CONSTRUCTION CONTRACT

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

Lisa F. Garcia
Commissioner

Joseph Vaicels
Assistant Commissioner Agency
Chief Contracting Officer

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

Contract: **NR-107**

Description: **North River WRRF – Underdeck Structural and Marine Improvements**

Volume 3 of 3
Specifications
(with separate Bid Booklet and Contract Terms)

August 2026

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North River WRRF – Underdeck Structural and Marine Improvements
Borough of Manhattan, New York

VOLUME 3 OF 3

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SECTION 01 11 00 – SUMMARY OF WORK
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Location and Description of Work
2. Work Included in the Contract
3. Related Construction Contracts
4. Inspection before Bidding
5. Site Characterization Reports and Information
6. Hazardous Soils Investigation
7. Datum Plane

B. The following index of this Section is presented for convenience:

C.

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3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. All Contract Documents, including all other specifications sections in the Contract, will apply to this Section.

1.04 REFERENCES

A. Abbreviations / Acronyms:

1. NR North River
2. WRRF Wastewater Resource Recovery Facility
3. FRP Fiberglass Reinforced Plastic
4. NYSPCS New York State Plane Coordinate System
5. NAD 83 North American Datum of 1983
6. LI Long Island

B. Definitions: [No new references are used in this Section]

C. Reference Standards: [No new references are used in this Section]

1.05 DESCRIPTION

A. Location of Work

1. Work is to be performed under this Contract at the following Site(s):
   a. Site: North River Wastewater Resource Recovery Facility (WRRF)
      1) Site Boundaries:
         i. West Sludge Barge Loading Dock
         ii. Below the North River WRRF in the Hudson River
         iii. Ice breaker structures located in the Hudson River
         iv. Along the fender boundary of the North River WRRF
      2) Work Access to the Site: Hudson River

B. Work Included in the Contract.

1. Contract Name: North River WRRF – Underdeck Structural and Marine Improvements
2. Work Description: Generally, the scope of work includes caisson jacketing, concrete repairs to the existing underdeck structure, installation of new membrane to the underdeck, replacement of the existing icebreaker structures, and repairs to the fender system.
3. Principal Items of Work:
   a. Structural/ Marine Work:
      1) Installation of FRP jacket sleeve to a select number of concrete-filled steel caissons located underneath the North River WRRF in the Hudson River.

2) Replacement of a select number of expansion joints in areas where corrosion and damage are identified.
3) Partial structural repairs to the existing concrete underdeck structure.
4) Repair existing underdeck waterproof membrane, including removal and replacement of sections with major damage and local repairs to sections with minor damage.
5) Demolition and replacement of the existing icebreaker structures.
6) Replacement of the existing gravity fenders with new marine rubber fenders at the West Sludge Barge Loading Dock.
8) Replacement of the existing gravity fenders and timber edge protection system with a new FRP lumber edge protection system along the remaining perimeter of the WRRF.
9) Remove, repaint, and reinstall bollards. Remove and dispose a select number of existing cleats and keep a select number of existing cleats, as shown in the contract drawing(s).
10) Temporary relocation of the existing sludge line and sludge nozzle assembly, to facilitate repairs.
11) Repair the leak in the 12-foot diameter precast concrete outfall pipe and remove debris obstructing the outfall diffuser heads.

b. Civil Work:
1) Construction of a security fence at the northern edge of the North River WRRF.

c. Electrical Work:
1) Installation of new lighting at the West Sludge Barge Loading Dock.
2) Installation of heat trace on the sludge nozzle assembly.

Other Construction Contracts

4. Contracts in Progress or Contracts to be Started:

a. NR-108 North River WRRF – Structural and Drainage Improvements

b. NR-115 Reconstruction of Power Distribution Equipment at North River

c. NR-111 Upgrade of Primary Settling Tanks

d. NR-117 Fire Protection System

e. NR-120 Improvement to the Odor Control Facilities (Potential)

f. NR-124 Reconstruction of Digester Gas System

g. NR-129 Replacement of the Main Sewage Pumps, Main Sewage Pump Discharge Piping, and Influent Bar Screens at North River WRRF

h. NR-GBT Installation of Gravity Belt Thickeners

5. The Contractor shall coordinate its Work with the prime contractors for the contracts listed above.

6. For contracts in progress, drawings, specifications, and schedules will be available for inspection at the Resident Engineer's Trailer at the North River WRRF, located at 725 West 135th Street in New York, New York.

7. 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 awarded Contractor at the above address.

C. Inspection before Bidding

1. 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 in the field by the Contractor.

2. The Contractor may examine the drawings of existing facilities used in preparation of the Contract Drawings which will be available at the Resident Engineer's Trailer at the North River WRRF, located at 725 West 135th Street in New York, New York. Access to the site for inspection purposes prior to bidding will only be on the date advertised for the pre-bid tour.

