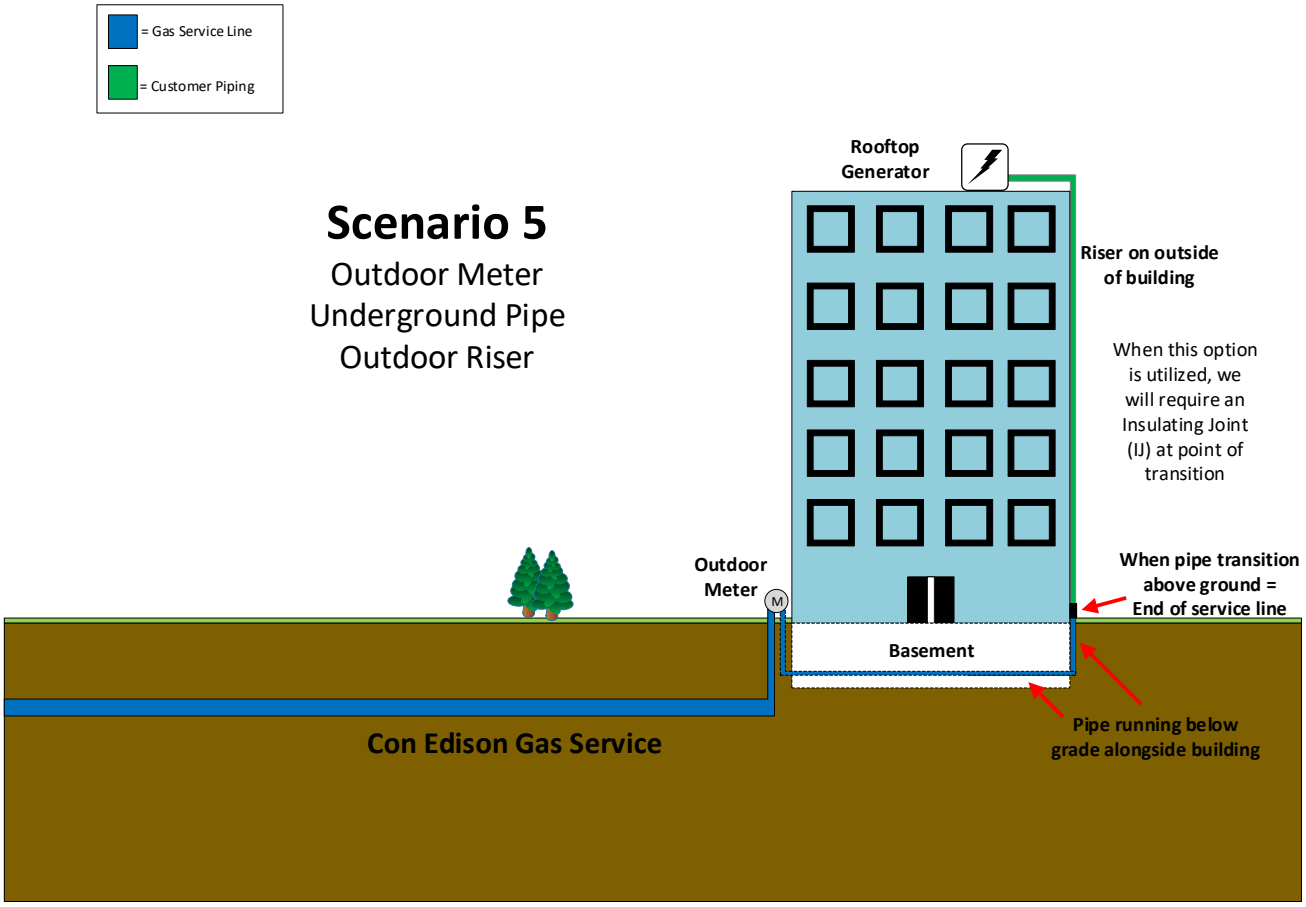


Diagram #14

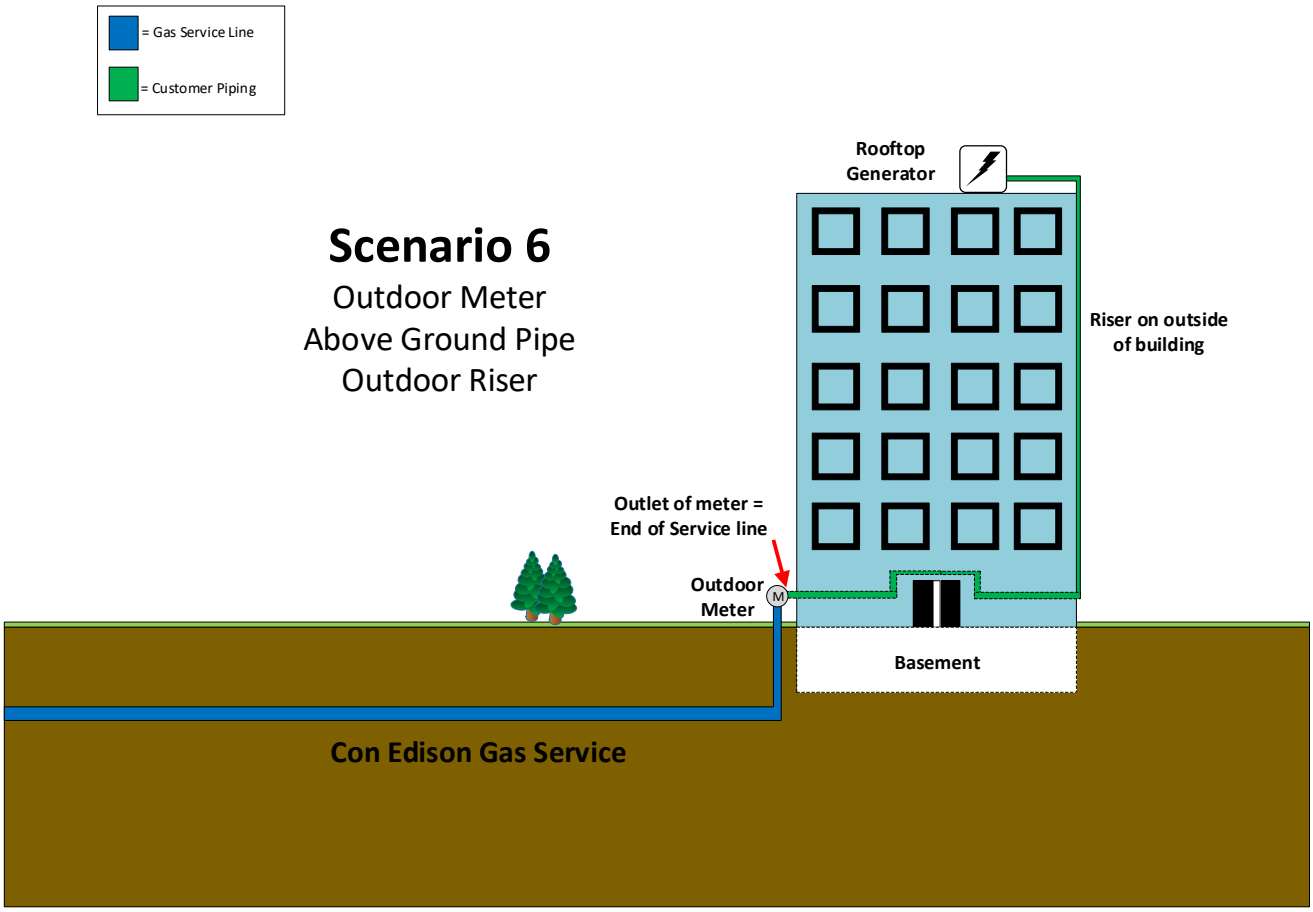
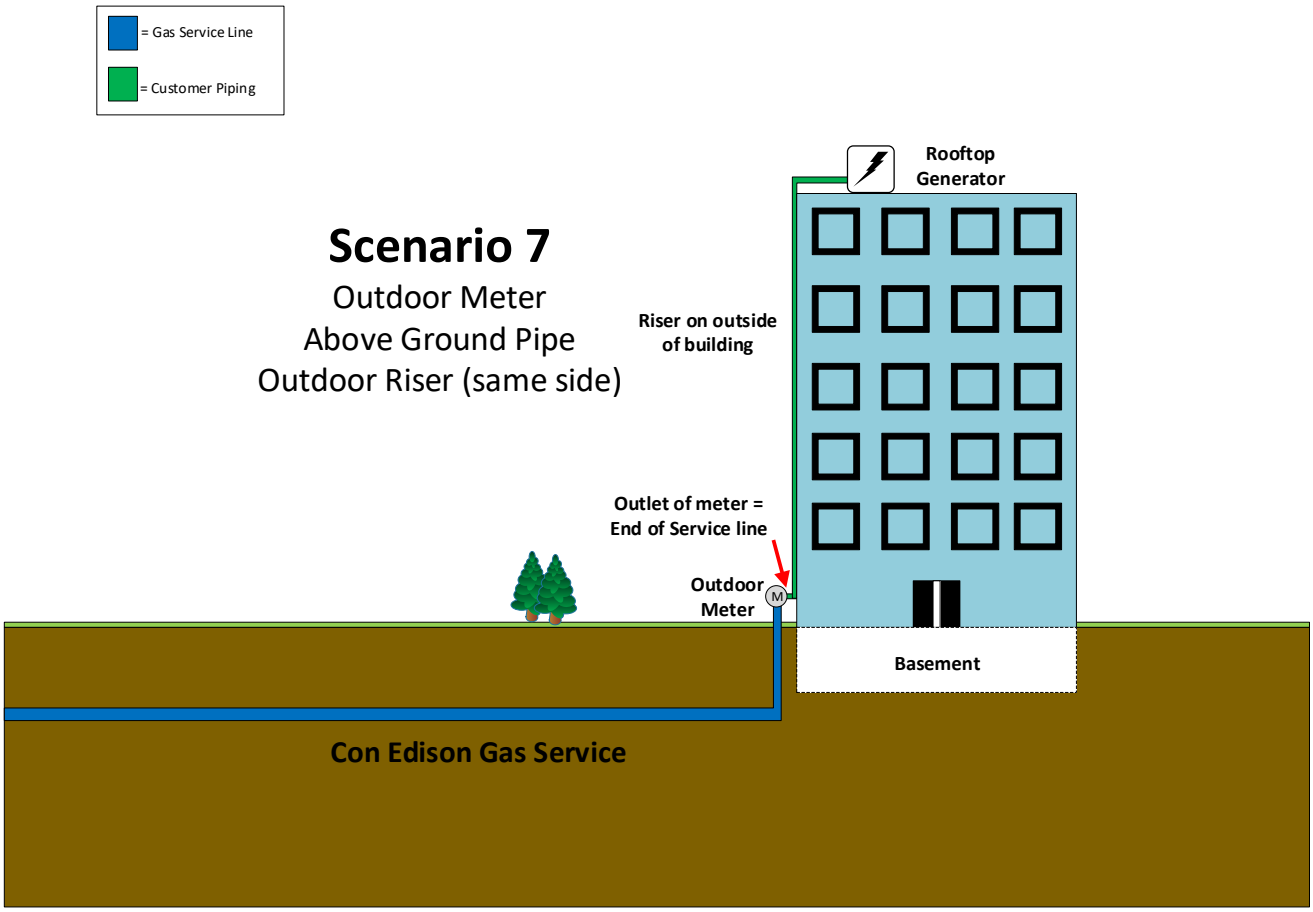

= Gas Service Line
= Customer Piping
Scenario 6
Outdoor Meter
Above Ground Pipe
Outdoor Riser
Rooftop
Generator
Riser on outside
of building
Outlet of meter =
End of Service line
Outdoor
Meter
M
Basement
Con Edison Gas Service

Diagram #15


= Gas Service Line
= Customer Piping
Rooftop Generator
Scenario 7
Outdoor Meter
Above Ground Pipe
Outdoor Riser (same side)
Riser on outside of building
Outlet of meter = End of Service line
Outdoor Meter
M
Basement
Con Edison Gas Service

Revisions

Revision One Updates, Additions and Omissions – September, 2014		
Page No.	**Section**	**Description**
2	-	Changed Revision Date and updated Edition Year.
6	TOC/Section 1	Added "O" – Flat Rate Policy.
6	TOC/Section 1	Added "P" – Termination and Reconnection of Gas Service.
7	TOC/Section 4	Added "I" – Commercial & Industrial Equipment Interaction.
	TOC/Reference Material	Added "Westchester County-Meter Piping Pressure Test Verification form, re-numbered Page No.'s and changed Exhibit Titles.
	TOC Revisions	Added Updates, Additions and/or Omissions (July, 2014).
10	-	Changed No. 6 in Step-2 to read "*Gas Cost Estimates*" are….
11	-	Changed No. 5 in Step-4 to reflect new Page. No.'s.
23	Section 1 – C	Changed to read "*are valid six (6) months*".
25	Section 1 – M	Changed Exhibit and associated Page No.'s.
26	Section 1 – M	Deleted d) Con Edison requires a "Statement of Chimney Service" in NYC and Westchester County for these installations that are converting to gas home heating.
27	Section 1	Added Section "O" titled "Flat Rate (Maintain integrity of gas piping during building swing-over)". Added Section "P" titled "Termination and Reconnection of Gas Service".
28	Section 2 – A	Changed No. 6 to read *"Gas services are to be properly sleeved and vented per* ***EO-4890*** *titled* ***"Service Pipe / Tubing and Service Sleeve through Vault, Open Areaway, Open Area under Stairs, Under Enclosed Area and Vaulted Basement"****. If the customer elects to build and/or add an extension over an existing gas service, the customer will bear the full cost to sleeve and vent the existing gas service or the full cost to off-set same."*
30	Section 2 – C	Added bullet: •The company has the right to refuse service and make the customer change out the piping at customer / plumber's expense when the piping size is found to be inadequately sized.
32	Section F	Changed g) tracer wire from yellow to "red".
34	Section 2 – J-B	b) Westchester County b) Changed Exhibit and associated Page No.'s. Updated "Note" - Replace "in excess of LP" with "not Distribution Piping" and added ".

36	Section 2 – N	Added bullet(s): • Steel services installed prior to 1972 that have been disconnected due to unplanned work (e.g. leak repairs, contractor damages, no gas investigations, removing a blockage from a service, etc.) shall be replaced per the requirements in Section 2 of the Yellow Book. • PPE plastic, copper, & steel services installed after 1971 that have been disconnected due to unplanned work (e.g. leak repairs, contractor damages, no gas investigations, removing a blockage from a service, etc.) may be reconnected by Con Edison after the service pipe is pressure tested from the point of disconnect to the service head valve per Section 2(M) of the Yellow Book.

37	Section 2 – N	b) Changed Page No. for Exhibit Reference.
39	Section 2 – Q	b) Changed Page No. for Exhibit Reference for Certificate of Compliance" form. Note Changed Page No. for Exhibit Reference for REQUEST FOR WAIVER - MINIMUM INSULATION STANDARD" form.
40	Section 2 – R Emergency Natural Gas Generator	*a)* Added: *In New York City, where a building is required to maintain emergency power equipment i.e. elevator bank, emergency lighting, fire pumps and the customer elects natural gas as the fuel source for the emergency generator, the customer is required to install a separate gas service and shut-off valve as per NYC Fire Department Rule. The Customer shall pay all costs associated for the second gas service under Excess Distribution Facility (EDF). See "Rates and Terms of Service" (pg. 24) and Special Services Provided at Cost (pg. 25) of this guide.* *b)* Added: *Where a customer elects to install a natural gas generator for storm and natural disaster preparedness and the existing gas service is no longer adequate, the Customer shall pay all costs associated with the installation including, if necessary, all costs for system reinforcement, gas mains and additional gas service. See "Rates and Terms of Service" (pg. 24) and Special Services Provided at Cost (pg. 25) of this guide.*
43	Section 3 – C	Added "*for residential usage*" and changed font to BOLD and red.
45	Section 4 – A	3. Added "*piping for a gas diaphragm*" and "*For rotary gas meters, refer to applicable gas meter drawing specifications*".
47	Section 4 – C	Under b) Indoor Installations: No. 4 Changed to read "*Gas meters may not be placed within*" three feet (3') of either side of an electric meter.
47	Section 4 – C	Under b) Indoor Installations: No. 5 Added "*for large general, mix-used buildings as per NYC Fuel Gas Code, Appendix G).*"
49	Section 4 – I	Added new Section I titled "Commercial & Industrial Customer Equipment Interaction with Con Edison Gas Regulator and Gas Meter".
59	Gas Reference Definitions	Added new "Meter Piping" Definition. *Meter Piping: Also known as, extension service pipe from the first fitting inside the building and the gas utility meter. Customer's plumber is responsible to meet all company specifications, procedures and drawing requirements. A NYC Meter Piping Pressure Test Verification form will be required.*
62	Gas Reference Specifications and Drawings	G-695 Updated to reflect most current revision date (02/18/2014).
		308657 R8 Updated to reflect most current revision date (07/15/2014).
		361571 R4 Updated to reflect most current revision date (07/15/2014).
		361693 R3 Updated to reflect most current revision date (07/15/2014).
		G-690-R5 – EO-16310-B Updated to reflect most current revision date (07/15/2014).
		EO-14134-C Updated to reflect most current revision date (01/28/2014).
		EO-16511-B R10 Updated to reflect most current revision date (07/15/2014).

		EO-16585-A Updated to correct most current revision date (07/19/2011).
		361100 R3 Updated to reflect most current revision date (07/15/2014).
		G-8094-9 Updated to reflect most current revision date (04/28/2014).
		G-2041 / 359677 Updated to correct most current revision date (03/26/2012).
63	Gas Reference Specifications and Drawings	G-703 Updated to reflect most current revision date (04/09/2014).
		G-11836-13-IGa Updated to reflect most current revision date. (09/11/2013). Interim revision reflects recent approval and use of a new higher volume excess flow valve.
		G-11837 Updated to reflect most current revision date (01/24/2014).
		G-414 aka EO-14166 Added specification after being over looked in initial publication. Titled: "*Installation of Twin Gas Regulators Indoors (1" – 2"*)".
		502163 R0 Added New Gas Metering Specification titled: "*Bumper Installation*".
		502164 R0 Added New Gas Metering Specification Drawing titled: "*Outdoor Installation of B-838 Gas Regulators – 2"x4" Flanged for Class 1000TC – 38000TC Rotary Meters.*
		G-704 Added New Gas Metering Specification titled: "*Gas Meter and Regulator Installation Requirements*".
		EO-16726-A Added specification after being over looked in initial publication. Titled: *Installation of 2 to 6 Units Prefabricated Meter Sets for Outdoor Class 250TC Meters.*
65	Approved Gas Service Equipment Tables	Table 1-A Added Dresser valves to table. Added 1 ¼" valve to table. Added Walworth valve 1797 F to table. Table 1-A and Table 3 Highlighted (in yellow) those valves designed and approved for use on operating pressures greater than 1 PSIG.
		Table 5 Added A.Y. McDonald "By-Pass" Meter Bar - Catalog No. 6410.
74	Reference Material	Added "New York City Gas Meter Piping Pressure Test Verification" forms as Exhibit-B. Added "*Note: Form is to be used for company documentation by the performing plumber of record for all oil-to-gas conversion, natural gas generators, upgrades and or swing over work, certification.*"
75		Changed to Exhibit-C.
76		Added "Westchester County Gas Meter Piping Pressure Test Verification" forms as Exhibit-D.
77		Changed to Exhibit-E.
78		Changed to Exhibit-F.
79		Changed to Exhibit-G.
80		Changed to Exhibit-H and replaced Interim and Final Gas Checklist with most current revision available date April, 2014.
84	Revisions	Added Revisions Section to track "Updates, Additions and Omissions to the gas "Yellow Book" document.