D. Site Characterization Report and Supplemental Information

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

a. Hazardous Materials Inventory and Mitigation Report for the North River WRRF, Contract NR-107, as prepared by AKRF

b. Climate Risk Assessment and Adaptation Plan, as prepared by Jacobs, February 2025

c. Construction Waste Estimate Report, as prepared by Jacobs, February 2025

d. Sustainability Management Plan, as prepared by Jacobs, February 2025

e. Sustainable Material Content Plan, as prepared by Jacobs, February 2025

2. 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.

3. Copies of these reports will also be available for review at the Resident Engineer's Trailer at the North River WRRF, located at 725 West 135th Street in New York, New York.

E. Datum Plane

1. All elevations indicated or specified refer to the New York State Plane Coordinate System (NYSPCS) and the site datum plane of the North American Datum (NAD 83), Long Island Zone (LI 3104).

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 14 00 – WORK RESTRICTIONS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Normal Project Working Hours
2. Emission Control Technology for Non-Road Vehicles
3. Vehicle Idling Time
4. Compliance with Quality of Life Requirements
5. Scheduling and Operational Constraints
6. Bureau of Wastewater Treatment Checklists for Bulk Storage Tanks
7. City Fleet and Truck Safety
8. Environmentally Friendly Oils and Anti-Freeze

B. The following index of this Section is presented for convenience:

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D. The following exhibits, attached after the End of Section designation, are a part of this Section:

1. Exhibit A - Local Law 77: DEP Monthly Reporting Forms
2. Exhibit B - BWT Petroleum Bulk Storage (PBS) Checklist of Requirements for Contractors
3. Exhibit C - BWT Chemical Bulk Storage (CBS) Checklist of Requirements for Contractors

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 51 30 – Temporary Electrical System

1.04 REFERENCES

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

B. New York City Executive Order No. 39 of 2024 – Improving City Fleet and Truck Safety

1.05 DESCRIPTION

A. Working Hours

1. "Normal Project Working Hours" for this Contract are between the hours of 7 AM through 3 PM, Monday through Friday (except for holidays). Work on the following components of the Project may be tide-dependent: concrete underdeck structure and membrane, fender system, and expansion joints. The Contractor may make a written request to the Resident Engineer when tidal work is required outside of normal working hours. Work outside of normal working hours must be approved in advance by the Resident Engineer. Notice must be requested at least two weeks in advance with a schedule of tidal work hours required to be worked for approval by the Facility Manager. 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".
2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. When work is scheduled to be performed beyond the Normal Project Working Hours, 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 01 51 30 – Temporary Electrical System.

B. Emission Control Technology for Non-Road Vehicles

1. 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.

C. Vehicle Idling time

1. 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:

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

   b. 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.

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

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

   e. When the mobile source is being repaired.

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

D. Compliance with Quality of Life Requirements

1. 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.

2. 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:

   a. 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.

3. 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.

4. 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.

E. Scheduling Constraints - Seasonal

1. Work on the sludge line shall be scheduled outside of the coldest winter months to avoid potential freezing and startup issues.

2. All concrete curing activities shall be performed per the Concrete schedule.

3. Marine Fisheries have constraints protecting the breeding seasons of certain fish, which may delay water-associated construction activities scheduled. Water-associated construction activities are prohibited from January 15 to May 31 to minimize impacts to winter flounder spawning. There is an additional window of March 1 to June 30 during which no sheet pile or coffer dams can be installed or removed. This is to minimize impacts anadromous fish migration. The facility owner (DEP) can apply for a variance from the Department of Environmental Conservation (DEC) and Army Corps of Engineers (ACE), but justification would be required with a noise assessment, discussion of measures to minimize sediment resuspension, and why it is necessary to conduct activities during these windows.

4. Work at or below the riverbed mudline is permitted only between July 1 and October 31, in accordance with the mudline moratorium. Any disturbance to the riverbed of the Hudson River is strictly prohibited outside of this period.

F. Operational Constraints

1. Work on the sludge line must be coordinated with DEP. The duration that sludge storage tanks can be taken offline is limited by the sludge storage capacity and the schedule of the DEP Marine Vessels.

2. Construction is prohibited until all construction permits and approvals are obtained.

3. Construction at the Sludge Barge Loading Dock must be coordinated with DEP BWT Operations and DEP Marine Operations Sludge Vessel Schedule.