Revision 2		
Updates, Additions and Omissions – May, 2015		
Page No.	**Section**	**Description**
2	-	Changed Revision Date and updated Edition Year.
10	Quick Start Section C Flow Process	Step-2 "Gas Service Ruling" | Added No 6. Gas Engineering Service Layouts are valid for 60 days from the date of issuance. A new load study and service layout will need to be prepared as Con Edison cannot reserve pipeline capacity.
25	Section 1 – M – 2	Added info and link to The Westchester County "Distribution" Pressure Test Verification Affidavit. Added info and link to The Westchester County Gas "Meter" Pressure Test Verification Affidavit
26	Section 1 – M/d	Removed sub-section d) for clarity. d) Read: Con Edison requires a statement from New York City and Westchester County for those customers performing oil or electric gas conversions for home heating.
26	Section 1 – N(b)	Updated "Definition of Cost" percentages to reflect current Tariff.
	Section 1 – N(f)	Updated "Definition of Cost" overheads to reflect current Tariff.
27	Section 1 – P	Updated Utility Notification Section to reflect NYCFGC language in Sect 406.6.2.2
28	Section 2 – A-9	Updated Tariff Reference Leafs No.'s to reflect current Tariff.
28, 29	Section 2 – A-9 1-111	Added the word "Firm" to reflect current Tariff language.
29	Section 2 – A-9 IV	Updated Tariff Reference Leafs No.'s to reflect current Tariff.
31	Section 2 – F - d)	Removed – "Plastic pipe joints shall be made only by qualified installers approved". Added note to include "operator".
33	Section 2 – J – e)	Updated Chart for Welding Inside Buildings to reflect 2014 NYCFGC for five (5) PSIG.
34	Section 2 – J (Note)	**Removed "Note" requiring all gas meter pipe that is butt-welded be radiographed.** Note read as follows: "Note: All gas meter piping that is butt-welded (not Distribution Piping) must be radiographed, regardless of whether the piping is inside or outside the building property line. Con Edison follows the Federal and State Code requirement for meter piping ending at the point of service determination for utility distribution companies. Gas distribution piping after the meter outlet where required must comply with the local municipal standard."
	Section 2 – J	A. Updated to incorporate Welding Requirements inside buildings as per 2014 NYCFGC. f) Updated Pipe Size and Pressure Limitations – Welding In-Side Building Chart to reflect latest NYCFGC piping pressure i.e. 3psi to 5psi Added Section C "Meter Piping" and included new Meter Piping Welding Requirement Table.
35	Section 2 – K – i)	Revised Text to incorporate Test Station Requirement on steel separately protected gas services as per Gas Bulletin.
37	Section 2 –M	Updated "Test Pressure and Duration" charts to reflect latest NYCFGC distribution piping pressure i.e. 3psi to 5psi
41	Section 2 – R - a)	Removed miscellaneous text. Text read as follows; "Storm damage to our overhead electric distribution system, flood damage from hurricanes and recent building and fire code regulations, many home owners and building developers are condition by company and/or municipal Office of Emergency Management."

	Section 2 – R - b)	Added text for clarity: “electric power use during a storm and/or” and added reference to current Tariff Leaf: See Gas Rate LEAF 38 PSC No. 9 III 3.H.
42	Section 2 – S	Updated NYCFGC Reference for Masonry Chimneys to reflect 2014 Code Sections
44	Section 3 – C	Updated Exceptions to Available Delivery Pressure to reflect 2014 NYCFGC Requirements of Appendix “G” and “E” and new NYC Fire Department approval and sign-off on natural gas installations above 15 psig.
45	Section 3 – D	Updated Gas Meter Specification to reflect current revision and title. See G-699-2.
47	Section 4 – A – b)	Updated Table 1 Title for consistency w/ NYCFGC Appendix E.
48	Section 4 – C – b)5	Updated to reference 2014 NYCFGC – Appendix “E”
50	Section 4 – H	Updated Gas Meter Specification to reflect current revision and title. See G-699-2.
63, 64	Gas Reference Specifications and Drawings	**G-699-2** Updated title and most current revision date (10/17/2014).
		EO-17118 R4 | Updated to reflect Revision 4 and most current revision date (02/13/2015).
		G-100, 276-7 | Added Purchase & Test Specification titled “Insulating Kits for Flanges on Steel Gas Pipelines” (09/02/10).
		308657 R9 | Updated to reflect Revision 9 to include revising Note 10 and the addition of Notes 22 & 23. (Rev. 04/15/15)
		361100 R4 | Updated to reflect Revision 4 to include revising Note 10 and the addition of Notes 21 & 22. Revised 6” Meters in Table 2. (Rev. 04/14/15)
		361571 R5 | Updated to reflect Revision 5 to include revising Note 10 and the addition of Notes 21 & 22. (Rev. 04/15/15)
		361693 R4 | Updated to reflect Revision 4 to include revising Note 10 and the addition of Notes 21 & 22. (Rev. 04/14/15)
		365531 R2 | Updated to reflect Revision 2 to include revising Drawing Title, Bill of Materials and Notes. Deleted 6” gas meters. (Rev. 04/14/15)
		384872 R1 | Updated to reflect Revision 2 to include revising Welding Requirements and Bill of Materials. Added “Y” Strainer requirements and notes F, G and H. Added reference to YB and July 1, 2015 start date for “Y” Strainer installation requirement. (Rev. 04/14/15)
		502164 R1 | Updated to reflect Revision 1 to include revising Bill of Materials, Notes F, M. Added Notes N and O. Deleted Note E and Item No. 9 and threaded meter piping. Added July 1, 2015 start date for “Y” Strainer installation requirement. (Rev. 04/14/15)
		EO-13977-C R15 | Updated to reflect Revision 15 to include revising Drawing Title, Bill of Materials and Notes. Deleted 6” gas meters. (Rev. 04/14/15)
		EO-14158 R26 | Updated to reflect Revision 26 to include adding Detail 1, items 24, 25 & 26. Deleted Note D and Item 7. Added July 1, 2015 start date for “Y” Strainer installation requirement. (Rev. 04/14/15)
		EO-14166 R25 | Updated to reflect Revision 25 to include adding Detail 1, items 28, 29 and 30. Deleted Item 12 and associated note. Added Note D and revised item no. 11. Added July 1, 2015 start date for “Y” Strainer installation requirement. (Rev. 04/15/15)
		EO-16390 R7 | Updated to reflect Revision 7 to include adding Notes 9 through 11. Updated ANSI STDS to ASME. Added Detail “A” and reference to gas “Yellow Book”. (Rev. 04/14/15)

		EO-16511-B R11 | Updated to reflect Revision 11 to include adding Detail for 23000R Meter, Revised Bill of Materials and Note F. Added Notes N, O, P, and Q. Revised Dim "D". Deleted Item No. 11 and Note E. Added July 1, 2015 start date for "Y" Strainer installation requirement. (Rev. 04/14/15)
		507002 R0 | New Drawing. Note: info previously covered on EO-13977-C. (04/14/15)
		507003 R0 | New Drawing. Note: info previously covered on 365531. (04/14/15)
73	Approved Gas Service Equipment Tables	Table 1 & Table 1A | Added 6" and 8" sizes to Nordstrom 143 valve listing. Added 143-T in 2".
		Table 1 | Added Dresser Style 350 Valve.
		Table 1-A & Table 3 | Added Walworth Valve No. 1718 (No Wheel).
		Table 18 | Removed Stuart Steel Production Corp as "Approved" Manufacturer. Per Purchase & Test Specification, Stuart Steel Production Corp. is a distributor not a manufacturer. Added Note: Refer to Purchase & Test Specification G-100,276-7 (pg. 64) for Gasket Info (Sold Separately).
		Table 25 | Added table titled "Y-Strainer" listing Approved Y-Strainer Info and Effective Date of use as of 07/01/2015.

Revision 3		
Updates, Additions and Omissions – November, 2015		
Page No.	**Section**	**Description**
2	-	Changed Revision Date and updated Edition Year.
6	Table of Contents	F. Plastic Service Pipe – incl. "OP Qualification".
27	Section 1 – P	• Any time a gas meter valve is being operated. Added the word "time" for correction.
31	Section 2 – F	Updated to reflect contractor OQ certification requirements for both contractor's PE "Joiner" and "Peer" Inspector per Gas Quality Assurance. Added gas training team email/contact info.
44	Section 3 – C	Added NYCFGC and Appendix G for reference.
62	Governing Codes	Added No. 9 - Reference to 2015 Northeast Gas Association (NGA) Plastic Pipe Joining Manual.
63, 64	Gas Reference Specifications and Drawings	**EO-16546-B** | Updated to include revised Drawing Name, Chart, Notes and Bill of Materials.
		G-2040 / 311296 | Added revision date for attached drawing.
		G-2041 / 359677 | Updated last revision date (correction).
		G-11837 | Added Rev. No. and updated date to most current.
		G-100, 276-7 | Updated to reflect Latest Review Date – 09/11/15
		507002 R1| Updated to reflect Revision 1 to include the addition of Item No. 14 to Bill of Materials.
		G-8199-7-IG | Added Specification covering Qualification of Installers who Join Plastic Pipe/Tubing with Mechanical Fittings
		G-8123-16 | Added Gas Specification covering Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services.
		G-8121-15-IG | Added Gas Specification covering Qualification of Installers Performing Heat Fusion or Electrofusion of Polyethylene Plastic Pipe/Tubing and Fittings for Gas Mains and Services.

		IP-27-5 | Added Gas Specification covering Installation of Electrofusion Fittings on PE Plastic Pipe/Tubing and Molded Fittings using a Universal Electrofusion Processor.
		IP-20-6 | Added Gas Specification covering Installation of Mechanical Fittings for Plastic Pipe and Tubing.
85	Section 7–Exhibit - I	Added PE Plastic Joint Fusion/Customer Property | Visual Inspection Form and changed Exhibit designation to “I”.
86	Section 7–Exhibit - H	Changed Exhibit designation to “H”.
93	Revisions	Updated to reflect Revision 4 of guide (Jan., 2016)

Revision Four		
Updates, Additions and Omissions – February, 2016		
Page No.	**Section**	**Description**
2	-	Changed Revision Date and updated Edition Year.
6	Table of Contents	Added Bookmarks to Table of Contents Page for Guide Navigation.
29-30	Section 2-B	Revised Con Edison Point of Service Termination for Residential (1-3 Family) – Indoor Meter(s) for consistency with G-8100 and Gas Tariff. Added “the point-of-service termination of Con Edison’s service pipe will be the first fitting inside the building connected to the sleeved elbow unit”.
30	Section 2-B / 3 b)	Added (1-3 Family) for Residential.
	Section 2-B / 3 c)	Added (>3 Family) for Multi-Dwelling Residential.
31	Section 2-F	Updated Section F – “Plastic Service Pipe” on Contractor OP Qualification Requirements for PE “Joiner” and “Peer Inspector”. Removed Reference to G-8199 (now obsolete) - Info now combined in G-8121.
47	Section 4 / C	Added to Prohibited Locations and Updated to Reflect G-704 and read; “Gas meters may be not be installed within three feet (3 ft.) of sources of ignition including burners, electric panel boxes or machinery”. Moved from Section b) to c).
64-65	Gas Reference Specifications and Drawings	**EO-511327 |** New Drawing Added– Titled: Installation of Class 250 TC Diaphragm Gas Meter – Indoors (Contains Info Previously Shown On DWG EO-7420-B Rev 18). Effective Date: Feb. 1, 2016.
		EO-16726-A R6 | Revised Title; Added AY McDonald 6312 Two- And Three-Unit Meter Bar Manifolds, Added Reference To DWG 502163. Effective Date: Feb. 1, 2016.
		EO-16886-B R5 | Revised Drawing Title Added Detail For A.Y McDonald 6312 Bypass Meter Bars; Created Sheet 2; Revised Bill Of Material. Effective Date: Feb. 1, 2016.
		EO-16585-A R11 | Revised Drawing Title, Deleted CL500 & CL1000 Meter Details, Revised Bill of Materials, Deleted Alternate Meter Bar Detail and Bumper Detail. Effective Date: Feb. 1, 2016.
		EO-7421-B R19 | Deleted Class 500 and Class 1000 Meter Details; Revised Bill Of Material; Deleted Alternate Meter Bar Detail; Revised Title. Effective Date: Feb. 1, 2016.

		506175 R0 | New Drawing Added Titled: Installation of Meter Piping for Class 500TC to 1000TC Diaphragm Gas Meters – Outdoors (2 – Sheets). This Drawing Is Being Issued For The First Time. The Information On This Drawing Was Extracted From Drawing EO-16585. Effective Date: Feb. 1, 2016.
		506214 R0 | New Drawing Added Titled: Installation of Twin Class 500TC to Class 1000TC Diaphragm Gas Meters – Indoors. Effective Date: Feb. 1, 2016.
		G-316 R19 aka EO-7420-B | Revised Drawing Title. Deleted Detail and Associated Material for Class 250 Meter Bar. Effective Date: Feb. 1, 2016.
		G-8121-16 | Renamed, completely rewritten, and combined with Gas Specification G-8199, "Qualification of Installers Who Join Plastic Pipe/Tubing with Mechanical Fittings." G-8199 is now obsolete. Effective Date: January 8, 2016
		G-8199 | Now Obsolete. Content combined in G-8121-16
		G-11836-13 1Ga | Updated Specification Number for consistency, noted Interim Guideline.
		G-699-2-IG-2 | Noted Interim Guideline.
		G-8123-17 | Updated to Reflect Most Current Review Date.
69	Approved Gas Service Equipment Tables	**Table 5** | Updated entirely. Deleted all class 250 meter bars and added class 250 by-pass meter bars and associated manifolds. Updated CMC designation for future clarity (Below Table).
94	**Revisions**	Updated to Reflect Revision 4 (February, 2016)

Revision 5

Updates, Additions and Omissions – July, 2016

The Customer Guide to Natural Gas Service Installation has been revised in its entirety.
Notable Updates Include;

Page No.	Section	Description
6	Table of Contents Section 1	Deleted – Sub-Section D. Standard Service Layouts and modified general information on customer responsibilities and contractors work information on gas service shutdown of buildings requiring Con Edison notification and the federal rules on OQ qualification to perform work on gas pipe. Page 19 Item S and T.
20	Table of Contents Section 2	Modified - Gas Service removed language on B through L items concerning construction task for gas services installation and Re-lettered items for the federal OQ requirements on covered task company requirements for gas service installation. Entire section was rewritten to clarify Con Edison position on gas service requirements.
31	Table of Contents Section 3	Modified – Gas Pressure Regulator added item D. Installation of the Water Intrusion Protection added language for buildings requirements in FEMA Flood Zone. Practical choice to raise vent.

34	Table of Contents Section 4	Modified – Gas Meter Equipment added language for approved location of gas meter equipment and re-lettered items to meet the State Code service line definition outlet of the meter. Each meter and service regulator on new and replacement service lines must be installed outside of the building, unless it is impractical or unsafe to do so. Any indoor installation, service head valves, pressure regulators (where required), meters and associated valves plans designs requests must be submitted to and approved, in writing, by Con Edison. Entire section of guidelines was rewritten by Gas Engineering to clarify Con Edison position on gas service requirements. Refer to pages 34 through 41.
43	Section 6 Item A	Omitted – c) Customer's Responsibility for Safety Inspection. The company no longer performs safety inspections to gas equipment on customer premises. State law removed Parts Plus program in 1996 from utility requirements. Renumber items. 1. to 4.
50	Section 7 Definition	Omitted – the definition of Con Edison Tariff rate leaf, Point of Gas Service Terminations from Yellow Book. Follow federal standard compliance.
53-56	Section 7 Reference Material Gas Meter and Gas Service Installation Specifications and Drawings	Revised to add gas specifications and drawings associated with covered tasks under the Operator Qualification requirements.
84	Revisions	Update to Reflect Revision 5 (July, 2016)

Revision 6		
Updates, Additions and Omissions – August, 2016		
Page No.	**Section**	**Description**
34	Section 4	Added - All gas meters shall be installed outside. Added - Installation of a gas meter(s) inside a building requires advance approval by the company prior to a customer's fuel line installation. Also added info re: contacting Con Edison during project design phase to determine the exact requirements for specific gas meter installations, including location and space requirements. b) Indoor Installations added "(Requires Approval)"
65	Approved Gas Equipment Tables	Deleted Table 22 – Approved Link Seals Approved Link Seals are provided in Gas Specification G-8096 referenced on pg.21.
78	Ways to Pay your Bill Exhibit-J	Updated – Customer Service Walk-In Center Locations and added hours of operation.

Revision 7		
Updates, Additions and Omissions – May, 2017		
Page No.	**Section**	**Description**
Cover		Updated Revision Date
2		Updated Revised to Date/Revision Yr.
9	Quick Tips	Updated Q-6 Answer – 1-3 Family residential gas meters will be placed outdoors. 4 Family and larger, commercial and mix-use will be placed outdoors unless “Waiver” exceptions apply.
10	Quick Tips	Step-One | Removed “280” reference.
17	Section 1(O) a) iii	Removed pg. no. reference for “NYC Gas Meter Pressure Test Verification Affidavit” Exhibit – B.
17	Section 1(O) b)	Distribution Piping - Removed pg. no. reference for “Westchester County Distribution Pressure Test Verification Affidavit” Exhibit – C.
17	Section 1(O) b)	Meter Piping - Removed pg. no. reference “Westchester County Gas Meter Pressure Test Verification Affidavit” Exhibit – D.
18	Section 1(P)	Updated applicable Taxes and Corp. Overheads.
19	Section 1(T)	Updated Operator Qualification requirements for “buried” service pipe, above ground outdoor meter-sets and/or new inside gas service piping between the foundation wall and the meter outlet. Removed NGA POC Info and added NGA email for OQ.
21	Section 2-5 b)4	Updated Gas Trench requirements per revised Gas Drawing 309495
21	Section 2-6(b)	Updated Backfill requirements per revised Gas Drawing 309495
24	Section 2(D)	Updated Welding Section to follow OQ requirements for buried pipe and to follow Gas Specifications for welding. Clarified NO OQ for new outdoor above ground meter sets and/or new inside gas service piping between the foundation wall and the meter outlet.
24	Section 2-2	Removed pg. no. reference for “Welder Affidavit” Exhibit – E.
26	Section 2(I) & b)	Removed pg. no. reference(2) for “Gas Integrity Test and Gas Turn-On Affidavit” Exhibit – A.
27	Section 2K-b)	Removed pg. no. reference for “Certificate of Compliance” Exhibit – F.
27	Section 2K-c)	Removed pg. no. reference for “Request for Waiver - Minimum Insulation Standard” Exhibit – G.
29	Section 2M	Removed “The following reference guide may help you understand the process and assess your options and potential cost savings.” Link “No Longer” active http://www.edf.org/sitecccoilujs/default/files/11726_clean-heat-step-by-step-guide.pdf
35	Section 4-A	Added Outdoor Gas Meter Waiver Request Guidelines
39	Section 4-C Gas Meter Piping	Updated Gas Meter Piping Table. Added Industrial Gas Meter Drawings 514590 and 514486. Added Turbine Low Pressure Drawing 514789.

	Section 7 Reference Material Gas Meter and Gas Service Installation Specifications and Drawings	G-2041 Requirements for the Installation of Gas Utilization Equipment that Mixes Pressurized Oxygen with Natural Gas - Procedure for the use of jeweler torches with natural gas and oxygen mixture.
65	Approved Gas Equipment Tables	Updated Table 21 Anodeless Riser Bends (Plastic Service Pipe) To include Honeywell Corp.having merged w/ Perfection Corp.
83	Ways to Pay your Bill Exhibit-L	Updated – Customer Service Walk-In Center Locations and added hours of operation.

Revision 8		
Updates, Additions and Omissions – August, 2017		
Page No.	**Section**	**Description**
7	Table of Contents	Changed note for Exhibit C to “Obsolete”
17	Section 1 b) In Westchester County	Removed references to Muni’s that do not require “Blue-Card”
72	Ref. Exhibit - C	Obsolete, all muni’s now issue Blue Cards.
79	Final Checklist	Replace statement “Each gas connection for future appliances must have a separate lockable control valve that is currently off, locked and plugged” with “Any provision for future extension of distribution pipe must have a lockable (by Con Edison) isolation valve, with a plug/cap on the outlet of the valve”.
79	Final Checklist	Replace statement “Gas appliance connected & ready to operate” with “Vented gas appliances connected & ready to operate.”

Revision 9		
Updates, Additions and Omissions – March , 2018		
Page No.	**Section**	**Description**
9	Quick Start	Added kilowatt hour to BTU conversion
13	1 – Part C	Revised minimum gas delivery pressures to indoor and outdoor meter installations
19	1 – Part T	Revised first and second paragraphs on Op Qual requirements
20	2 - Part A	Addition – Item 6. Gas meter sets location exceptions require an approved
20	2 – Part B (1)	Addition – Item 2. Added piping must follow National, State and City Fuel Gas Code
20	2 – Part B (2)	Deleted – Item 2. “Normal delivery pressure”. Addition – Item 2. Sizing of downstream distribution gas piping/fittings/valves shall meet the municipality IFGC for Schedule 40 metallic pipe Gas Piping Installation building code
21	2 - Added Section C	Added section 2 Item C) on Installations in Specialized Areas

24	Added Section h	Added section for: All PE plastic joints, joiners, and second inspectors shall be parked and documented as per DOJTGAS6000. “Documentation and Inspection of Polyethylene (PE) Plastic Joints on Gas Mains and Services”
24	Added Section i	Added section for: Qualification of new and existing joiners and second inspectors of PE plastic pipe shall be performed and documented by Con Edison or Northeast Gas Association (NGA trained evaluators)
26	2 - Part D	Revised Section 2 Part D to reflect new requirements for service line definition
31	3 – A 3rd bullet	Addition - Con Edison medium, intermediate, or high pressure gas system, where a gas service regulator is supplying the gas meter, gas boosters equipment are not allowed.
56	Gas Meter Specifications and Drawings	Listed Gas Meter Specification EO-7421 – Twin Class 250TC Diaphragm Listed Gas Meter Specification 506214 – Twin Class 500TC to CL-1000TC Diaphragm. Note these specifications replace previous G-317 specification.
56	Review of Specification dates	Revised Heading of table to: Applicable Gas Specifications and Drawings. Verified specification names and dates. Added statement on checking with the con Edison Representative for the latest specification Revisions
66	Approved Gas Equipment Tables	Updated Table 23 Gas Booster Equipment Check Valve To add Etter Engineering Model ECV to chart.
70	Exhibit A	Revised Gas Integrity Test and Turn-On Affidavit Service Restoration Repair to include Building with Risers
71	Exhibit B	Eliminated the word New York City to combine NYC and Westchester Meter Piping Affidavits. Combine previous Exhibits B and D
72	Prev. Exhibit - C	Deleted Page Obsolete for Westchester County, all muni’s now issue Blue Cards
73	Prev. Exhibit D	Deleted page and combined NYC and Westchester Gas Meter piping affidavits
78-79	Interim and Final Gas Checklist Oil to Gas	Updated email address and inquiries to be sent through the project center

Revision 10		
Updates, Additions and Omissions – November, 2018		
Page No.	**Section**	**Description**
15	Section 1	Added foot note on outside meter set and building definition
19-22	Section 1 Part T	Added additional information on Op Qual Requirements and training instructions for NYC and Westchester
23	Section 2 – Gas Services	Added additional requirements on customer pipe size
33	Section 2 Item I	Section a) replaced Blue Card with Gas Authorization

34	Section 2 Item J	Added section g) on identifying risers and gas shut off valves
41	Section 4	Added language on gas meter and Head of Service gas valve location
45	Section 4 Tabl. 2	Added In excess of above requirements on maximum distances
61	Specs and Dwg	Update Link to G-316 EO-7420-B Bypass Meter Bar Drawing
62	Gas Spec/Dwg	Updated link to current spec 506175 to reflect bypass meter bar
77	Exhibit A	Revised Affidavit tittle to reflect New or Repair
68	Table 5	Updated Table 5 on Meter Bars/Manifolds for bypass class 500 and 1000 meter bars
78	Exhibit -B	Added Con Ed Name and Employee number for Gas Pressure Witness
79	Exhibit -E	Add Gas Sleeve Installation Affidavit Form

Revision 11		
Updates, Additions and Omissions – January, 2019		
Page No.	**Section**	**Description**
2		Revised date
61-63	Specs and Dwg	Revised links for current updates on specifications and drawings
78	Exhibit -B	Clarified affidavit to be used on meter piping, pressure test inspections above 1 Psig to be witnessed by Con Edison OP Qual personnel.

Revision 12		
Updates, Additions and Omissions – April, 2019		
Page No.	**Section**	**Description**
6	1.U	Table of contents; added Drug and Alcohol Requirements
7	7.M	Table of contents; added Exhibit M Gas Service Line Scenario Sketches
15	1- G	Added Exhibit M diagrams and description
19-20	1-T	Updated Operator Qualification Requirements

20-21	Appendix A, B	Updated Appendix A&B for repair or replacement
22	Section 1	Added section U for Drug and Alcohol Requirements
26	Section 2 C.7	Added language on second PE Joint Inspection
27	Section 2 C.8	Added OQ requirements for steel service pipe
29	Section 2 D	Added OQ requirements for welding
37	Section 2 N	Added Odor Fade Section
38	Section 3	Clarified provision for low pressure supply
58	Section 7 - Definitions	Added Service pipe definitions for Inside and Outside Meter(s)
79	Welder Affidavit Exhibit -E	Added Contractor OQ# field
83	Interim Gas Checklist	Added Contractor OP Qual Requirements field
84	Final Gas Checklist	Added Contractor OP Qual Requirements field
85	PE Joint Visual Inspection Exhibit I	Added note on scheduling inspections through the Con Edison representative
89	Gas Service Line Scenario Sketches Exhibit M	Added Diagrams 1- 5 for various gas pipe location scenarios Diagrams 6 through 8 for Operator Qualification Requirements
97	General questions and CT87 requirements	Added general questions and Op Qual requirements.
98-99	Op Qual FAQS	Added OP Qual descriptions for new and existing construction

Revision 13		
Updates, Additions and Omissions – December, 2019		
Page No.	**Section**	**Description**
12	Quick Reference	Step – 1 Item 3 and 4 added Gas Conversions
13	Quick Reference	Application for Service – added OQ Affidavit information
16	Section 1 – General Information	O.Added information on permits, Gas Authorization, defined meter piping, distribution piping, OQ and NYC Requirements
18	Section 1 – General Information	O. Added information on OQ for Westchester Requirements
19-20	1-T	Updated Operator Qualification Requirements
21	Section 1 – General Information	T.OQ instructions, added Appendix A, B for below grade installation
22-23	Section 1 – General Information	T.OQ Added information on Task 86/87, training and testing for OQ
23	Section 1 – General Information	T.OQ Added Frequent Asked Questions on OQ, and OQ instructions
24	Section 1 – General Information	T.OQ Added Task 41/42, clarified Task 70 for Appendix A. Plastic pipe below grade
25	Section 1 – General Information	T.OQ Added Task 41/42, clarified Task 70 for Appendix B. Steel pipe below grade
25	Section 1 – General Information	T.OQ Clarified the welding requirements Note:
28	Section 2 – Gas Services	C. Gas Trench.Gas Service Installation Requirements item 1. – added second level and backfill inspection prior to the backfill of pipe
29	Section 2 – Gas Services	C.5.5 Gas Trench Added task 70/71 OQ appointment
29	Section 2 – Gas Services	C.6 c,d Added Task 70/71 OQ requirements
30	Section 2 – Gas Services	C.7 b.1 Added information on second inspection of PE – Polyethylene joints32

32	Section 2 – Gas Services	C.10 Added Oil to Gas projects on witnessing meter piping test operating at 1 psig or greater by a con ed operator qualified person
33	Section 2 – Gas Services	D. Welding – Clarified welding requirements for below grade pipe, added ASME Boiler and Pressure Vessel Code, Section IX acceptance to welding requirements D. 1. f) added NYC overlapping jurisdiction acceptance35
35	Section 2 – Gas Services	G.1 Added below grade pipe
36	Section 2 – Gas Services	I. Restoring Gas Service- Added language on the NYC EWN procedure and Westchester Added Task 87 Requirements Clarified additional document requirements OQ Affidavit Added test and purge on utility jurisdictional piping work
36	Section 2 – Gas Services	J.f. Restoring Gas Service to Buildings with Risers – Highlighted the importance of installing lockable valves at the base of risers
37	Section 2 – Gas Services	L.a Emergency Natural Gas Generators – Added language on Operator Qualification Requirements for storm Hardening projects and reference to Appendix M
41	Section 2 – Gas Services	N.Odor Fade – Updated information on Odor Fade
42	Section 2 – Gas Services	O.Natural Gas Detector – Added section and information on Natural Gas Detectors
44	Section 3 – Gas Pressure Regulator Equipment	Added information on con Edison OQ personnel shall install control piping and pilot regulators
47	Section 4 – Gas Meter Equipment	Added information on location of Meters and Regulators
48	Section 4 – Gas Meter Equipment	A.2. 49Added if available plot plan for existing buildings, required for new buildings on meter waiver requirements
49	Section 4 – Gas Meter Equipment	Added new Section E. on inside gas meter requirements for buildings of 20,000 Net Square feet and or 6 stories tall.
59	Section 6 – Gas Customer Responsibility	Added new section B.1. Utility – all con Edison Gas area - and NYC Corrosion Inspection information
60	Section 6 – Gas Customer Responsibility	C.2. Added information on location of low pressure Gas Switch

66	Section 7 – Reference Material	Odorant – added related definition on Adsorption, Absorption and Oxidation Operator Qualification – Added description on OQ Point of Delivery – Added information on point of delivery description
69-71	Applicable Gas Specifications and Drawings	Updated Revision number and Revision Dates on all listed specifications and drawings
84	Operator Qualified Affidavit Exhibit B.1	Added new Operator Qualified Affidavit to be used when work, testing or purging is performed on Utility Jurisdictional piping
85	Welder Affidavit Exhibit - E	Modified welding affidavit requiring compliance with local AHJ codes and removed Contractor OQ#
97-110	Exhibit M	Updated Service Line Definition Drawings (1-5) and Below Grade Meter Drawings (6-8)
111	Exhibit M	Added Description for Drawings 9-15 on OQ requirements for storm hardening projects – installation of above grade emergency generators on customer property
112-118	Exhibit M	Added drawings 9-15 for different meter, piping and riser scenarios
98-99 version 12	Op Qual FAQS, General Information	Deleted section with appropriate content moved within the body of the OQ section in this Book

Revision 14		
Updates, Additions and Omissions – January, 2021		
Page No.	**Section**	**Description**
10	Step 2 – Quick Start	Revised all requests to be reviewed by Engineering. Added please provide accurate gas loads
16-18	Section 1 – General Information Section 1 O c	Updated Gas Authorization and Permit Requirements. Identified NYC permit requirement for piping test after the meter for integrity test affidavit

23-25	Section 1 – General Information T.OQ requirements	Added additional OQ instructions for Licensed Master Plumbers
26	Section 2 – Gas Services. Item B. Customer Pipe Size	Added additional information on interior pipe sizing and added requirements for elevated pressure
35	Section 2 – Gas Services Section I. Restoring Gas Services after a repair	Added information on Inside Service Line Inspection
40	Section 2 – N Odor Fade	Updated description and direction to the building industry, added Odor Fade Licensed Plumber/Owner checklist
47	Section 4 – Gas Metering Equipment	Added G-48 - Gas Metering and Service Regulator Sizing, added statement for Engineering review. Added reference to screen filters for Rotary Meters
49	Section 4 – Gas Metering Equipment	Section A, revised Note E. on Gas Metering Communication requirements for New Construction
50	Section 4 – Gas Meter Equipment Item c) prohibited locations	Added requirement on bypass meter bar installation during major rehabilitation work and meter bars to be properly supported. added requirement for master meter installation for 12 or more apartments
51	Section 4 – Gas Meter Equipment d) General Installation	Meter bar installation requirements
65	Section 7 – General Reference Material	Definitions: Added definition of Elevated Pressure
66	Section 7 – General Reference Material	Definitions: Added Meter Bar Definition

70-72	Applicable Gas Specifications and Drawings	Updated Specifications and Drawings EO-14158, EO-14166, EO-16511, EO-16585, 506175 added Specification and Drawings G-48, 514203
85	Appendix B Meter Piping Affidavit	Added Service Line Inspection requirement
104-106	Appendix Exhibit M	Updated below grade OQ piping drawings

Revision 15		
Updates, Additions and Omissions – April, 2021		
Page No.	**Section**	**Description**
40	Section 2 – N Odor Fade	Added additional protection items to prevent Odor Fade
35-36	Section 2 – Gas Services Section I. Restoring Gas Services after a repair	Update information on Inside Service Line Inspection
70-72	Applicable Gas Specifications and Drawings	Updated Specifications and Drawings EO-14158, EO-14166, EO-16511, EO-16585, 506175, 514203, 511327
85	Appendix B Meter Piping Affidavit	Updated Service Line Inspection Requirements

Revision 16		
Updates, Additions and Omissions – November, 2021		
Page No.	**Section**	**Description**
30	Section 2 – Gas Services, Section C	Galvanized sleeve installation prohibited
52-53	Section 4 – Gas Meter Equipment Section 4	Galvanized pipe and fittings information for existing installations on Utility Jurisdictional piping
58 and 12	Section 5 Distributed Generation Item B and Gas Workflow	Updated requirement for load letter/gas loads to be submitted through Project Center
60	Section 6 Customer Responsibility	Corrosion repairs before and after the meter require permits and gas authorization from the permitting authority and OQ Task 87
70-72	Applicable Gas Specifications and Drawings	Updated Specifications and Drawings; 506175, 514203, EO-14158 (AKA G-413), EO-14166 (AKA G-414), EO-16511-B, EO-16585-A, EO16726-A

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Reserved for future use

If you damage or pull a gas facility or SMELL GAS

Call us immediately 1-800-75CONED or dial 911 once safely away from the gas leak.

And then:

- Keep all persons away from the area
- Follow directions from Emergency Responders who arrive on-site

Do not:

- Do anything to create a spark that could cause an explosion, such as:
    - Light a match
    - Turn appliance or lights on or off (including flash lights)
    - Use a telephone or cell phone
    - Ring a doorbell
    - Start a car

conEdison

NO TEXT ON THIS PAGE

SECTION 15060P
Hangers and Supports

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15060 – Hangers and Supports, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

B.

1.04 REFERENCES

Replace 1.04.J with the following:

J. Latest Edition of the New York State Building Code.

1.05 DESIGN REQUIREMENTS

Replace 1.05.B.2.e with the following:

e. Seismic forces, as required by the latest edition of the New York State Building Code

PART 3 EXECUTION

3.02 SPACING OF HANGERS AND SUPPORTS

Replace 3.02.C with the following

C. Pipelines installed under plumbing work shall be spaced in conformity with the requirements of the New York State Building Code or as specified herein.

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15081P
Piping Insulation

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15081 – Piping Insulation, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A and B with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.04 REFERENCES

Replace 1.04.A.10 with the following:

10. New York State Building Code

PART 2 PRODUCTS

2.03 BUILDING CODE COMPLIANCE

Replace 2.03.A with the following:

A. Piping insulation products shall comply with the New York State Building Code and with the New York State Energy Conservation Code

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15112P
Valves Smaller Than 4 Inches

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15112 – Valves Smaller Than 4 Inches, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

1.03.C shall be deleted

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15141P
Disinfection

NOTE: The work of this Section shall be in accordance with the requirements of General Specification 15141 – Disinfection, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A and B with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.03 REFERENCES

Replace 1.03.A.3 with the following:

3. New York State Plumbing Code

1.04 QUALITY ASSURANCE

Replace 1.04.A with the following:

A. Disinfection shall be in accordance with AWWA C651 for water mains and AWWA C652 for water storage facilities and equipment, except as modified herein. Disinfection procedures for new water mains and water storage facilities shall also conform to the requirements of the New York State Plumbing Code, Section 610 “Disinfection of Potable Water System” and Section 606.5.4.5 “Installation of the Building Water Distribution System - Cleaning or Painting" respectively, except as modified herein.

- END OF DETAILED SPECIFICATION –

NO TEXT ON THIS PAGE

SECTION 15400
Plumbing

NOTE: Detailed Specification 15400 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 15400.

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all labor, equipment and material for the complete installation of the plumbing system as indicated on the Drawings and specified herein.

B. Plumbing systems shall be furnished and installed to operate as a system. The Contractor shall coordinate all requirements between manufacturers to insure unit responsibility and compatibility of the systems.

C. Provide the following Plumbing Equipment.

1. Potable water piping systems.
2. Water Hammer Arresters.
3. Thermometers.
4. Pressure Gauges.
5. Pipe supports, hangers, escutcheon plates, and sleeves.
6. Plumbing pipe insulation.
7. Pipe ID markers and equipment identification tags.
8. Plumbing Fixtures
9. Water Heaters.
10. Expansion Tank.
11. Emergency Shower and Eye/Face Wash Combination.
12. Emergency Eye/Face Wash Unit.
13. Flow Alarm Switches.
14. Reduced Pressure Zone Backflow Preventer (RPZ).
15. Shut-off valves

16. Sanitary sewer (DWV) piping systems, floor drains and cleanouts.

17. Natural gas piping systems.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SPECIFICATIONS

1.04 REFERENCES

A. Equipment shall comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

C. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.05 SYSTEM DESCRIPTION

1.06 QUALITY ASSURANCE AND QUALIFICATIONS

A. Each plumbing fixture shall be provided with an approved P-trap, which shall be set as close to the outlet as practicable, all water supply connections shall be provided with loose key stops.

B. Vitreous china fixtures shall be carefully selected, free from spots, grazing or chips.

C. Fixture trim, traps, faucets, escutcheons, and waste pipes that are exposed to view shall be brass with polished chromium plating over nickel finish. Exposed supplies shall be brass pipe plated in the same manner.

D. All fixtures designated for use by the disabled shall fully conform and shall be installed per the requirements of the American Disabilities Act.

E. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

F. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

1.07 SUBMITTALS

A. The Contractor shall submit shop drawings on all equipment, accessories and appurtenances and all fabrication work or other mechanical and air conditioning

work required, all in accordance with the requirements of Division 1, Submittals.

B. Data to be submitted shall include but not be limited to:

1. Catalog data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used for the various parts and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.
2. Complete assembly and installation drawings with clearly marked dimensions. This information shall be in sufficient detail to serve as a guide for assembly and disassembly and for ordering parts.
3. Weight of all component parts and assembled weight.
4. Electrical characteristics, wiring, diagrams, etc.
5. Sample data sheet of equipment nameplate(s) including information contained thereon.
6. Insulation materials, coating, jackets, detail density, thermal conductivity and thickness of all insulation materials to be furnished.
7. Details of special fasteners and accessories.
8. Type of adhesives, binders, joint cement, mastics.
9. Proposed insulation procedures and installation methods.
10. Spreadsheet or chart identifying piping systems type and pipe size, model numbers of hangers to be used, special coatings for pipe supports etc.
11. Sample data sheet of piping and valves including information contained thereon.
12. Spare parts list
13. Special tools list

C. The Contractor shall obtain from the manufacturer and submit to the Engineer copies of the results of all certified shop tests.

D. The Contractor shall obtain from the manufacturer and submit to the Engineer copies of certified letters of compliance in accordance with the Specifications.

E. The Contractor shall submit operation and maintenance manual in accordance with the procedures and requirements set forth in the General Conditions and Division 1. Operation and Maintenance Manuals shall be submitted for all equipment.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to the Project Site under provisions of Division 1.

B. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.

C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures and finish.

D. Protect openings in casing and seal them with plastic wrap to keep dirt and debris. Protect coils from entry of dirt and debris with pipe caps or plugs.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES (NOT USED)

1.10 SPECIAL WARRANTY PROVISIONS (NOT USED)

1.11 SCHEDULES AND DRAWINGS

A. In general, all capacities of equipment and fixture characteristics are shown in schedules as shown on the Drawings. Reference shall be made to the schedules for such information. Variations of the scheduled equipment supplied under this Contract will be permitted only with the written direction of the Engineer.

1.12 MANUFACTURER'S INSTRUCTIONS

A. Installation of all equipment shall be in accordance with manufacturer's data and recommendations.

B. All changes from the installation procedures in manufacturers' data shall be submitted for approval in accordance with the requirements for shop drawings.

C. All manufacturers' data provided shall be kept in a secure manner at the job site at all times. Catalog and index this data for convenient reference.

D. Manufacturers' data shall be available for the information of DEP, Engineer, and the use of other trades.

E. Turn over all data to DEP through DEP's representative at completion of the Work and final testing.

F. Submit all instruction books and manuals in accordance with Division 1.

1.13 CODES, PERMITS AND STANDARDS

A. The Contractor shall obtain and pay for all permits and shall comply with all laws and codes that apply to the Work.

B. The Contractor shall be responsible for all added expense due to his choice of equipment, materials or construction methods.

C. All work and materials shall be in full accordance with the latest State rules and regulations or publications including those of the State Fire Marshall, the New

York State Plumbing and Energy Codes, and all local codes. Nothing in the Plans and/or Specifications shall be construed to permit work not conforming to the above codes, rules and regulations.

D. All equipment, materials and installations shall conform to the requirements of the most recent edition with latest revisions, supplements and amendments of the following, as applicable:

1. American National Standards Institute (ANSI).
2. American Society for Testing and Materials (ASTM).
3. American Society of Mechanical Engineers (ASME).
4. Factory Mutual (FM).
5. National Electric Code (NEC).
6. Occupational Safety and Health Standards (OSHA).
7. State and local codes, ordinances and statutes.
8. Underwriters Laboratories (UL).
9. Others as designated in the specifications.

PART 2 PRODUCTS

2.01 GENERAL

A. Each item of equipment shall be furnished and installed complete with all supports, mounting frames, piping, electrical work, insulation and appurtenances ready for operation.

B. All equipment and appurtenances shall be anchored or connected to supporting members as specified or as indicated on the Plans.

C. The Plans shall be taken as diagrammatic. The Contractor shall check the Structural Plans and sections for detail dimensions and clearances. Sizes of ducts and their locations are indicated, but not every offset, fitting, or structural obstruction is shown.

D. All supports required for the proper installation of the equipment, but not forming an integral part of the building structure, shall be provided, unless specifically noted otherwise. Equipment shall be supported on spring type vibration isolators.

2.02 MATERIALS

A. Underground cold water piping shall be copper tubing, Type “K”, 2-1/2-inch and smaller with wrought copper solder joint fittings; 3-inch and larger shall be ductile iron pipe, bell and spigot, Class 52. Fittings shall be bell and spigot, Class 250.

B. Aboveground tempered, hot and cold water piping shall be copper tubing, Type "L", 3-1/2-inch and smaller with wrought copper solder joint fittings; 4-inch and larger shall be ductile iron pipe, AWWA C151, grooved or flanged ends.

C. Underground soil, waste, and drainage pipe inside building and to a point 5'-0" (five feet) outside the building shall be standard weight cast iron soil pipe and fittings conforming to ASTM A74. Joints shall be hub and spigot, caulk joint, or installed with compression gaskets conforming to ASTM C-564. No-hub is not permitted underground.

D. Aboveground soil, waste, and vent piping shall be standard weight no-hub cast iron, ASTM A 888 or CISPI 301 pipe with DWV pattern standard weight cast iron fittings and solvent-cemented joints.

2.03 PIPING

A. Contractor shall form all holes; furnish and install all concrete inserts, flashings and sleeves in existing floors, walls, equipment foundations, ceilings, and roofs as required for the erection, installation, and support of all pipe and tubing.

1. Provide sleeves and flashings for all pipes and tubing, etc., furnished which passes through existing walls, intermediate floors, partition walls and roofs. Caulk wall opening with fire retardant sealant.

2. Provide fire stopping materials which consist of commercially manufactured products capable of passing ASTM E-814 (UL 1479) Standard Method of Fire Test for Through Penetration Fire Stops wherever piping penetrates a fire rated roof, wall or floor assembly.

3. Install concrete inserts, sleeves and flashings required, as indicated, or in a manner acceptable to the Engineer.

4. All holes missed by the Contractor, but required for the installation of the piping systems, shall be made in the walls, floors, roof and by the Contractor at no additional expense to DEP by core drilling or saw cutting methods only.

5. Provide escutcheons around pipes in all areas. Use chromium plated escutcheons on pipe penetrations exposed in finished rooms or areas. Use stainless steel escutcheons in all process areas.

6. Install water hammer arrestors on all hot and cold water branch lines to fixtures and equipment.

B. Copper Water Tube:

1. Tube:

a. Reference: ASTM B88.

b. Type: K or L.

c. Temper: Hard drawn or soft annealed.

2. Joints:

a. General: Connect pipe with solder joints except where threaded or flanged fittings are required at valves, equipment connections or otherwise shown or directed.

b. Solder Joints: ASTM B32, Sb5 (95 5 tin antimony).

c. Threaded Joints:

d. Taper Pipe Threads: ANSI B2.1.

e. Joint Preparation: Teflon Tape.

f. Flanged Joints:

1) Flanges: ANSI B16.24, 150 lb. class.

2) Gaskets: Red rubber, ASTM D1330, Grade 1, 1/8 inch thick.

g. Bolts and Nuts:

1) Standard: ANSI B18.21 and ANSI B18.2.2, respectively.

2) Material: ASTM A307, Grade B.

3. Fittings:

a. Type: Wrought Copper.

b. Reference: ANSI B16.22.

4. Unions:

a. Reference: FS WW U 516.

b. Material: Bronze.

c. Rating: 250 pound W.O.G.

5. All copper piping 2 1/2 inches and smaller, run within the interior of a building, shall be hard drawn copper Type "L".

6. All buried copper piping 2 1/2 inches and smaller shall be soft temper copper Type "K".

C. Ductile Iron Pipe:

1. Pipe:

a. Reference: AWWA C151.

2. Joints:

a. Ductile-Iron Piping, Grooved-End Fittings: ASTM A 47 (ASTM A 47M), malleable-iron castings or ASTM A 536 ductile-iron castings with dimensions matching pipe.

1) Ductile-Iron-Piping, Keyed Couplings: AWWA C606 for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

b. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron, standard pattern; or AWWA C153, ductile-iron, compact pattern.

1) Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

D. Drain, waste and vent piping and fittings shall be manufactured by Tyler Pipe, Charlotte Pipe and Foundry, A.B. and I. Foundry, or equal.

1. The piping shall be installed complete, of the size and arrangement shown on the drawings. All piping shall be installed to allow for expansion, and parallel or perpendicular to the building construction. When pipe is installed underground, the ground shall be excavated to a minimum depth to accomplish the grade shown or required by code. The pipe shall have bearing along its entire length and if installed on fill, shall be supported by concrete cradles to firm earth.

2. All pipe shall be supported from the building structure in a neat manner, in compliance with current trade practices and wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze hangers. Single runs of horizontal piping shall be supported with clevis type hangers. Vertical risers shall be supported at each floor line with steel pipe clamps. The use of wire or perforated metal to support pipe will not be permitted. In concrete construction, approved inserts will be carefully set to support the piping. Soil and waste pipe shall be supported at intervals of not more than five feet on horizontal runs and at the base of every stack.

3. Sealing Coupling Sleeve for No-hub joints: The coupling shall be made of stainless steel, ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 EPDM rubber sleeve with integral, center pipe stop. All surfaces of the sleeve shall be smooth except for the specified marking. The sleeves shall be free from dirt and foreign materials.

4. All pipes extending through the roof shall be a minimum of 3-inch diameter and shall be flashed with black EPDM rubber flashing boots.

Vents shall extend 12- inches above finished roof and in conformity with NRCA details.

E. Natural Gas Piping System

1. Piping 1½ inches and smaller shall be seamless Schedule 40 black steel, ASTM A53 Type "S", Grade A or B, with Class 150 black malleable iron threaded fittings conforming to ASME B16.3.

2. Piping 2 inches and larger shall be Type "S" seamless or Type "E" electric resistance welded Schedule 40 black steel, ASTM A53, Grade A or B, with Schedule 40 wrought carbon steel fittings, ASTM A 234 and butt weld joints.

3. Provide factory-applied, three-layer coating of epoxy, adhesive, and PE or field applied primer and epoxy paint coating on all pipe and fittings. Field applied coating is restricted to fittings and short sections of pipe necessarily stripped for threading or welding. Field coating shall be manufactured by Amercoat Type 240 or approved equal and applied in accordance with manufacturer's recommendations.

4. All valves shall be designed, manufactured and approved for natural gas service.

   a. Line Shut-off Valves sizes 2 inches and smaller shall be iron body lubricated plug valve conforming to ASTM-A-126, U.L. Listed and A.G.A. Approved for natural gas service with threaded ends, wrench operation, rated for 200 WOG service pressure and –20 to 200 degrees F., manufactured by Resun Model R-1430 or Nordstrom Model 142 or approved equal

   b. Appliance/Equipment Shut-off Valves at local connections sizes 2 inches and smaller shall be bronze body, full port ball or butterfly type, U.L. Listed and A.G.A. Approved for natural gas service with threaded ends, quarter turn lever handle operation, rated for 175 W.O.G. service pressure and 30 to 275 degrees F., manufactured by Nibco Model T585-70-UL, Model T580-70-UL or Milwaukee Model BB2-100 or approved equal.

   c. Manual Emergency Shut-off Valves sizes 2 inches and smaller shall be bronze body, full port ball or butterfly type, U.L. Listed and A.G.A. Approved for natural gas service with threaded ends, quarter turn lever handle operation, rated for 175 W.O.G. service pressure and 30 to 275 degrees F., manufactured by Nibco Model T585-70-UL, Model T580-70-UL or Milwaukee Model BB2-100 or approved equal.

5. All pressure regulators shall be designed, manufactured and approved for natural gas service.

a. Pressure regulators for individual service lines shall be capable of reducing distribution line pressure to pressures required for users. Pressure relief shall be set at a lower pressure than would cause unsafe operation of any connected user. Regulator shall have a single port with orifice diameter no greater than that recommended by manufacturer for the maximum gas pressure at the regulator inlet. Regulator vent valve shall be of resilient materials designed to withstand flow conditions when pressed against valve port. Regulator shall be capable of limiting build-up of pressure under no-flow conditions to 50 percent or less of the discharge pressure maintained under flow conditions.

b. Commercial grade diaphragm type with internal relief valve, vent valve, cast iron body, Buna-N diaphragm. Manufactured by Rockwell, or Fisher or approved equal.

c. Install pressure gauge adjacent to and downstream of each line pressure regulator.

6. Unions in 2 inches and smaller in ferrous lines shall be Class 300 AAR malleable iron unions with iron to brass seats, 2-1/2 inches and larger shall be ground flange unions. Companion flanges on lines at various items of equipment, machines and pieces of apparatus may serve as unions to permit disconnection of piping.

7. Unions connecting ferrous pipe to copper or brass pipe shall be Epco dielectric type or approved equal.

8. Service line riser steel-to-polyethylene transition fittings shall provide pull-out strength greater than PE tubing to which they are connected. Anodeless service line riser shall meet or exceed the requirements of ASTM D 2513 Category I, ASTM F 1973, ANSI B1.20, ANSI B31.8, US DOT Part 192, NFPA 58 and CSA B137.4. Service line riser shall be by Elster Perfection, or Approved Equal.

F. De-ionized water pipe shall be Orion Whiteline pipe manufactured to Schedule 80 iron pipe dimensions from virgin un-pigmented Type I Homopolymer Polypropylene, meeting ASTM D4101, using no anti-oxidants or pigments. Pipe shall meet the dimensional tolerances of ASTM D2447. All piping shall be capped and bagged. Valves and fittings shall be Orion Riontite Type of same material as piping or approved equal.

G. High purity gas tubing, fittings and valves shall be produced from type 316L stainless steel. Seamless tubing shall be manufactured and tested to ASTM A269 and AST M A213 (EAW). Welded tubing shall be manufactured and tested to ASTM A270 and ASTM A249.

1. The sulfur content of all tubing shall be 0.005 - 0.012% for seamless tubing and 0.005 - 0.017% for welded tubing.
2. Tubing less than or equal to 4" OD shall be bright annealed in a dry hydrogen atmosphere (dew point <= -40 degrees C). or vacuum annealed (10 micron Hg), at the producing mill. 6"tubing shall be annealed and pickled.
3. Tubing shall be permanently marked with a mechanical etching tool, or other approved method. The mark shall contain: manufacturers identification, the size and wall thickness the alloy, and the heat number.
4. Fittings shall be permanently marked with a mechanical etching tool, or other approved method. The mark shall contain: manufacturer's identification, the alloy, and the heat number, ASME BPE and the applicable surface finish designation.
5. Bar stock shall conform to the requirements of ASTM A479.
6. Valves and fittings shall be of the compression type as made by Swagelok, or Approved Equal.

H. Pipe sleeves and escutcheons:

1. Sleeves shall be provided for all piping passing through masonry or concrete walls and floors. Sleeves for walls and floors shall be indicated, made watertight and extend above floor lines. Sleeves shall conform to the requirements of Division 15.
2. Escutcheon plates shall be polished chrome. Provide for all wall penetrations in finished areas.

I. Hangers and Supports shall be epoxy-coated Dura-Green by Cooper B-Line, Inc., Perma-Green III by Unistrut, Inc. or Approved Equal.

2.04 THERMOMETERS

A. Thermometers shall be all 300 Series stainless steel welded construction, 5” anti-parallax dial with bold black on non-reflective satin or white background, hermetically sealed and weatherproof, vibration dampened bimetallic actuation, over range protection of 50 percent full scale up to 500° F and 10 percent above 500° F, external recalibrator, 1 percent full scale accuracy. Thermometers shall be of the variangle stem configuration to maintain perpendicular orientation of the dial face to the User’s vision. Temperature ranges shall be: 0/20-140° F.

B. Acceptable products: Tel-Tru Manufacturing #AA575R, Marshall Town Figure 254, or A. A. Weiss & Sons #5VBM or approved equal.

2.05 PRESSURE GAGES

A. Pressure gages shall be selected so that normal operating pressures fall at approximately midscale and so that continuous operation does not exceed 75 percent of full scale.

B. Pressure gages shall be 4-1/2" dial type with bold black markings on white background, aluminum or steel pressure relieving case, phosphor bronze brazed Bourdon tube, bronze and stainless steel movement, provision for zero shift calibration without removing or bending the pointer. Accuracy shall be ANSI Grade A per ANSI B40.1 1980. Acceptable products: AMETEK/U. S. Gage 5000 Series, Marshall Town Figures 42 and 224, or A. A. Weiss & Sons #PG-1 Series or approved equal.

2.06 GAGE COCKS

A. Gage cocks shall be brass with 1/4 inch NPT female threads and lever or tee handles. They shall be rated for service at 600 pounds WOG and 150 pounds saturated steam pressure. All gage cocks shall be the same.

B. Acceptable products: AMETEK/U. S. Gage Figure 520, Dresser Industries Figure 1095, or Parker Hannifin #V500P-4 or approved equal.

2.07 WATER METER

A. Turbine Type with magnetic drive (3 to 4-inch):

1. All meters furnished shall be manufactured by a registered ISO 9001 quality standard facility. Acceptable meters shall have a minimum of fifteen (15) years of successful field use. All specifications meet or exceed the latest revision of AWWA C701.

2. Lead free and shall meet the Safe Drinking Water Act (SDWA) per NSF 372.

3. All meters shall be equipped with either direct reading hermetically sealed register or encoder remote registers per AWWA C707 and meet all AWWA C701 performance standards and per local authorities standards.

4. The main case and cover shall be cast from NSF/ANSI 61, certified lead free bronze alloy. The hermetically sealed register shall consist of naturally lubricated, molded gears. A positive magnetic drive shall couple the register with the measuring element.

5. Water meter shall be Trident Turbine, Neptune, or approved equal.

2.08 BACKFLOW PREVENTERS

A. Reduced Pressure Backflow Preventers (3/4 to 2-inch):

1. Provide reduced pressure zone backflow preventers in the size shown on the Drawings. Backflow preventers shall be rated for 175 psig and temperatures up to 140 degrees F. Backflow preventers shall be tested and certified in accordance with ASSE 1013 and AWWA C506.
2. Provide with bronze body construction, FDA epoxy coated bronze body check valve and relief valve assemblies, and bronze seats, stainless steel trim.
3. Provide isolation valves on the inlet and outlet of each backflow preventer. Valves shall be quarter-turn, full port, resilient seated, bronze ball valves.
4. Provide bronze body valve test cocks.
5. Backflow preventers shall be Watts Series 909, Wilkins, or approved equal.

2.09 WATER SERVICE BALL VALVES

A. Products and Manufacturers: Provide ball valves as made by one of the following:

1. Watts, Series FBV-3C or FBVS-3C.
2. Nibco.
3. Or Approved Equal.

B. 2-piece full port brass ball valve.

C. NSF/ANSI Standard 61, for potable water use.

D. Sizes: 1/4" – 3".

2.10 FIXTURE WATER STOPS

A. Products and Manufacturers: Provide stops as made by one of the following:

1. Zurn, Model Z8800 to Z8845.
2. Watts.
3. Or Approved Equal.

B. Chrome plated, solid brass with round wheelhandle.

2.11 PIPE HANGERS AND SUPPORTS

A. Hangers and supports shall conform to recommendation of Standard Practice No. 58 and 69 of Manufacturer's Standardization Society of the Valve and Fitting Industry.

B. Hangers for pipes shall be clevis and adjustable rod hangers for single pipes or trapeze hangers for supporting more than one pipe on the same hanger. Trapeze

hangers shall be made of 2-inch by 2-inch by 1/4-inch thick structural steel channels with legs down, and steel blocking of varying thickness welded to the channel under each pipe shall be used to obtain proper pitch.

C. Pipe covering protection saddles shall be the weld on type, and protection shields shall be half round heavy gage galvanized sheet metal with heavy density weight bearing insulation where required.

D. Hanger rods shall be 3/8-inch for pipe 2-inch and smaller, 1/2-inch for pipe 2-1/2-inch and larger. Acceptable manufacturers: Crawford, B-Line, Elcen Metal Products Co., or Fee & Mason or approved equal.

E. Nickel plated spring ceiling plates shall be provided for all hanger rods in all exposed areas. Acceptable manufacturers: Grinnell, Crawford, B-Line or Elcen or approved equal.

F. Electrolysis: Prevent electrolysis to copper tubing with rubber or neoprene lined pipe ring isolators and copper plated hanger and supports or other recognized industry methods.

G. Corrosion protection: Hangers located in chemical storage room areas of the Treatment Facility shall be hot dipped galvanized. Threaded rod shall be electroplate galvanized or be manufactured of stainless steel.

2.12 PIPE INSULATION

A. Products and Manufacturers: Provide insulation as made by one of the following:

1. Armstrong: AP Armaflex
2. Schuller: Aerotube II
3. Rubatex Corp.: R-180-FS
4. IMCOA: Imcolock
5. Or approved equal.

B. Pipe Insulation:

1. Type: Elastomeric Closed Cell.
2. FM Approved.
3. Unit slit tubing and miter cut fittings.
4. Thickness and Application: 1/2” to 1-1/4” pipe – 3/4 inch insulation and 1-1/2” to 4” pipe – 1-inch of insulation on all water piping above slab/grade.
5. Average thermal conductivity not to exceed 0.27 (Btu-in)/(hr-FT2-°F) at mean temperature of 75° F, temperature range -40° to 220° F;

permeability not to exceed 0.20 by ASTM E96; water absorption 3 percent by ASTM D1056 and ozone resistant.

2.13 PIPE IDENTIFICATION

A. Piping shall be identified by means of card mounted, self-bonding pipe markers. Markers shall be made of nonporous, color fast, nonabsorbent vinyl plastic. Letters shall be black or white for easy readability.

B. Markers for pipe having an outside diameter of 3-inches or more (including insulation) shall have 2-inch high letters. Markers for pipe having an outside diameter of less than 3-inches (including insulation) shall have 1-inch high letters.

C. Provide matching 3/4-inch wide banding tape.

D. Acceptable Manufacturers: Seton Name Plate Corporation, W. H. Brady Company, or Westline Products Company or approved equal.

2.14 VALVE TAGS AND NUMBERING

A. All valves shall be tagged with 1-1/4-inch diameter, 0.040-inch thick brass or laminated plastic tags with numbers and letters. A complete directory of valves, pump motors, controls, devices, and other equipment, giving use, location, size, and manufacturer's number of each shall be prepared with permanent ink, framed under glass, and hung in the mechanical equipment room where directed by DEP.

B. All valves above ceilings or access panels shall be identified by color-coded, self-adhesive "dots" affixed to the ceiling grid or the access panel frame. Dots shall be visible from a standing position on the floor immediately below the marker.

PART 3 EXECUTION

3.01 POTABLE WATER SYSTEMS

A. Provide cold and hot water supply systems in the buildings as indicated, making connections to all fixtures and equipment requiring hot and/or cold water.

B. The Contractor shall provide swing or swivel joints on connections from mains to risers and from risers to branches. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

C. Install gages and thermometers in straight runs of piping so they may be read from the floor or operating platform. Install all gages with gage cocks.

D. Underground Pipe

1. The piping shown on the drawings shall be installed complete and shall be of the size shown. All pipe shall be installed in such a manner that it

does not bear directly on rocks or debris in ground. Where pipe passes close to or through walls or footings, it shall be protected from contact with concrete or cinder block. All pipe passing through building walls shall be protected by a cast iron sleeve large enough to permit free movement of pipe. All turns shall be made with a gradual curve so there is no chance of kinking or collapsing the pipe. Where pipe passes through a building wall from underground to inside building, the sleeve shall be packed with oakum and made watertight.

2. Pipe Joints

   a. Solder Joints for copper pipe: All pipe shall be reamed to full diameter before joining. Ends of pipe and inside of fittings shall be cleaned and flux applied to entire area of pipe end to be soldered. On pipe 1-1/2-inch and larger, flux shall be applied to pipe and fittings. Joints shall be made with silver solder and a torch using a mixture of oxygen and acetylene.

   b. Install underground ductile-iron piping according to AWWA C600, and AWWA M41. Install buried piping inside building between wall and floor penetrations and connection to water service piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets

3. Pipe Supports: Earth shall be excavated to a minimum depth with an even surface to insure solid bearing of pipe for its entire length. Where water lines cross deeper excavations, these shall be filled and tamped to the proper level before copper pipe is installed.

4. Pipe Depth

   a. Interior: Water pipe shall NOT be permitted inside concrete slabs.

   b. Exterior: the water pipe shall have a minimum of 4 feet of cover and shall comply with state and local codes.

5. Under floor water piping shall be insulated with closed cell elastomeric foam insulation (reference Section 15081- Pipe Insulation).

E. Aboveground Pipe:

1. The piping shown on the drawings shall be installed complete and shall be of the size shown. All piping shall be installed to allow for expansion, either parallel or perpendicular to the building construction. On individual fixtures, water hammer arrestors shall be installed at each fixture sized per PDI recommended sizes. On groups of fixtures, one

water hammer arrestor (shock absorber) shall be installed for each group.

2. Pipe Joints: All pipe shall be reamed to full diameter before joining. Ends of pipe and inside of fittings shall be cleaned and flux applied to entire area of pipe end to be soldered. On pipe 1-1/2-inch and larger, flux shall be applied to pipe and fittings.

3. Solder Joints: Make up joints with 95% tin and 5% antimony (95-5) solder conforming to ASTM B32 "Solder Metal" Grade 95TA. Solder and flux used for piping material providing water for human consumption shall be lead free. Flux shall be non-acid, non-lead type. Remove composition discs from solder end valves during soldering. Wipe excess solder, leaving a uniform fillet around cup of fitting.

4. Copper pipe shall be supported not to exceed 8 feet on center. Plastic pipe shall be supported in accordance with manufacturer's instructions, but in no case shall exceed 3 feet on center.

5. Use bracket type hanger fastened to walls to support piping running adjacent to walls and not supported from ceilings. Valves 3 inches and over in horizontal lines shall be supported independent of the pipelines.

6. Perforated strap iron hangers or wire are prohibited.

7. Pipe hangers shall be cleaned and painted with rust resistant paint before installation.

8. Hanger supports shall be securely fastened to structural members by beam clamps and clips, concrete inserts, or anchors.

9. Where pipes pass through walls and suspended ceilings, provide pipe sleeves of No. 20 gage galvanized iron, 1/2 inch larger than insulated pipe or bare pipe outside diameter.

10. Pipe passing through floors and foundation shall be provided with sleeves of standard weight galvanized steel pipe. Sleeves shall be at least 1 inch larger than bare pipe and 1/2 inch larger than insulated pipe outside diameter. Ends shall be cut square and smooth and finish flush with surface of building construction. Where specifically noted, ends shall extend 1 inch above floor and edges chamfered.

11. Pipe sleeves shall be securely bedded in the building construction. Sleeves shall finish flush with finished wall and ceiling lines. Note that where covering is provided, it shall extend continuously through sleeves.

12. Sleeves installed in vertical positions shall be perfectly plumb and sleeves in horizontal positions shall be level. They shall be located, set, and maintained in position while surrounding construction work is

being installed so that the center of each pipe shall be accurately installed in the center of the sleeve. The space between the pipe or the insulation and the sleeve shall be caulked to prevent light or air transfer. Where vertical sleeves occur, such as in floors or ceilings, special collars secured to the pipes or to the ceiling construction shall be provided to prevent the packing from falling out. The standard floor and ceiling plates herein specified for finished areas may be used for this purpose provided they are firmly secured to the pipes.

13. Pipe Insulation: Continuous through inside walls and at all hangers; pack insulation around pipes with fireproof self-supporting mineral wool insulation material, fully sealed.

14. Insulation for cold piping: Insulate all fittings, including flanges, all valve bodies and devices associated with cold surfaces. Maintain vapor barrier integrity.

15. Insulation for hot and tempered water piping: Insulate all fittings. Do not insulate unions, flanges, strainers, valves, flexible connections, or expansion joints.

16. Finish insulation neatly at hangers, supports and other protrusions or interruptions.

17. Ensure hangers and cradles are properly installed to avoid crushing insulation.

18. Install protective metal saddles and insulated inserts to prevent insulation compression.

19. Insulate all exposed piping below fixtures scheduled for use by the disabled in accordance with ADA with pre-formed insulation kits.

    a. Truebro Lavguard 2E-Z, or approved equal.

3.02 ROOF VENTS

A. Roof stack terminals shall be flashed using 16 ounce sheet copper.

3.03 WASTE SYSTEMS

A. Horizontal piping shall be installed as high as possible without sags. Install 3 inches and larger horizontal drain and waste piping to 1/8 inch per foot slope. Piping 2-1/2 inches and smaller shall be installed at a slope of 1/4 inch per foot.

B. Concealed piping shall be installed in time so as not to delay work of other trades and to allow ample time for tests and inspection.

C. Before beginning installation work, check plumbing Drawings with architectural, structural, mechanical, civil, air conditioning and electrical Drawings and make accurate layouts of plumbing piping. Coordinate with

other trades and report all interferences, discrepancies, or proposed changes to the Engineer for approval prior to beginning installation work.

D. Underground piping shall be firmly bedded on solid ground as specified in Division 2. Soil and vent stacks shall be supported at the base by means of piers or hangers close to the bottom of the riser and at the floor by means of riser clamps.

1. Each horizontal length of cast or ductile iron pipe and PVC DWV pipe shall be firmly fastened to wall, or otherwise suitably supported.

2. All water risers shall be properly anchored with allowance made for expansion.

3. Hangers, support and anchors shall be installed as required to adequately support the lines without interfering with their inherent flexibility. Pipes, pipe installation, hangers, supports, and anchors shall conform to the requirements of Section 15060-Hangers and Supports.

E. Should the Contractor fail to accurately locate and lay out all necessary openings in new construction in sufficient time to incorporate same in the structure, then the Contractor shall, at no extra cost to DEP, cut such holes as may be required and replace at his own expense all completed work which may have been damaged or destroyed by the cutting of the holes. All such cutting shall be done under the direction and with the permission of the Engineer.

F. Provide sleeves as described under potable water systems of this specification section.

3.04 FLOOR DRAIN AND CLEANOUT INSTALLATION

A. Floor drains shall be installed perfectly plumb and level with elevation to provide for proper floor pitch.

B. Verify that the floor drains are not disturbed during floor or concrete installation.

C. Cleanouts installed in connection with cast iron soil pipe shall consist of a long sweep 1/4 bend or one or two 1/8 bends extended to place of access or as shown on the drawings. An extra heavy cast brass ferrule with countersunk head screw plug shall be caulked into the hub of the fitting and shall be flush with the floor. Cleanouts in connection with other pipe shall be tee pattern, 90-degree branch drainage fittings with screw cast brass plugs of the same size as the pipe up to and including 4-inches.

D. Cleanout tee branches with screw plug shall be installed at the foot of soil and waste stacks and on each building drain outside the building. Cleanouts on pipe concealed in partitions and walls shall be provided with chromium plated cast brass covers secured to plugs.

E. The access covers shall be installed to provide easy and complete access to the cleanout plug. Due consideration of wall construction must be given to allow for proper installation of frame and the installation shall be coordinated with the GC.

F. Each cleanout, unless installed under an approved cover plate, shall be above grade, readily accessible, and so located as to serve the purpose for which it is intended. Cleanouts located under cover plates shall be so installed as to provide the clearances and accessibility required by the local plumbing code.

G. Each cleanout in piping 2- inches or less in size shall be so installed that there is a clearance of not less than 12-inches in front of the cleanout. Cleanouts in piping larger than 2-inches shall have a clearance of not less than 18-inches in front of the cleanout.

3.05 PLUMBING FIXTURES

A. After plumbing fixtures have been installed, fixtures and trim shall be thoroughly cleaned of all grease, oil, dirt, labels, stickers, and other foreign matter, and all packing materials shall be promptly removed from the premises. All valves and faucets shall be adjusted to suit the operating water pressure and all work maintained in clean and proper operating condition until accepted by the Engineer.

B. Connect water supplies from water distribution piping to fixtures.

C. Connect drain piping from fixtures to drainage piping.

D. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.

E. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.

F. The Contractor shall not install any equipment or materials until DEP and Engineer have approved all submittals.

G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

H. Installation of the plumbing fixtures and accessories shall meet the applicable requirements of the Accommodations for the Physically Handicapped Federal Regulation (36 CFR 910.34) and shall be located as shown on the Architectural Drawings.

I. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

J. Install toilet seats on water closets.

K. Install faucet, flow-control fittings with specified flow rates and patterns.

L. Install traps on fixture outlets.

M. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division 7 for sealant and installation requirements.

3.06 TESTING

A. Notify Engineer one week in advance that the items are ready for testing.

1. Perform testing before work is concealed with construction or insulation, or before backfilling if piping is to be buried.

a. Concealed piping shall be installed in time so as not to delay work of other trades and to allow ample time for tests and inspection.

B. Test pressures shall be in accordance with ANSI B31.1 Code for Pressure Piping, Paragraphs 121(a), (b), and (c).

1. Test pressures shall be as follows:

a. Cold Water System - 100 psig hydrostatic.

b. Compressed Air Water System - 100 psig hydrostatic.

c. Drainage, Waste, and Vent - 15 psig hydrostatic.

d. Natural Gas:

1) Systems on which the normal operating pressure is less than 0.5 pounds per square inch gauge (psig), the test pressure shall be 5.0 psig and the time interval shall be 30 minutes.

2) Systems on which the normal operating pressure is between 0.5 psig and 5.0 psig, the test pressure shall be 1.5 times the normal operating pressure or 5.0 psig, whichever is greater, and the time interval shall be 30 minutes.

3) Systems on which the normal operating pressure is 5.0 psig or greater, the test pressure shall be 1.5 times the normal operating pressure, and the time interval shall be one (1) hour.

2. All tests other than natural gas shall be held for at least 4 hours and until each joint has been inspected.

3. At conclusion of testing remove special test fittings, caps, blanking plates, etc. and replace damaged gaskets and place systems in operation.

C. If inspection or tests show defects or failure, such defective work, materials or failure shall be replaced without delay and inspection and tests repeated. Repairs to piping and equipment shall be repaired or replaced with new material or equipment. Caulking of screw joints or plugging leaks shall not be permitted.

D. All water piping shall be hydraulically tested at 100 psig and proven tight for a period of not less than 4 hours with no loss of pressure. Tests for each section shall be repeated at no additional cost to DEP until the piping is proven tight at the specified test pressure. Upon completion of work, inspection shall be made by the Engineer. All corrections, changes or removal of defective work shall be made by the Contractor at no cost to DEP prior to approval of installation.

E. Water and DWV Pipe Testing: Shall be hydrostatic tested as follows, except where more stringent tests are required by the codes.

1. Slowly fill with water each valved section in pipe, and apply the specified test pressure by means of a portable positive displacement pump connected to the piping in an acceptable manner.

2. Make taps if necessary, at points of highest elevation, and plug tightly afterwards.

3. Carefully examine all exposed pipe, fittings, valves and joints during the tests.

4. Where joints show seepage or slight leaks repair as requested.

5. Remove and replace any cracked or damaged pipe, fittings, valves, or other defective materials discovered during the test.

6. After replacements and repairs have been made, repeat tests until work is satisfactory and approved.

F. All drainage and vent piping shall be tested before fixtures are installed, by capping or plugging the openings and filling the entire system with water and allowing it to stand thus filled for three hours.

G. All natural gas systems shall be inspected, tested, purged and placed into operation in accordance with NFPA 54 and as required herein.

H. All water supply piping shall be tested before fixtures or faucets are connected.

I. Each fixture shall be tested for soundness, stability of support and satisfactory operation of all its parts.

J. Disinfection of potable water systems shall be performed in accordance with the procedures described in AWWA C651 or AWWA C652.

3.07 PIPE IDENTIFICATION

A. Pipe markers shall be located as follows:

1. On straight runs of pipe at intervals not exceeding 100 feet.
2. At every sectionalizing or main shut off valve.
3. On each riser at a point 5 feet above floor or platform.
4. On both sides of a wall or partition through which pipe passes.

B. Markers shall be applied so they can be read from the floor.

C. Markers shall be applied only after all insulating and painting has been completed.

D. Surfaces shall be clean and free of dust, oil, or loose paint before applying markers.

E. Before applying markers on insulated surfaces, smooth the surface with sandpaper. Clean surface of all dust after sanding.

F. After applying each marker, wrap one turn of pipe banding tape completely around the circumference of the pipe at each end of the marker. Overlap ends of marker with the tape and overlap the tape upon itself a minimum of 1-inch. The pipe banding tape shall match the background color of the marker.

G. Where a service is indicated on the drawings as a circulating system, the pipe marker legend for the particular service shall be followed by either the word "supply" or "return" to clarify the line function. An arrow designating direction of flow shall follow the legend on each marker.

3.08 CLEANING

A. Clean dirt and marks and other debris from exterior of equipment weekly.

B. Remove debris and waste material resulting from installation weekly.

C. Properly protect all plumbing fixtures and trim at all times and temporarily close all openings to prevent obstruction and damage.

D. Maintain protective covers on all units until final clean-up time and, at that time, remove covers, clean and polish all fixture and trim surfaces.

END OF SECTION

NO TEXT ON THIS PAGE

DETAILED SPECIFICATION 15410P – PLUMBING FIXTURES
CONTRACT CRO-624P

SECTION 15410P
Plumbing Fixtures

NOTE: This Detailed Specification 15410P – Plumbing Fixtures replaces General Specification 15410 – Plumbing Fixtures in its entirety. Wherever a reference appears in the Contract Documents to General Specification 15410, it shall now be deemed to refer to Detailed Specification 15410P.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish, install, test and place in satisfactory operation all plumbing fixtures as specified and shown on the Contract Drawings.

B. Plumbing fixtures shall be furnished complete with all accessories, attachments, fastenings and other appurtenances as specified or as may be required for a satisfactory installation.

C. Index:

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SPECIFICATIONS

A. 15141 - Disinfection

1.04 REFERENCES

A. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use.

B. ASME A112.18.1M - Plumbing Fixture Fittings.

C. ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures.

D. ASME A112.19.2M - Vitreous China Plumbing Fixtures.

E. ANSI A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards).

F. ANSI Z358.1 - Emergency Eyewash and Shower Equipment.

G. ANSI/ARI 1010 - Drinking-Fountains and Self-Contained, Mechanically-Refrigerated Drinking-Water Coolers.

H. ANSI/CABO A117.1 - Accessible and Usable Buildings and Facilities.

I. U.S. Department of Commerce Commercial Standard.

J. New York State Building Code Chapter 6 Water Supply and Distribution Section PC 601

1.05 DESIGN REQUIREMENTS

A. Plumbing fixtures shall conform to the requirements of Section 604.4 Water Distribution System Design Criteria for Maximum Flow Rates and Consumption for Plumbing Fixtures and Fixture Fittings of the New York State Building Code.

B. Plumbing fixtures for use by the physically handicapped shall be in accordance with ANSI/CABO A117.1.

C. Contract Drawings are generally diagrammatic and installation of the plumbing fixtures in the allotted spaces shall be verified.

D. Electric water cooler and emergency flow switch equipment shall be nominal 120 volts, 1 phase, 60 Hertz electrical service, in accordance with Section 16442.

1.06 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Manufacturer's technical information which shall include:

a. Product Data and Information: Provide catalogue cuts of all plumbing fixtures, sizes, rough-in dimensions, utility sizes, faucets, drains, carriers, flush valves, trim and finishes, and all electrical requirements. Complete assembly, layout required clearances and installation drawings with clearly marked dimensions and weights of all component parts and assembled weight. This information shall be in sufficient detail to serve as a guide for assembly and disassembly and for ordering parts. Provide a list of manufacturer's recommended special tools and spare parts to be supplied.

b. Operation and Maintenance Manuals: Submit operation and maintenance manuals for plumbing fixtures, faucets, drains, mixing valves, flush valves, carriers, assembly of parts list for flush valves, signage, emergency equipment and electric water coolers as required by the Contract Documents.

c. Sample data sheet of equipment nameplate(s) including information contained thereon.

d. Insulation materials, coating, jackets, detail density, thermal conductivity and thickness of all insulation materials to be furnished.

e. Details of special fasteners and accessories

f. Type of adhesives, binders, joint cement, mastics.

g. Proposed insulation procedures and installation methods.

h. Spreadsheet or chart identifying piping systems type and pipe size, model numbers of hangers to be used, special coatings for pipe supports etc.

i. Sample data sheet of piping and valves including information contained thereon.

2. The Contractor shall obtain from the manufacturer and submit to the Engineer copies of the results of all certified shop tests.

3. The Contractor shall obtain from the manufacturer and submit to the Engineer copies of certified letters of compliance in accordance with the Specifications.

4. The Contractor shall submit operation and maintenance manual in accordance with the procedures and requirements set forth in the General Conditions and Division 1. Operation and Maintenance Manuals shall be submitted for all equipment

1.07 QUALITY ASSURANCE AND QUALIFICATIONS

A. The Contractor shall be a New York State licensed plumber.

B. All plumbing fixtures shall be "First Quality" as defined and set forth in Commercial Standard CS77-28 as promulgated by the U.S. Department of Commerce. All fixtures are to be white vitreous china unless otherwise specifically noted. Where enameled iron fixtures are specified, they shall be furnished with acid resisting enamel.

C. Plumbing fixtures shall essentially be as efficient as those fixtures that have been tested to perform satisfactorily for at least two years.

D. Fixtures shall be properly protected from damage during construction and shall be cleaned in accordance with manufacturer's instructions.

E. Fixtures and fittings proposed shall be from one manufacturer and of similar character in any room or location. Escutcheons, handles, etc., on the different fixtures shall be of the same design.

F. All plumbing fixtures, water coolers and other related materials shall be inspected for chips, cracks, dents and other flaws. Only items free from defects shall be installed in the work. All fixtures shall be furnished with all necessary supports, hangers, brackets, etc., for the proper installation of the fixtures. Such supports, etc., shall be in accordance with the manufacturer's recommendations.

G. All wall hung fixtures shall be adequately supported from floor with fixture support carriers independent from walls, and floor mounted fixtures shall be secured to concrete slabs with lead expansion inserts.

H. Each plumbing fixture shall be provided with an approved P-trap, which shall be set as close to the outlet as practicable, all water supply connections shall be provided with loose key stops.

I. All fixtures designated for use by the disabled shall fully conform and shall be installed per the requirements of the American Disabilities Act.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle all products and materials as specified in Division 1 and as follows:

B. The Contractor shall deliver the plumbing fixtures and appurtenances to the site in the original sealed packing crate. All products shall be protected from chips, scratches or any damage. Any product damaged shall be replaced at no cost to the City. The fixtures will be inspected for damages. Fixtures gouged, chipped or otherwise damaged will not be considered acceptable.

C. The Contractor shall be responsible for securing storage until final acceptance. The City will not be responsible for any products lost or stolen. Plumbing fixtures shall be stored on heavy wood blocking or platforms so that they are not in contact with the ground.

D. To avoid unnecessary handling, plumbing fixtures shall be unloaded as close to the place where they are to be installed as is practical. Interiors shall be kept free from dirt and foreign matter.

1.09 JOB CONDITIONS

A. Protection: At the end of each day's work or other stopping point throughout the construction, contractor shall provide temporary covering over all plumbing fixtures and trim as required to prevent damage due to moisture, dirt, plaster, concrete or other material. Chipped, cracked, dented or damaged fixtures or trim will not be accepted in the finished installation.

1.10 FIELD MEASUREMENTS

A. The Contractor shall verify all dimensions and shall make any field measurements necessary and shall be fully responsible for accuracy and layout of the work.

B. The Contractor shall review the Contract Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting installation.

1.11 SPARE PARTS, TOOLS AND SUPPLIES

A. The Contractor shall furnish all spare parts as specified. All spare parts, tools and supplies shall be delivered with the equipment, neatly wrapped or boxed, indexed and tagged with complete information for use and reordering.

B. Furnish the following spare parts:

1. One set of faucet washers per 3 faucets.

2. One flush valve service kit per 3 flush valves.

C. The Contractor shall furnish and deliver other spare parts as specified or recommended by the manufacturer.

D. Tools: All special tools necessary to service, disassemble, repair, and adjust the equipment shall be furnished.

1.12 SPECIAL WARRANTY

A. Electric water cooler shall be provided with a five (5) year warranty.

PART 2 PRODUCTS

2.01 MATERIALS

A. All plumbing fixtures provided shall be of high quality and shall be manufactured from the following materials:

1. Vitreous china shall be non-absorbent, hard-burned, and vitrified throughout the body.

2. Porcelain enameled ware shall have specially selected, clear white, acid-resisting enamel coating evenly applied on surfaces.

3. Internal parts of flush and/or flushometer valves, shower mixing valves, shower head face plates and pop-up stoppers of lavatory waste drains may contain acetyl resin, fluorocarbon, nylon, acrylonitrile-butadiene-styrene (ABS) or other plastic material, if the material has provided satisfactory service under actual commercial or industrial operating conditions for not less than 2 years. Plastic in contact with hot water shall be suitable for 180 degrees Fahrenheit water temperature.

4. No fixture will be accepted that shows cracks, blisters, thin spots, or other flaws. All fixtures shall be white and faucets shall have chrome plated flexible tube risers with loose key operated shutoff valves.

B. Fixtures shall be equipped with appurtenances such as traps, faucets, stop valves, and drain fittings. Each fixture and piece of equipment requiring connections to the drainage system shall be equipped with a trap. All exposed traps shall be cast brass swivel chromium plated, grounded joint, and with cleanout.

C. Brass expansion or toggle bolts capped with acorn nuts shall be provided for supports, and polished chromium-plated pipe, valves, and fittings shall be provided where exposed to view.

D. Plumbing fixtures shall be as indicated in the specified Plumbing Fixture Schedule or on the Contract Drawings.

2.02 COMPONENTS

All components shall be as manufactured by:

A. Water Closets:

1. Item No. WC-1:

a. As manufactured by:

1) Kohler Company, Kohler, WI

2) American Standard, Piscataway, NJ

3) SLOAN, Franklin Park, IL

4) Or approved equal.

b. Type: Wall-hung, direct-fed siphon jet.

c. Features:

1) Water saver, 1.28 GPF or equivalent dual flush water closet where one third of the sum of the high flush volume plus twice the low flush volume is less than or equal to 1.28 gallons per flush

a) Dual flush

b) $\frac{(High\ Flush\ Volume + 2 * Low\ Flush\ Volume)}{3} \leq 1.28 GPF$

2) Elongated bowl. Top spud flushometer mounting.

d. Materials: Vitreous China, white.

e. Accessories:

1) Conventional dual flush valve, high efficiency (1.1/1.6 GPF) shall SLOAN, Polished Chrome Finish, Dual Flush, Exposed Water Closet Flushometer or approved equal.

2) Electronic dual flush valve, (1.1/1.6 GPF) shall be equal to SLOAN Exposed Hardwire, Sensor Activated SLOAN ECOS Hardwire Dual Flush Water Closet Flushometer with Smart Sense Technology or approved equal.

3) Battery operated dual flush valve (1.1/1.6 GPF) shall be equal to SLOAN Water Conserving Dual Flush Electronic Flushometer with "Low Battery" flashing LED with sensor control circuit, solenoid valve, transformer, connection boxes, etc or approved equal.

4) Seat, shall be equal to Kohler white open front with quiet-close lid and molded wood material, or approved equal.

5) Closet support, adjustable carrier shall be equal to Jay R Smith Wall-Hung Siphon Jet Water Closet Support with Double

adjustable rough-in support for single-pour flood construction or approved equal.

2. Item No. WC-2:

   a. Same as WC-1 above except furnish a Jay R. Smith "High Set" closet support carrier as required, or approved equal.

B. Lavatories:

1. Item No. L-1:

   a. As manufactured by:

      1) American Standard, Piscataway, NJ

      2) Kohler Company, Kohler, WI

      3) SLOAN, Franklin Park, IL

      4) Or approved equal.

   b. Type: Wall hung lavatory.

   c. Materials: Vitreous China, white.

   d. Features:

      1) Water efficient

      2) Anti-splash rim.

      3) Front overflow.

      4) Concealed arm support

   e. Accessories:

      1) Conventional faucet, commercial self-closing double pedal valve shall be American Standard Double Pedal Valve with polished chrome finish, wall mounted with extended color-coded pedals, red (hot) and blue (cold), or approved equal.

      2) Electronic faucet shall be equal to Delany Lavatory Faucet activated by infrared sensor powered by a 9V external wall plug-in transformer and 0.5 GMP aerator.

      3) Battery operated faucet shall be Delany Lavatory Faucet activated by infrared sensor powered by a 9V externally mounted battery with automatic shut-off after 90 seconds and 0.5 GMP aerator, or approved equal.

      4) Concealed arm carrier, floor mounted shall be Jay R Smith, Lavatory and Sink Support for High Back Lavatories – Floor Mounted or approved equal.

5) Trap, "P" trap with cleanout, slip joint inlet,17gauge tubing, 1-1/4 inch by 1-1/2 inch outlet, chrome finish shall be equal to Kohler Polished Chrome Adjustable P-trap, or approved equal.

2. Item No. L-2:

a. As manufactured by:

1) American Standard, Piscataway, NJ

2) Kohler Company, Kohler, WI

3) SLOAN, Franklin Park, IL

4) Or approved equal

b. Type: Countertop lavatory.

c. Materials: Vitreous China, white.

d. Features:

1) Self-rimming installation.

2) Front overflow.

3) Faucet holes 4 inch on centers.

e. Accessories:

1) Conventional faucet, commercial self-closing double pedal valve shall be American Standard Double Pedal Valve with polished chrome finish, wall mounted with extended color coded pedals, red(hot) and blue(cold), or approved equal.

2) Electronic faucet shall be equal to Delany Lavatory Faucet activated by infrared sensor powered by a 9V external wall plug-in transformer and 0.5 GMP aerator, or approved equal.

3) Battery operated faucet shall be equal to Delany Lavatory Faucet activated by infrared sensor powered by a 9V externally mounted battery with automatic shut-off after 90 seconds and 0.5GMP aerator or approved equal.

4) Trap, "P" trap with cleanout, slip joint inlet, 17 gauge tubing, 1-1/4 inch by 1-1/2 inch outlet, chrome finish shall be equal to Kohler Polished Chrome Adjustable P-trap, or approved equal.

C. Handicapped Lavatories:

1. Item No. HCL-1:

a. As manufactured by:

1) American Standard, Piscataway, NJ

2) Kohler Company, Kohler, WI

3) SLOAN, Franklin Park, IL

4) Or approved equal.

b. Type: Wall hung wheelchair lavatory.

c. Materials: Vitreous China, white.

d. Features:

1) Anti-splash rim.

2) Front overflow.

3) Concealed arm support.

e. Accessories:

1) Conventional Faucet, faucet, commercial self-closing double pedal valve shall be American Standard Double Pedal Valve with polished chrome finish, wall mounted with extended color coded pedals, red(hot) and blue(cold), or approved equal.

2) Electronic faucet shall be Delany Lavatory Faucet activated by infrared sensor powered by a 9V external wall plug-in transformer and 0.5 GMP aerator or approved equal.

3) Concealed arm carrier, floor mounted shall be equal to Jay R Smith, Lavatory and Sink Support for High Back Lavatories – Floor Mounted or approved equal.

4) Trap, "P" trap with cleanout, slip joint inlet, 17 gauge tubing, 1-1/4 inch by 1-1/2 inch outlet, chrome finish shall be equal to Kohler Polished Chrome, or approved equal.

5) Hot and cold water supplies and drain piping shall be provided with insulation guard in accordance with ANSI requirements.

2. Item No. HCL-2:

a. Same as L-2 above except furnish insulation guard for hot and cold supplies and drain piping in accordance with ANSI requirements.

D. Service Sinks:

1. Item No. SS-1:

a. As manufactured by:

1) Kohler Company, Kohler, WI

2) Grainger, Brooklyn, NY

3) WATTS, North Andover, MA

4) Or approved equal.

b. Type: Wall mounted, enameled cast iron sink.

c. Accessories:

1) Faucet with vacuum breaker shall be Kohler spill resistant vacuum breaker shall be closed by ambient air pressure when water flow is off or approved equal.

2) Wall carrier shall be equal to WATTS 3-bolt floor mounter service sink carrier with epoxy coated steel uprights, welded feet, and cast iron fitting, or approved equal.

3) P-Trap shall be equal to Kohler polished chrome P-Trap with adjustable rotation and slit joint inlet with cleanout plug and strainer or approved equal.

4) Rim guard shall be equal to Kohler stainless steel coated wire or approved equal.

5) Fitting shall be wall mounted, mixing faucet type with integral stop, vacuum breaker, pail hook, and adjustable top brace. Finish shall be polished chrome.

E. Electric Water Coolers:

1. Item No. EWC-1:

a. Water cooler shall deliver a minimum capacity of 8 GPH (gallons per hour) of 50ºF water temperature supply based on 80ºF inlet water & 90ºF ambient air temperature.

b. Easy touch push bars.

c. Water bottle filling station with sanitary no touch electronic sensor activation with automatic 20 second shut-off timer.

d. Fountain top shall be stainless steel.

e. Cabinet finish shall be stainless steel.

f. As manufactured by:

1) Elkay, Oak Brook, IL

2) Haws Company, Lane Sparks, NV.

3) Halsey Taylor, Melville, NY.

4) Or approved equal.

2. Item No. EWC-2:

a. Water cooler shall be dual height drinking fountain with sculptured bowl.

b. Receptors, back plate and grille plate shall be manufactured of heavy gauge stainless steel with a No. 4 satin finish.

c. Bubbler shall be one-piece chrome plated, shielded anti-squirt angle stream designed to prevent contamination.

d. Minimum capacity of unit shall be 8 GPH of 50ºF water temperature supply based on 80ºF inlet water & 90ºF ambient air temperature.

e. Water bottle filling station with sanitary no touch electronic sensor activation with automatic 20 second shut-off timer.

f. Manufacturer:

1) Haws Company, Lane Sparks, NV.

2) Halsey Taylor, Melville, NY.

3) Elkay, Oak Brook, IL

4) Or approved equal.

F. Urinals:

1. Item No. UR-1:

a. As manufactured by:

1) American Standard, Piscataway, NJ

2) SLOAN, Franklin Park, IL

3) Kohler Company, Kohler, WI

4) Or approved equal.

b. Type: Wall-hung, siphon jet.

c. Features:

1) Water Sense Label

2) 0.125 -0.50 GPF.

3) Flushing rim.

d. Materials: Vitreous China, white.

e. Accessories:

1) Conventional flush valve, 0.5 GPF shall be Sloan Royal, Franklin, Park, IL, Model No.186-1 flush valve or approved equal.

2) Electronic flush valve shall be American Standard electronic Exposed AC Flush Valve System with 0.5 GPF flush valve, or approved equal

3) Battery operated flush valves (existing fixture retrofit) shall be equal to Sloan 0.5 GPF with battery powered infrared sensor, or approved equal.

4) Urinal support shall equal Kohler floor mount urinal plate type carrier, or approved equal.

5) Wall spout and escutcheons shall be furnished.

2. Item No. UR-2: Same as UR-1 above and mounted at height for the physically handicapped.

3. Safety Valve Lockout with Padlock:

a. Heavy duty plastic, dielectric and chemical resistant valve lock.

b. Padlock with unique serial number, hardened steel shackle, two brass keys with matching serial numbers for each padlock.

c. Supplier: Provide products as manufactured by:

1) Akron, Safety Products, Inc., Akron, OH.

2) Brady USA, Inc., Milwaukee, WI.

3) Or approved equal.

4. Anti-Freeze and Anti-Scald Valves:

a. Type: Anti-freeze valve provides freeze protection and bleeds valve to flush water through line when internal temperature drops below 35°F and closes when the line temperature reaches 45°F. Anti-scald valve provides scald protection and bleeds valve whenever internal temperature rises above 100°F and closes when line temperature drops to 85°F.

b. As manufactured by: Provide products as manufactured by:

1) Haws Drinking Faucet Company, Lane Sparks, NV, Model SP158A freeze protection valve.

2) Haws Drinking Faucet Company, Lane Sparks, NV, Model SP157A scald-protection valve

3) Speakman Company, New Castle, DE.

4) Or approved equal.

G. Mop Sinks:

1. Item No. MS-1:
    a. Mop sink shall be cast terrazzo manufactured tan and white marble chips cast in white Portland Cement to produce a compressive strength of 3,000 psi.
    b. Terrazzo surface shall be ground and polished with all air holes and/or pits to be grouted and excess removed and sealed to resist stains and moisture.
    c. Cement shall be reinforced with 16 gauge galvanized wire.
    d. Shoulder shall not be less than 9" high inside and not less than 2-1/2" wide.
    e. Drain body shall be brass, cast integral and shall provide for caulked lead connection not less than 1" deep for a 3" pipe.
    f. Furnish with a stainless steel removable strainer plate and 8344.111 exposed wall mounted faucet by American Standard or approved equal.
    g. Faucet shall have two handle body with lever handles, Unions spout with pail hook and wall brace, 3/4" hose connection and integral vacuum breaker.
    h. Shall be drop front neo design 36" x 36" x 12" with stainless steel cap/front, Model 97 by Florestone or approved equal.
    i. As manufactured by:
        1) Fiat Products.
        2) Crane Plumbing.
        3) Or approved equal.

H. Sample Sink SPS-1:

1. As manufactured by:
    a. Elkay Manufacturing Company, Jamesburg, NJ, Model No. SS814.
    b. Just Manufacturing Company, Franklin Park, IL
    c. Or approved equal.
2. Type: Stainless steel sink with single compartment and back-splash.
3. Compartments shall be welded 1/4-inch radii coved corner construction.
    a. Material: Type 304 stainless steel, 14 gage.
    b. Size: 48-inches long by 24-inches wide by 14-inch deep compartment with 8-inch high backsplash.

1) Backsplash shall be punched for faucet.

2) Rims shall be channel rim or 1-1/2-inch radius roll rim.

4. Sink shall be supported by 4 stainless steel tubular legs with adjustable height for leveling minimum 1-5/8 inch diameter.

5. Faucet:

a. Manufacturer: Provide products of one of the following:

1) Chicago Faucet Company, Des Plaines, IL, Model No. 332.

2) T&S Brass and Bronze Works, Incorporated, Travelers Rest, SC, Model No. B-216 with No. 634 four arm handle.

3) Or approved equal.

b. Description: Sink faucet, 6-inch swing spout, four-arm handle, 1/2-inch IPS inside threaded female inlet shank inlet, adjustable flanges.

c. Provide sign "SERVICE WATER NOT FOR DRINKING PURPOSES", mount permanently on wall adjacent to sink.

6. Trap:

a. Manufacturer: Provide products of one of the following:

1) Jay R. Smith Manufacturing Company, East Montgomery, AL, Fig. No. 9124.

2) Zurn Industries Incorporated, Erie, PA.

3) Or approved equal.

b. Type: Cast brass adjustable height P-trap for installation on stainless steel sink outlet with cleanout plug and slip nut, 3-inch inlet by 3-inch outlet.

I. Mop Receptor (MR): Provide floor mounted basins, 36 by 24 by 10 inches, made of molded stone in No. 321 white drift.

1. Model: Fiat MSB-3624

2. Faucet: Provide a built-in valve on 8-inch centers with rigid spout with pail hook.

a. Wall brace.

b. Cross handles.

c. 3/4-inch hose thread outlet vacuum breaker for back-siphonage protection.

d. Model: Chicago Faucet No. 782-E27 or approved equal.

3. Hose and Hose Bracket - Plate No. 832-AA.
    a. 30-inch long flexible, heavy-duty 5/8-inch rubber hose.
    b. Cloth reinforced.
    c. 3/4-inch coupling at one end.
    d. Five inches long by 3 inches wide bracket of 18-gauge No. 302 stainless steel.
    e. No. 4 finish.
    f. Rubber grip.
4. Mop Hanger-Plate No. 889-CC
    a. 2 feet long by 3 inches wide.
    b. 18-gauge.
    c. No 302 stainless steel bracket.
    d. No. 4 finish.
    e. Three rubber tool grips.
5. Drain Body-Plate No. 874:
    a. Factory installed.
    b. Stainless steel.
    c. Neoprene gasket.
    d. Stainless steel lock ring.
    e. Stainless steel combination dome strainer and lint basket attached with stainless steel screws.
    f. Design the drain body outlet for a lead caulked joint to a 3-inch drain pipe.
    g. Seal basin watertight at wall and floor lines with silicone sealant.

J. Shower Stations: Type SH-1:
1. As manufactured by:
    a. Symmons Safetymix Visu-Temp, Erie, PA, Model 1-100VT-E.
    b. Leonard Valve Company, Cranston, RI, Advantage Series 6701-TB.
    c. Or approved equal.
2. Type: Single handle pressure balanced mixing valve with integral thermometer. Valve shall have single bronze stem, housing stainless steel

balancing piston. All bronze valve body, housing cap and renewable seats, adjustable temperature limit stop. Valve body to incorporate well for thermometer bulb. Thermometer shall be mounted in a Lexan escutcheon color coded to match valve. All metal shall be triple chrome plated.

3. Materials:

   a. Shower Head: Chrome-plated brass, swivel neck with 2.5 gpm flow restrictor.

   b. Shower Valve: Pressure balanced lever handle with check-stops.

   c. Shower Head: Chrome-plated brass, swivel neck with 2.5 gpm flow restrictor.

   d. Shower Base: Shower base shall be one-piece precast terazzo 36-inches by 36-inches square and shall be made of green and white marble chips in white Portland Cement rated at 3000 psi, seven days after casting. Grind and polish surface to a smooth finish. Tiling flange shall be cast integrally and shall extend a minimum of 1-inch above the shoulder on three sides of the receptor. Receptor shoulder shall not be less than 4-inches high inside and 6-inches high outside and not less than 3-inches wide. Shower receptor shall have a 2-inch floor drain type 1 cast integrally, as specified. Shower receptor shall be Gibraltar Model RM with tiling flanges on three sides as manufactured by Fiat Products or approved equal.

K. Shower Stations: Handicapped: Type SH-2:

1. As manufactured by:

   a. Symmons Safetymix Visu-Temp, Erie, PA, Model 1-117VT-FS.

   b. Leonard Valve Company, Cranston, RI, Advantage Series 6702-TB.

   c. Or approved equal.

2. Type: Single handle pressure balanced mixing valve with integral thermometer. Valve shall have single bronze stem, housing stainless steel balancing piston. All bronze valve body, housing cap and renewable seats, adjustable temperature limit stop. Valve body to incorporate well for thermometer bulb. Thermometer shall be mounted in a Lexan escutcheon color coded to match valve. All metal shall be triple chrome plated.

3. Materials:

   a. Shower Head: Chrome-plated brass, swivel neck with 2.5 gpm flow restrictor.

b. Shower Valve: Pressure balanced lever handle with check-stops.

c. Diverter Valve: Lever handle valve to divert water from shower head to flexible hose shower.

d. Flexible Hose: Chrome-plated brass or stainless steel hose with in-line vacuum breaker, rubber liner and stainless steel or chrome-plated brass threaded connections, with wall connection and escutcheon.

e. Hand Held Shower: 2-inch spray face with water-conserving flow restrictor set for 2.0 gpm and chrome plated wall hook.

f. Shower Head: Chrome-plated brass, swivel neck with 2.5 gpm flow restrictor.

g. Shower Base: Shower base shall be one-piece precast terazzo 36-inches by 36-inches square and shall be made of black and white marble chips in white Portland Cement rated at 3000 psi, seven days after casting. Grind and polish surface to a smooth finish. Shower receptor shall have an integral stainless steel entry cap suitable for wheelchair accessibility complying with ANSI Standard A-117.1-1980. Receptor shoulder shall not be less than 4-inches high inside and 6-inches high outside and not less than 3-inches wide. Tiling flange shall be cast integrally and shall extend a minimum of 1-inch above the shoulder on three sides of the receptor. Shower receptor shall have a 2-inch floor drain type 1 cast integrally, as specified. Shower receptor shall be model WTR-4990 as manufactured by Fiat Products or approved equal.

L. Shower Head, Valve and Spray Handle: Handicapped Showers:

1. As manufactured by:

   a. Symmons Safetymix Visu-Temp, Erie, PA, Model 1-117VT-FS-X.

   b. Leonard Valve Company, Cranston, RI, Advantage Series 6702-TB.

   c. Or approved equal.

2. Type: Pressure balanced mixing valve, with integral thermometer, shower head with adjustable spray, spray head adjusting bar, hand spray unit with flexible hose, wall hook, wall connection, in-line vacuum breaker and diverter with volume control for shower head and hand spray.

3. Materials and Construction:

   a. Shower Valve:

      1) Single bronze stem.

2) Body: Bronze.

3) Valve Seat: Stainless steel renewable.

4) Thermometer: Bi-metallic, dial type with shatterproof case and white against black background.

5) All Metal Trim: Triple chrome plated.

6) Temperature Stops: Adjustable.

b. Shower Head:

1) Chrome plated brass.

2) Description: Adjustable spray, self-cleaning, ball joint.

3) Flow Restrictor: 2.5 gpm maximum.

c. Hose: Flexible hose, wall hook, wall connection, in-line vacuum breaker all chrome plated and 2.0 gpm flow restrictor.

d. Diverter Valve: Double outlet with volume control for shower head and hand spray.

4. Accessories:

a. Integral service stops.

PART 3 EXECUTION

3.01 INSTALLATION

A. Fixtures requiring hot and cold water shall have the cold water faucet on the right hand side of the fixture and the hot water faucet on the left hand side of the fixture. Each fixture shall have shut off valves or stops for hot and cold water.

B. Each fixture shall be separately trapped.

C. Pipe openings shall be closed with caps or plugs during installation. Fixtures shall be tightly covered and protected against dirt, water, chemicals and mechanical injury.

D. Plated or polished fittings, pipes and appliances shall be coated with protective material immediately after installation.

E. Where space limitations prohibit fixture connections with standard fittings in conjunction with the cast-iron floor flange, special short-radius fittings shall be provided. Connections between earthenware fixtures and flanges on soil pipe shall be made gas-tight and water-tight with a closet-setting compound or neoprene gasket and seal. Use of natural rubber gaskets or putty will not be permitted. Fixtures with outlet flanges shall be set the proper distance from

floor or wall to make a first-class joint with the closet-setting compound or gasket and fixture used.

F. Confirm location, size of fixtures and openings before installation.

G. Layout fixtures as indicated on the drawings.

H. Carefully install fixtures in accordance with manufacturer's data with sufficient clearances to coordinate with accessories, specialties and equipment specified in other sections and/or as shown on the drawings.

I. Hangers and carriers shall be installed in accordance with manufacturer's recommendations and in accordance with good practice and workmanship.

J. Provide one support for each water closet with all necessary hardware and gaskets, suitable for specified floor construction.

K. Upon completion of the work, all labels shall be removed, fixtures and trim shall be cleaned of all dirt, grease and markings and all valves properly adjusted.

L. Clean all exposed metal surfaces from grease, dirt, paint or other foreign material.

M. Fixtures shall be properly protected from damage during construction and shall be cleaned in accordance with manufacturer's instructions.

N. Fixtures, chrome-plated piping, fittings and trim shall be polished before requesting acceptance of the system.

O. All exposed valves and trim shall be chrome plated.

P. The entire plumbing installation shall be in accordance with best standard practice and in conformance with the plumbing ordinances in the Building Code of the State of New York.

Q. Coordinate shower valve assembly installation with installation of shower stall, shower partitions and base.

R. Lavatory faucets for handicapped and non-handicapped utilization shall match.

S. Insulate drain, trap, hot and cold water supply lines under handicapped lavatories.

3.02 FIXTURE HEIGHTS

A. The Contractor shall install fixtures to the heights above finished floor as indicated. Installation of fixtures for use by the physically handicapped shall be in accordance with ANSI/CABO A117.1.

B. Water Closet:

1. Standard 15 inches to top of bowl rim.

2. Handicapped 18 inches to top of seat.

C. Urinal:

1. Standard 22 inches to top of bowl rim.
2. Handicapped 19 inches to top of bowl rim.

D. Lavatory:

1. Standard 31 inches to top of basin rim.
2. Handicapped 32 inches to top of basin rim.

E. Water Cooler Fountain:

1. Standard 42 inches to top of basin rim.
2. Handicapped 34 inches to top of spout outlet.

F. Water Closet Flush Valves:

1. Standard 11 inches minimum above bowl rim.
2. Handicapped 27 inches from finished floor.

3.03 FIXTURE ROUGH-IN SCHEDULE

A. The following schedule indicates the minimum size of run out piping to the fixtures.

Fixtures	**HOT WATER**	Cold Water	Waste	Vent
Water Closet, Flush Valve	--	1 inch	4 inch	2 inch
Water Closet, Tank Type	--	1/2 inch	4 inch	2 inch
Urinal, Flush Valve	--	3/4 inch	2 inch	1-1/2 inch
Lavatory	1/2 inch	1/2 inch	1-1/2 inch	1-1/2 inch
Service Sink	1/2 inch	1/2 inch	3 inch	2 inch
Water Cooler Fountain	--	1/2 inch	1-1/2 inch	1-1/2 inch

3.04 DISINFECTION

A. Prior to placing the potable water systems in service, they shall be disinfected in accordance with AWWA Standard C601, Section 15141 – Disinfection, and any additional requirements prescribed by the public health authorities having jurisdiction.

3.05 ADJUSTING

A. Upon completion of the installation, the Contractor shall adjust all fixtures for their intended use.

B. The Contractor shall operate each fixture to ensure their performance without splashing, noise or overflow.

3.06 CLEANING

A. The Contractor shall thoroughly clean all surfaces of the installed fixtures and polish all chromed surfaces.

B. Fixtures shall be protected and use of fixtures will not be permitted until permission is given by the Engineer. Clean work as specified.

3.07 PROTECTION OF FINISHED WORK

A. Protect finished Work as specified.

B. Fixture Use: Do not permit use of fixtures.

3.08 SUPPORT TESTING

A. All wall hung fixtures shall have a sand bag load placed on the fixture in accordance with the testing schedule below and shall not exhibit any downward deflection.

TESTING SCHEDULE	
Fixture	**LOAD**
Water Closet	250 LBS
Urinal	150 lbs
Lavatory	150 lbs
Mop Sink Faucet	50 lbs
Electric Water Cooler	50 lbs

3.09 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop drawings. Confirm the location and size of fixtures and openings before rough-in and installation.

END OF SECTION

SECTION 13101E
Lightning Protection System

NOTE:
The work of this Section shall be in accordance with the requirements of General Specification 11301 – Lightning Protection System, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.02 COMPONENTS

Replace 2.02.A with the following:

A. All lightning protection system fittings shall be heavy duty type, copper material unless otherwise noted or specified. All bolts, screws and hardware shall be stainless steel.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16010E
General Electrical Requirements

Note: The work of this Section shall be in accordance with the requirements of General Specification 16010 – General Electrical Requirements, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A. with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 3 EXECUTION

3.01 MAINTENANCE OF OPERATIONS

Add the following to 3.01:

E. See Detailed Specification 01711 – Maintenance of Operations and Construction Staging for additional details, requirements and coordination.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16061E
GROUNDING

Note: The work of this Section shall be in accordance with the requirements of General Specification 16061 – Grounding, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

Delete article 1.03.E in its entirety.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16071E
Supporting Devices

Note: The work of this Section shall be in accordance with the requirements of General Specification 16071 – Supporting Devices, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.02 CHANNELS, FITTINGS AND BRACKETS

Replace 2.02.F with the following:

F. In outdoor, wet, hazardous and corrosive areas, channels, fittings, brackets and related hardware shall be type 316 stainless steel or PVC coated.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16076E
Labeling and Identification

Note: The work of this Section shall be in accordance with the requirements of General Specification 16076 – Labeling and Identification, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

Delete article 1.03.D in its entirety.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16121E
Low-Voltage Wires, Cables and Accessories

Note: The work of this Section shall be in accordance with the requirements of General Specification 16121 – Low-Voltage Wires, Cables and Accessories, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification**.**

1.03 RELATED SECTIONS

Delete article 1.03.D in its entirety.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16131E
Electric Conduit System

Note: The work of this Section shall be in accordance with the requirements of General Specification 16131 – Electric Conduit System, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.02 HANGERS, SUPPORTS AND INSERTS

Replace 2.02.E with the following:

E. Hangers and supports shall be in accordance with the requirements of General Specification 15060 - Hangers and Supports except beam clamps, hanger rods and hardware shall be steel with electro-plated zinc finish. This shall also include bolts, nuts and washers. In outdoor, hazardous, wet and corrosive locations, hangers and support hardware shall be type 316 stainless steel or factory applied 40 mil thick PVC coated.

2.05 CONDUIT ACCESSORIES

Replace 2.05.C.3 with the following:

3. For outdoor, hazardous, wet and corrosive locations, seal fittings shall include interior and exterior coatings equivalent to the PVC conduit coating specified under this Section.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16133E
Underground Ducts – Ducts in Concrete

Note: The work of this Section shall be in accordance with the requirements of General Specification 16133 – Ducts in Concrete, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.02 NON-METALLIC CONDUIT

Delete article 2.02 in its entirety.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16211E
Electrical Service Entrance

Note:	The work of this Section shall be in accordance with the requirements of General Specification 16211 – Electric Service Entrance, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.04 REFERENCES

Replace 1.04.B.1 with the following:

1. Electric Utility – Consolidated Edison Company of New York. Customer Project Manager – XXX XXX, tel: 914-XXX-XXXX, email: XXX@coned.com, mailing address: 511 Theodore Fremd Avenue, Rye, NY 10580

PART 2 PRODUCTS

2.01 MANUFACTURERS

Add the following to 2.01.A:

4. Square D, Andover, MA (Design Basis).

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16221E
Electric Motors

Note: The work of this Section shall be in accordance with the requirements of General Specification 16221 – Electric Motors, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTION

Add the following to 1.03:

B. Detailed Specification 15530 – HVAC Pumps

C. General Specification 15720 – Heating and Ventilating Units.

D. General Specification 15830 – Fans.

PART 2 PRODUCTS

2.03 DC MOTORS

Delete article 2.03 in its entirety.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16231E
Standby Power

Note: This Detailed Specification 16231 – Standby Power replaces General Specification 16231 – Standby Power in its entirety. Whenever a reference appears in the Contract Documents to General Specification 16231, it shall now be deemed to refer to Detailed Specification 16231G.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish and install a portable 150 kW, diesel generator in sound attenuating enclosure with 150 gallon diesel fuel tank and all accessories as specified herein.

B. Standby power required shall be provided in accordance with the requirements under this Section, the Contract Documents and the Contract Drawings.

C. Section includes packaged engine generators used to supply non-emergency power, with the following features:

1. Diesel engine.
2. Diesel fuel-oil system.
3. Control and monitoring.
4. Generator overcurrent and fault protection.
5. Generator, exciter, and voltage regulator.
6. Vibration isolation devices.
7. Finishes.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

A. Detailed Specification 16413 – Enclosed Transfer Switches

B. Detailed Specification 01434 – Witness Shop Testing and Quality Assurance Inspection

1.04 REFERENCES

A. Standby power shall comply with the latest applicable provisions and recommendations of the following:

1. NYSEC - New York State Electrical Code.
2. NFPA 30 - Flammable and Combustible Liquids Code.
3. NFPA 37 - Standard for Installation and use of Stationary Combus tion Engines and Gas Turbines.
4. NFPA 110 - Standard for Emergency and Standby Power.
5. NEMA MG1 - Motors and Generators.
6. NEMA AB1 - Molded Case Circuit Breakers.
7. NETA ATS - NETA Acceptance Testing Specification.
8. IEEE 446 - Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications.
9. UL-142 - Steel Aboveground Tanks for Flammable and Combus tible Liquids.
10. UL-508 - Industrial Control Equipment.
11. UL-2200 - Standard for Stationary Engine Generator Assemblies.
12. New York State Mechanical Code.
13. New York State Noise Code.
14. New York State Building Code.

1.05 DEFINITIONS

A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.06 SUBMITTALS

A. The Contractor shall submit to the Engineer for approval the material specifications specified below.

B. ACTION SUBMITTALS

1. Product Data: For each type of product.

a. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

b. Include thermal damage curve for generator.

c. Include time-current characteristic curves for generator protective device.

d. Include fuel consumption in gallons per hour at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.

e. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.

f. Include airflow requirements for cooling and combustion air in cubic feet per minute at 0.8 power factor, with air-supply temperature of 95, 80, 70, and 50 deg F.

g. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

2. Shop Drawings:

a. Include plans and elevations for engine generator and other components specified. Indicate access requirements affected by height of subbase fuel tank.

b. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

c. Identify fluid drain ports and clearance requirements for proper fluid drain.

d. Design calculations for selecting vibration isolators and for designing vibration isolation bases.

e. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.

f. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for engine generators and functional relationship between all electrical components.

C. INFORMATIONAL SUBMITTALS

1. Qualification Data: For Installer manufacturer and testing agency including UL, NETA, NFPA, etc.

2. Source Quality-Control Reports: Including, but not limited to, the following:

   a. Certified summary of prototype-unit test report.

   b. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.

   c. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.

   d. Report of sound generation.

   e. Report of exhaust emissions showing compliance with applicable regulations.

3. Field quality-control reports.

4. Warranty: See Warranty article below.

D. CLOSEOUT SUBMITTALS

1. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.

   a. Include the following:

      1) List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

      2) Operating instructions laminated and mounted adjacent to generator location.

      3) Training plan.

E. MAINTENANCE MATERIAL SUBMITTALS

1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   a. Fuses: One for every 10 of each type and rating, but no fewer than one of each.

   b. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.

   c. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

d. Tools: Each tool listed by part number in operations and maintenance manual.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer in writing.

B. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.08 WARRANTY

A. Manufacturer's Warranty: The Contractor shall obtain from the manufacturer and provide to DEP a manufacturer’s warranty for a period of 5 years from the date of equipment startup, in an acceptable and beneficial form, warranting the material of this Section, including the components of packaged engine generators and associated auxiliary components, against defects in design, materials, abnormal aging and workmanship. The warranty shall include all parts, labor and transportation for replacing or repairing any defective components of the equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Cummins Sales & Service – Basis of Design model Cummins C150D2RE. Contact Mr. Ed Cheung. 890 Zerega Ave. Bronx, NY 10473. 718-892-2400.

2. Caterpillar model C4.4 series.

3. Or approved equal.

B. Source Limitations: Obtain packaged engine generators and auxiliary components from single source from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. B11 Compliance: Comply with B11.19.

B. NFPA Compliance:

1. Comply with NFPA 37.

2. Comply with NFPA 70.

C. UL Compliance: Comply with UL 2200.

D. Engine Exhaust Emissions: Comply with EPA Tier 4 requirements and applicable state and local government requirements.

E. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by engine generator including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

F. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: 5 to 104 deg F.

2. Relative Humidity: Zero to 95 percent.

3. Altitude: Sea level to 1000 feet.

2.03 ENGINE GENERATOR ASSEMBLY DESCRIPTION

A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

C. Power Rating: Industrial.

D. Power Rating: 150 kW.

E. Power Factor: 0.8, lagging.

F. Frequency: 60 Hz.

G. Voltage: 208-V ac and 480-V ac.

H. Phase: Three-phase, four wire, wye.

I. Induction Method: Turbocharged.

J. Governor: Adjustable isochronous, with speed sensing.

K. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.

L. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated excluding power required for the continued and repeated operation of the unit and auxiliaries, with capacity as required to operate as a unit as evidenced by records of prototype testing.

2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

2.04 PORTABLE DIESEL GENERATOR

A. Cummins model Cl00D2RE rated for prime power duty and operation at 60 Hz, with an option to change output to 50Hz, with the minimum capabilities

   a. 208 / 120 V 3-phase, 4 wire, prime power (l50kW)

   b. 480 / 277 V 3-phase, 4 wire, prime power (150kW)

   c. Generator shall be sized to operate at 50 DEGREES C. at full power output rating. Prime power output rating shall be as per1SO-8528 as delivering an average load factor of seventy percent (70%) of the prime power rating with varying load for an unlimited number of hours per year with a permissible ten percent (10%) overload capability for emergency purposes for one (1) in twelve (12) hours.

   d. 480 / 277 Volt and 208 / 120 Volt three (3) phase shall be generated simultaneously through a dual wound generator with two (2) separate sets of bus bar connections, which are three (3) wires and a neutral, on the electrical distribution panel. All must utilize and be included with Cam Locks.

   e. All serviceable filters, components, and drains shall be clearly labeled and marked

      a. All Drains shall exit under the generator and be clearly labeled as to what is being drained.

B. Engine-Cummins QSB5-Gll, turbocharged and after-cooled in-line four (4) cylinder diesel engine.

   a. Tier 4 Final compliant engine

   b. Operating RPM not to exceed safe limits

   c. CAT Clean Emissions module equipped

   d. DEF system equipped.

      1. More than twenty-four (24) hours runtime at seventy-five percent (75%) load

2. Electrically heated DEF flow and return lines
3. Apparatus must remain " invisible" in both operation and function of equipment
4. No service requirement for ash traps or cleaning for the life of the engine

e. Starting system
1. Twenty-four (24) Volt system, seventy (70) Amp battery charging alternator
2. Engine must be equipped with glow-plugs as must be controlled with an appropriate temperature sensing system in order to provide adequate glow-plug activation time
3. Glow plug S)'Stem must be fused
4. Twenty-four (24) Volt, Cummins approved brand batteries of appropriate CA andCCA must be used
5. Jumpstart lugs must be clearly labeled, and color coded as per RED being battery POSITIVE and BLACK being battery NEGATIVE. These lugs must be covered and protected from corrosion when not in use.
6. Integral UL and CSA listed three (3) Amp, one hundred and twenty (120) Volt battery charger shall be mounted on the control panel and used to charge the starting battery
7. Engine Starting battery shaJl have master shut off clearly labeled, and accessible.

f. Cooling System
1. Vertical Discharge cooling system
2. Complete cooling system with radiator, blower fan, fan drive, belt guards, fan shroud
3. Permanent type antifreeze to operate between -40 degrees Fahrenheit ("F) to 120 degrees F ambient temperature
4. Shall be non-corrosive coolant
5. External coolant reservoir includingsight gauge
6. External drain that drains to bottom of unit, clearly labeled "ENGINE COOLANT DRAIN"
7. Engine shall also have coolant shutoff valve

8. Integral, fused, thermostatically controlled block heater that will disconnect itself from AC power supply upon generator start

C. Fuel System

a. Twenty-four (24) hour runtime at seventy-five percent (75%) prime rating

b. One hundred and fifty (150) Gallon, dual-wall, puncture resistant, Underwriters Laboratories ("UL")-142 listed unit

c. Integral with generator set base allowing the generator to be removed from the trailer while still satisfying runtime requirements

d. Electric mounted automatic with manual override priming pump

e. Three (3) way fuel supply valves, if external fuel supplies are needed

f. All piping and tubing shall be rated for the appropriate fuels to be used, including B20 Biodiesel.

g. Lockable fuel fill, located in an isolated enclosed space away from engine compartment Fuel fill cap to be green in color, and "DIESEL FUEL ONLY ' green with white engraved letter placard shall be located directly in view of the fill

h. Fuel tank shall have a level gauge and audible and visual low-level alarm

i. Fuel tank shall have a drain, easily accessible and clearly labeled "FUEL TANK DRAIN' that exits the bottom of the unit

D. Exhaust system

a. Internally mounted muffle and stainless exhaust system

b. No site installation of exhaust components shall be required

c. Heat Guards shall be provided and installed as per Occupational Safety and Health Administration (OSHA) and American National Standards Institute (ANSI) standards.

E. Generator

a. The generator shall be screen protected and drip-proof, permanent magnet, self-regulating, brushless generator with fully interconnected damper windings, IC06 cooling system and sealed-for-life bearings. A 2/3 pitch factor is standard on all stator windings. The generator voltages of 480/277V 3-phase and 208/120V 3-phase shall be generated simultaneously via a dual wound generator. The engine will be equipped with an isochronous electronic governor, compliant with ISO3046 Class Al providing steady state speed regulation to =/- 0.25%.

b. Class H insulation system, utilizing windings in a triple-dip

thermosetting moisture, oil and acid resisting polyester varnish. This should also include a heavy coat of anti-tracking varnish or material in order for additional protection from moisture, condensation, or corrosion.

c. Electrical design shall be in accordance with BS5000 Part 99, IEC60034-l,EN61000-6, NEMA MG-1.22

d. Generator shall utilize an integrated voltage regulator that maintains system voltage within the limits of +/- .5% at steady state from no load to full load. This will enable precise operation, control, block loading, and constant voltage in normal operating range.

e. Permanent magnet shall be able to provide three hundred percent (300%) short circuit capabilities, enhanced motor starting, and non-linear loading performance.

f. Shall be equipped with an automatic sensing 120 VAC condensation heater.

g. Waveform Distortion, THF, TIF

1. Total distortion of the voltage waveform with open circuit between phases, or phase and neutral, shall be in the order of 1.8.

2. For three (3) phase balanced harmonic-free loads, the total distortion shall be less than four percent (4%)

3. Telephone harmonic factor (THF) less than two percent (2%)

4. Telephone influence factor (TIF) less than fifty (50)

h. Radio interference - RF suppression shall be in accordance with EN61000-6 and all Society of Automotive Engineers (SAE), Federal Aviation Administrator (FAA), or local regulations regarding radio frequency (RF) emission at airfields, proximity of instrument landing system (ILS) equipment, or radio transmitting and receiving equipment.

F. Electrical Distribution panel

a. Electrical distribution panel shall be located with the generator controls behind a single access door, utilizing rubber gaskets and sealed from the elements.

b. A bus bar shall be incorporated, 480/277V and 208/120V three (3) phase power, oriented so that four (4) posts for each of three (3) phases with neutral plus a common ground connec

tion shall have non-conducting dividers to prevent contact between phase cables. All connections shall be equipped with included Cam Locks

c. Bus bars shall be protected from the elements with a protective, clear cover, and equipped with a trip relay that will trip the primary breaker if the protective door is opened while the bar is powered.

d. Three (3) Single-phase, California style, twist-lock NEMA receptacles with the following ratings: 50A @ 208V phase to phase, 120V phase to neutral, or 240/120V single-phase when in appropriate voltage position.

e. Two (2) three (3) pole molded case, UL / CSA certified, circuit breakers with a solid neutral shall be provided. These shall incorporate a shunt and integral trip for protection due to thermal or magnetic reasons.

f. Two (2) duplex, GFCI equipped, rated for 120 V and 20 A shall be provided

g. One (1) set of a two (2) wire remote start *I* stop connections shall be provided.

h. 30A, 125V single phase, NEMA locking inlet receptacle shall be installed as shore power line, to keep starting batteries charged, or an external power source for internal generator loads.

G. Control Panel

a. Shall be a vibration resistant, mounted auto start digital control panel incorporating a NEMA 1 sheet steel enclosure with a hinged lockable door and viewing window for monitoring when the door is closed. The panel shall be collocated behind a common door with the distribution panel.

b. Run/Stop/Auto control pushbuttons with LED light status indicators
   a. LED status light indicators for both warning and shutdown events with an alarm silencer pushbutton
c. Panel light ON/OFF switch
d. Lamp Test Key
e. A High/Low voltage toggle switch to easily change metering display between 480/277 and 208/120 three (3) phase voltages
f. English and Spanish textual readout capabilities

g. Gauges or metering capabilities for the following
   a. Volts three (3) phase and one (1) phase (both line-to-line and line-to-neutral)
   b. Amperage (per phase & average)
   c. Generator Frequency
   d. Battery Voltage
      Engine hours run
   e. Engine Jacket Water Temperature (in °C or °F)
   f. Lube oil pressure (in psi, kPa or bar)
   g. Engine speed (rpm)

h. Protective Functions
   a. Fail to Start Shutdown
   b. Low oil pressure shutdown
   c. High engine temperature
   d. Low/High battery voltage
   e. Battery charger failure (if fitted)
   f. Underspeed / Overspeed
   g. Loss of engine speed detection
   h. Twenty (20) event fault log

H. Enclosure

The fully weatherproof and sound attenuated enclosure shall provide sound attenuation of 66dBA at twenty-three (23) ft. The enclosure shall be painted white with a black base and lifting arch.

a. Following Features shall be incorporated:
   a. Twelve (12) gauge sheet steel components pretreated with zinc phosphate prior to polyester powder coating at 200° C (392° F)
   b. Black stainless-steel pad-lockable latches
   c. Zinc die cast hinges/grab handles
   d. Rooftop maintenance access doors for fluids access
   e. Side doors for generator compartment access
   f. Front panel for air discharge box access
   g. Lube oil and cooling water drains piped to exterior of the enclosure
   h. Safety glass control panel viewing window in a lockable access door
   i. Cooling fan and battery charging alternator fully guarded
   j. Fuel fill and battery reachable only through lockable access doors
   k. Tested and certified single point lifting eye

l. Lifting points on base frame

I. Trailer Chassis

a. The generator set shall be mounted on a tandem axle towing style trailer that complies with Federal DOTs Federal Motor Vehicle.

Safety Standards, state, local, and PANYNJ standards

b. Three (3") inch eye-pintle hitch, with 2-5/16" ball adaptor shipped loose

c. Electrically actuated brakes

d. Tires - ST225/75R15 - load range C

e. Electrical connection shall be via a seven (7) blade plug

f. Chassis constructed of American Society for Testing and Materials (ASTM) A36 Grade structural steel, including twelve (12) gauge galvanized steel, roll-formed and bolt-on wheel fenders

g. Finish shall be constructed of an epoxy ester high solid enamel primer, then finish painted with polyurethane, two (2) component, high-solid enamel in gloss black. Every surface, and fastener must be corrosion resistant in coating or material

h. Serviceable bearing hubs

i. Serviceable pivot points and landing gear

2.05 FINISHES

A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.06 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

1. Tests: Comply with IEEE 115.

B. Project-Specific Equipment Tests: Before shipment, factory test engine generator and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
2. Test generator, exciter, and voltage regulator as a unit.
3. Full load run.
4. Maximum power.
5. Voltage regulation.
6. Transient and steady-state governing.
7. Single-step load pickup.
8. Safety shutdown.
9. Provide 21 days' advance notice of tests and opportunity for observation of tests by DEP's and Engineer's representative.
10. Generator shall be load bank tested for a period of 4 hours at 0.8 PF. One-half hour at 25% load, one-half hour at 50% load and three hours at 100% load.
11. Report factory test results within 10 days of completion of test.

C. Witnessed Shop Tests:

1. Two representatives of DEP and two representatives of Engineer will witness shop testing. Contractor shall pay costs for two representatives of the Engineer to witness the performance tests at the Manufacturer's factory or test facility.
    a. DEP and the Engineer shall be permitted to witness all performance tests and re-tests at DEP's and Engineer's option.
    b. Dates of the performance tests shall be acceptable to DEP and Engineer, and shall be agreed upon in writing at least 21 days prior to the actual test. All witness tests at the Manufacturer's plant shall be performed on the same day or on consecutive days, to minimize the time required of DEP and Engineer for the witness tests.
    c. The Engineer will be responsible for the cost of Engineer's time (labor/overhead cost) for the first shop test on each unit, and for time to travel to and from the manufacturer's plant. The cost of lodging, meals, and travel expenses for the Engineer shall be the responsibility of the Contractor.
    d. If re-testing is required, all labor, overhead, and expense costs incurred by the Engineer will be deducted from money due the Contractor. If the tests are not performed on the agreed-upon date as a

result of Manufacturer's action and the Contractor incurs lost time as a result of this action, the associated costs will be deducted from money due the Contractor.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.

B. Examine roughing-in for electrical connections. Verify actual locations of connections before packaged engine generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with NECA 1 and NECA 404.

B. Comply with packaged engine generator manufacturers' written installation and alignment instructions.

C. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

D. Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.03 CONNECTIONS

A. Ground equipment according to Section 16061 – Grounding.

B. Connect wiring according to Section 16121 – Low-Voltage Wires, Cables and Accessories. Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.

C. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.04 IDENTIFICATION

A. Identify system components according to Section 16076 – Labeling and Identification.

B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.05 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in first two subparagraphs below, as specified in NETA ATS. Certify compliance with test parameters.

a. Visual and Mechanical Inspection:

1) Compare equipment nameplate data with the Contract Drawings and the Specifications.

2) Inspect physical and mechanical condition.

3) Inspect anchorage, alignment, and grounding.

4) Verify that the unit is clean.

b. Electrical and Mechanical Tests:

1) Perform insulation-resistance tests according to IEEE 43.

a) Machines Larger Than 200 hp Test duration shall be 10 minutes. Calculate polarization index.

b) Machines 200 hp or Less: Test duration shall be one minute. Calculate the dielectric-absorption ratio.

2) Test protective relay devices.

3) Verify phase rotation, phasing, and synchronized operation as required by the application.

4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.

5) Perform vibration test for each main bearing cap.

6) Verify correct functioning of the governor and regulator.

2. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

    a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.

    b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.

    c. Verify acceptance of charge for each element of the battery after discharge.

    d. Verify that measurements are within manufacturer's specifications.

3. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

4. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.

5. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.

6. Exhaust Emissions Test: Comply with applicable government test criteria.

7. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.

8. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 and 100 percent of rated linear load. Verify that harmonic content is within specified limits.

C. Coordinate tests with tests for transfer switches and run them concurrently.

D. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.

E. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.

F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.

G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

H. Remove and replace malfunctioning units and retest as specified above.

I. Retest: Correct deficiencies identified by tests and observations, and retest until specified requirements are met.

J. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

K. Infrared Scanning: After generator startup, but not more than 60 days prior to Final Acceptance, perform an infrared scan of each power wiring termination and each bus connection while running with maximum load. Remove all access panels so terminations and connections are accessible to portable scanner.

1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

2. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

L. Diesel fuel for all testing and demonstration purposes shall be provided by the Contractor. Fuel tank shall be filled complete prior to final turnover to the City.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train DEP's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION

SECTION 16243
Electric-Vehicle Charging Stations

Note: Detailed Specification 16243 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 16243.

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section furnishing and installing includes electric-vehicle charging stations (EVCS) that provides AC Level 1 and Level 2 EV charging.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.04 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For EVCS.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail fabrication and assembly of mounting assemblies for EV charging equipment.
4. Include diagrams for power, signal, and control wiring.
5. Include verification of wireless communications service at each location of EVCS.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Area plans and details, drawn to scale, and coordinated with each other, using input from installers of the items involved.

B. Qualification Data: For factory-authorized service representative.

C. Seismic Qualification Data: Certificates, for EVCS, accessories, and components, from manufacturer.

D. Field quality-control reports.

E. Sample warranty.

1.06 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. Software and Firmware Operational Documentation:

1. Software operating manuals.
2. Program Software Backup: On USB, CD, Cloud, or approved media, complete with configuration files.
3. Device address and password list.
4. Printout of software application and graphic screens.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.08 FIELD CONDITIONS

A. Wireless Survey: Complete wireless survey to determine if wireless provider signals meet or exceed manufacturer's recommended minimum values.

1.09 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components of EVCS that fail(s) in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. ChargePoint CT4021 Bollard Charging Station.

B. Source Limitations: Obtain EVCS from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. Ambient Temperature: -22 degrees F to 122 degrees F.

B. Relative Humidity: Zero to 95 percent.

C. Altitude: Sea level to 400 feet.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

E. Surge Withstand: 6 kV at 3000 A.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

G. EV Charging Levels:

1. Dual vehicle, AC Level 2 at up to 7.2 kW per vehicle.

2.03 EVCS DESCRIPTION

A. Comply with NFPA 70.

B. Comply with:

1. UL 2231-1.
2. UL 2594.
3. SAE J1772 for SAE combo chargers.

C. Comply with ADA-ABA Accessibility Guidelines.

D. Metering: Revenue grade meter.

E. Input Power:
1. Dual, 40 A, 208/240-V ac, 60 Hz, single-phase services per charger.

F. Integral GFCI.

G. Auto-GFCI fault retry.

H. EVCS Mounting: Bollard mount as indicated on Drawings.

I. Enclosures:

1. Rated for environmental conditions at installed location.
    a. Outdoor Locations: NEMA 250, Type 3R.
    b. Lockable.
    c. Tamper resistant.

J. EV Cable and Connectors:

1. SAE J1772 connector.
2. Single connectors with locking holster.
3. 18-foot cable with cable management system.
4. Field-replaceable connector and cable assembly.

K. Status Indicators:

1. LEDs to indicate power, charging, charging complete, system status, faults, and service.

L. Display Screen:

1. Daylight viewable, UV-protected display with 5.7 inch, color, LCD, touch human-machine interface capability.
2. Displays power, charging, charging complete, remote control, system status, faults, and service.

M. Networking:

1. WAN Communications: Cellular GSM/GPRS.
2. Capable of remote configuration and reporting.

N. Payment System:
1. PCI compliant.
2. Capable of remote control and authorization.

O. Charging Network: Compatible with the Chargepoint EV charging network.

1. Multiple units shall independently connect to charging network.
2. Multiple units shall have one unit designated as a master unit that is configured as a gateway unit between the EVCS and the charging network.
3. Individual units shall be capable of indicating station status and availability.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1 and NECA 413.

B. Concrete Base Mounting:
   1. Install EVCS on 12-inch nominal-diameter and 48-inch deep concrete base. Comply with requirements for concrete base specified in Section 03300 "Cast-in-Place Concrete."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking from enclosures and components.

E. Secure covers to enclosure.

3.02 CONNECTIONS

A. Connect wiring according to Section 16121 "Low-Voltage Wires, Cables and Accessories."

B. Comply with grounding requirements in Section 16061 "Grounding."

C. Comply with requirements for installation of conduit in Section 16131 "Electric Conduit System." Drawings indicate general arrangement of conduit, fittings, and specialties.

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

E. Verify that all electrical connections have been made according to the manufacturer's instructions. Remove all burrs, shavings, and detritus from inside the enclosure.

F. After confirming all connections, install covers and tighten fasteners to according to manufacturer's instructions.

3.03 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 16076 "Labeling and Identification."

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections with the assistance of a factory-authorized service representative.

C. Tests and Inspections:

1. For each unit of EVCS, perform the following tests and inspections:

    a. Unit self-test.
    b. Operation test with load bank.
    c. Operation test with EV.
    d. Network communications test.

D. EVCS will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION

SECTION 16271E
Dry Type Transformers

Note: The work of this Section shall be in accordance with the requirements of General Specification 16271 – Dry Type Transformers, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.03 SHIELDED ISOLATION TRANSFORMERS

Delete article 2.03 in its entirety.

2.04 NON-LINEAR LOAD TRANSFORMERS

Delete article 2.04 in its entirety

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16413
Enclosed Transfer Switches

Note: Detailed Specification 16413 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 16413.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish and install non-automatic transfer switches with open transition.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification.

1.03 RELATED SECTIONS

A. Section 16231 – Standby Power.

1.04 REFERENCES

A. NFPA 70 - National Electrical Code.

B. NEMA ICS 1 - General Standards for Industrial Control and Systems.

C. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers, and Assemblies.

D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.04 QUALIFICATIONS

A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum 20 years of documented experience and with service facilities within 50 miles of Project.

B. Supplier - Authorized distributor of specified manufacturer with minimum ten years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to and on the Site.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to internal components, enclosure and finish.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on the Shop Drawings.

1.07 MAINTENANCE SERVICE

A. The manufacturer shall furnish to the DEP a service contract for maintenance of transfer switch for two (2) years from date of Substantial Completion.

1.08 MAINTENANCE MATERIALS

A. Provide two of each special bypass operation tool required for maintenance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ASCO, Model 7000 Series 7NTS (Design Basis). Florham Park, NJ.
B. Cummins, OTPC Series. Minneapolis, MN.
C. Or approved equal.

2.02 NON-AUTOMATIC TRANSFER SWITCH

A. Description - NEMA ICS 10, non-automatic transfer switch.

B. The electrical operator shall be a single-solenoid mechanism, momentarily energized. Main operators which include overcurrent disconnect devices will not be accepted.

C. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.

D. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.

E. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand current capability and be protected by separate arcing contacts.

F. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.

G. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.

H. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor terminal plate with fully-rated AL-CU pressure connectors shall be provided.

I. The non-automatic transfer switch shall be field serviceable and upgradeable to future fully automatic operation.

2.03 SERVICE CONDITIONS

A. Service Conditions - NEMA ICS.

B. Temperature - 95 degrees F.

C. Altitude - 400 feet.

2.04 RATINGS

A. Voltage – 120/208 volts, three phase, four wire, 60 Hertz.

B. Switched Poles - Three.

C. Load Inrush Rating - Combination load.

D. Continuous Rating - 600 amperes.

E. Interrupting Capacity - 100 percent of continuous rating.

F. Withstand Current Rating - The transfer switch shall be rated to close on and withstand the available rms symmetrical short circuit current (100kAIC) at the transfer switch terminals with the type of overcurrent protection shown on the plans.

2.06 PRODUCT OPTIONS AND FEATURES

A. Indicating LED (Light Emitting Diode) Lights - Mount in cover of enclosure, one to indicate when the ATS is connected to normal source (green), one to indicate when the ATS is connected to emergency source (red), one to indicate when the normal source is available (green) and one to indicate when the emergency source is available (red). This ASCO 7000 shall have a light indicating “Load Disconnect Active.”

B. Manual Transfer Switch - Mount in cover of enclosure to initiate transfer from normal source to emergency source.

C. Transfer Switch Auxiliary Contacts - Contacts rated 10 amps, 480 VAC shall be provided consisting of one contact, closed when the ATS is connected to normal source and one contact closed, when the ATS is connected to emergency source.

D. Normal Source Monitor - The voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85 to 100 percent and dropout adjustable from 75 to 98 percent of pickup setting.

E. Alternate Source Monitor - Single-phase voltage sensing of the emergency source shall be provided, with a pickup voltage adjustable from 85 to 100 percent and frequency sensing with pickup adjustable from 90 to 100 percent.

F. In-phase monitor.

G. Solid neutral.

2.07 ENCLOSURE

A. Enclosure - ICS 6, NEMA Type 1, front accessible only.

B. Finish - Manufacturer's standard gray enamel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface is suitable for transfer switch installation.

3.02 INSTALLATION

A. Install transfer switches in accordance with manufacturer's instructions.

B. Provide engraved plastic nameplates under the provisions of Section 16076 – Labeling and Identification.

3.03 MANUFACTURER'S FIELD SERVICES

A. Prepare and start systems.

B. Provide four (4) hours of operator training.

C. Provide a field report for each visit to the Site.

3.04 DEMONSTRATION

A. Demonstrate operation of transfer switch in bypass, normal and emergency modes.

3.05 TESTS AND CERTIFICATION

A. The manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

B. The manufacturer shall be certified to the ISO 9001 International Quality Standard and the manufacturer shall have third-party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.

3.06 SERVICE REPRESENTATION

A. The services of the transfer switch manufacturer shall be retained for field service as specified in article 1.07. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16441E
Panelboards

Note: The work of this Section shall be in accordance with the requirements of General Specification 16441 – Panelboards, except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.01 MANUFACTURERS

Add the following to 2.01.A:

4. Square D, Andover, MA.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16511E
Lighting Fixtures and Devices

Note: The work of this Section shall be in accordance with the requirements of General Specification 16511 – Lighting Fixtures and Devices, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.01 LUMINAIRES

Replace 2.01.A with the following:

A. A luminaire shall be provided for each luminaire symbol shown on the Contract Drawings. Luminaires shall be provided in accordance with the luminaire schedule shown on the Contract Drawings and as specified below.

Add the following sections:

I. Type A fixtures shall be WAC Oculux 3.5" model or approved equal.
   a. Lamp
      1. 970 lumens
      2. 88 lm/W efficacy
      3. CRI of 90. CCT of 3000 K
      4. Internal driver with ELV dimming and 0-10V dimming optional. Fixtures designated as 'F EM' provide with additional R3BNICA-10U-EM emergency battery pack with 24" lead wire and remote test switch.
   a. Housing
      1. 3.5" round
      2. Die-cast aluminum trim and heat sink
      3. Wet location listed
      4. White finish
   b. Optics
      1. Open reflector
      2. 50° beam

J. Type B fixtures shall be WAC Oculux 3.5”model or approved equal.
   a. Lamp
      1. 970 lumens
      2. 88 lm/W efficacy
      3. CRI of 90. CCT of 3000 K
      4. Internal driver with ELV dimming and 0-10V dimming optional. Fixtures designated as ‘F EM’ provide with additional R3BNICA-10U-EM emergency battery pack with 24” lead wire and remote test switch.
   a. Housing
      1. 3.5” square
      2. Die-cast aluminum trim and heat sink
      3. Wet location listed
      4. White finish
   b. Optics
      1. Open reflector
      2. 50° beam

K. Type C fixtures shall be Finelite HPR LED model or approved equal.
   a. Lamp
      1. 4,367 lumens
      2. 118 lm/W efficacy
      3. CRI of 80. CCT of 3500 K
      4. Internal driver with 0-10V dimming. Fixtures designated as ‘C EM’ provide with additional Bodine BSL722 emergency battery.
   b. Housing
      1. 2’x 2’ length
      2. Steel housing
      3. Damp location listed
      4. Angled door
   c. Optics
      1. Boosted standard output
      2. Diffused center

L. Type D fixtures shall be Finelite HP4 ID LED model or approved equal.
   a. Lamp
      1. 4,058 lumens
      2. 110 lm/W efficacy
      3. CRI of 80. CCT of 3500 K
      4. Internal driver with 0-10V dimming. Fixtures designated as ‘D EM’ provide with additional Bodine BSL722 emergency battery pack.
   b. Housing
      1. 4’-0” length

2. Extruded Aluminum, white
3. Damp location listed
4. Fully adjustable mounting
5. Flat end caps
6. White finish

c. Optics
1. Flush boosted standard output uplight and downlight
2. Low gloss reflector

M. Type E fixtures shall be WAC BRINK 12" model or approved equal.
a. Lamp
1. 840 lumens
2. 80 lm/W efficacy
3. CRI of 90. CCT of 3500 K
4. Internal driver with ELV dimming
b. Housing
1. 12" linear vanity
2. Aluminum hardware
3. Damp location listed
4. Fully adjustable mounting
c. Optics
1. Co-extruded acrylic diffuser

N. Type F fixtures shall be Beghelli BS100LED model or approved equal.
a. Lamp
1. 3,585 lumens
2. 110 lm/W efficacy
3. CRI of 80. CCT of 3500 K
4. Internal driver with 0-10V dimming. Fixtures designated as 'F EM' provide with additional emergency battery pack.
b. Housing
1. 4'-0" length
2. Polycarbonate
3. Corrosion, flame and vandal resistant
c. Optics
1. Frosted polycarbonate diffuser

O. Type G fixtures shall be Finelite HP4 surface mounted model or approved equal.
a. Lamp
1. 1,907 lumens
2. 107 lm/W efficacy
3. CRI of 80. CCT of 3500 K

4. Internal driver with ELV dimming and 0-10V dimming. Fixtures designated as 'G EM' provided with Bodine BSL722 emergency battery pack.

b. Housing
1. 4'-0" length
2. Extruded Aluminum, white
3. Damp location listed
4. Surface mounted
5. Flat end caps
6. White finish

c. Optics
1. Boosted standard downlight output
2. Low gloss reflector

P. Type H fixtures shall be Kirlin LRS downlight model or approved equal.
a. Lamp
1. 1,500 lumens
2. 103 lm/W efficacy
3. CRI of 80. CCT of 3500 K
4. Internal driver with 0-10V dimming. Fixtures designated as 'H EM'
b. Housing
1. 4" square
2. Rustproof and corrosion resistive housing
3. Wet location listed
c. Optics
1. Fully enclosed downlight

Q. Type EX fixtures shall be Beghelli Curva model or approved equal.
a. Lamp
1. Red LED
2. Double face
3. Nickel cadmium battery with 90 mins
b. Housing
1. Mirror panel color
2. White housing
3. Indoor / damp listed

R. Emergency Lighting Inverter shall be Beghelli model Vesta-M series or approved equal.
a. 55W at 12V, sealed lead calcium battery (10 year lifetime)
b. 120/277 volt input/output
c. Exterior rated heavy-duty steel cabinet

d. UL924 listed, solid-state automatic switching circuits

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 16521E
Outdoor Lighting

Note: The work of this Section shall be in accordance with the requirements of General Specification 16521 – Outdoor Lighting, except as modified herein.

PART 1 GENERAL

1.03 PAYMENT

Replace 1.03.A with the following:

A. No separate payment will be made for performing any Work required under this Specification.

PART 2 PRODUCTS

2.01 LUMINAIRES

Replace 2.01.B with the following:

B. Luminaires shall be provided for each lighting fixture symbol shown on the Contract Drawings and in accordance with the lighting fixture schedule shown on the Contract Drawings and Detailed Specification 16511 – Lighting Fixtures and Devices.

END OF SECTION

NO TEXT ON THIS PAGE

NO TEXT ON THIS PAGE

THE CITY OF NEW YORK

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Invitation for Bids for Furnishing all Labor and Material Necessary and Required for:

Repurposing of the Kensico Laboratory as the Kensico Regional Headquarters

CRO-624G – STRUCTURES AND EQUIPMENT
CRO-624H – HVAC
CRO-624P – PLUMBING
CRO-624E – ELECTRICAL

Volume 2 of 2
Contract Terms and Specifications
(with separate Bid Booklets)

April 2023