G. Bureau of Wastewater Treatment (BWT) Checklists for Bulk Storage

1. BWT Petroleum Bulk Storage (PBS) Checklist. Contractors shall follow and comply with the requirements of the BWT Petroleum Bulk Storage (PBS) Checklist of Requirements for Contractors when they are bringing PBS tanks to the site for temporary use during construction. See Exhibit B, attached to this Section.
2. BWT Chemical Bulk Storage (CBS) Checklist. Contractors shall follow and comply with the requirements of the BWT Chemical Bulk Storage (CBS) Checklist of Requirements for Contractors when they are bringing CBS tanks to the site for temporary use during construction. See Exhibit C, attached to this Section.

H. City Fleet and Truck Safety

1. The Contractor shall comply with the requirements of New York City Executive Order No. 39 of 2024 (EO 39), and BEDC EHS Standards Chapter 29 – Vehicles and Truck Safety.
2. The Contractor shall submit to the Engineer a Fleet Safety Plan, as required by EO 39.

I. Environmentally Friendly Oils and Anti-Freeze

1. For all projects where work is occurring in an environmentally sensitive area, the Contractor shall ensure the following:
   a. All off-road heavy equipment utilizes environmentally friendly, vegetable oil based, hydraulic fluids such as, EAL 224H as manufactured by Mobil, or approved equal.
   b. All off-road heavy equipment utilizes environmentally friendly, propylene glycol based, antifreeze such as, Fleet Charge PG as manufactured by Old World Industries, or approved equal.
2. Environmentally Sensitive areas include:
   a. Areas in the New York City water supply watershed.
   b. On, or adjacent to, a reservoir, wetlands, streams, rivers, brooks, ponds, or other waterbody.
   c. Adjacent to any storm water collection system.
   d. Facilities or structures located on, or a part of, the aqueduct.
   e. Any other area deemed as such by the DEP or other regulatory agency.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Quality of Life Compliance Plan

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 s specified herein.

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

B. Fleet Safety Plan

C. Environmentally Friendly Oils and Anti-Freeze Documentation

1. The Contractor shall submit documentation necessary to demonstrate compliance with environmentally friendly oils and environmentally friendly anti-freeze requirements as specified herein:

a. Safety Data Sheet (SDS)

b. Self-certification, on company letterhead, confirming compliance with the requirements specified.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

EXHIBIT A – LOCAL LAW 77: DEP MONTHLY REPORTING FORMS

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.

Page 1 of 2

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.**

Page 2 of 2

EXHIBIT B - BWT PETROLEUM BULK STORAGE (PBS) CHECKLIST OF REQUIREMENTS FOR CONTRACTORS

New York City Department of Environmental Protection Petroleum Bulk Storage (PBS) Checklist of Requirements for Contractors					
WPCP Name:		**Contract Supervisor (BEDC or BWT):**		**Date Distributed to Contractor:**	
Contractor Company:		**Contractor Contact:**		**Contact Cell Phone:**	
Contract Supervisor Assessment Date:		**WPCP Responsible Individual (RI):**		**RI's Concurrence Date:**	

PBS Checklist	
Contractor Requirements	**Assessment/Comment**
Contractor is responsible to comply with applicable "Contractor Requirements" for work to be completed on a BWT WPCP. The Contract Supervisor and the WPCP RI will assess the Contractor's compliance. Any findings of non-compliance or partial compliance must be addressed to the satisfaction of the Contract Supervisor and the WPCP RI.	*Contractor requirements are designed to meet applicable NYS PBS regulatory requirements and supplement the WPCP's Spill Prevention Control and Countermeasures Plan (SPCC).*
Prior to Commencement of Contractor's On-Site Work	
(PBS-C1) Provide a table identifying temporary aboveground storage tanks (ASTs) and containers storing petroleum (i.e., fuel, oil, lubricants) that are to be brought on-site by the Contractor to complete a construction project. Provide the total capacity, contents, construction material (i.e., steel, fiberglass), secondary containment type, and secondary containment capacity. Include all stationary and non-stationary (mobile) tanks and containers. Provide cut sheets describing specifications of the tanks. Provide an updated table to identify any additions or deletions from the table and as needed to maintain current and accurate information.	
(PBS-C2) Provide the manufacturing specification for each AST to be brought on-site to store petroleum. Demonstrate that each tank design meets or exceeds one of the following manufacturing standards: UL No. 142, UL No. 58, API 650, API 620, CAN4-S601-M84 or CAN4-S630-M84. See www.ul.com/info/standard.htm and www.api.org for tank manufacture standards.	
(PBS-C3) Ensure ASTs to be brought on-site have useful life for the duration of on-site use and are in sufficient condition to meet or exceed the inspection and testing requirements while on-site.	

(PBS-C4) Provide tank specifications, testing schedule, application, and fees to BWT Project Management. BWT Project Management will attach a letter and submit the application and fees to NYC DEC. All ASTs that store petroleum, oil and lubricants must be registered with the NYS DEC. Contact the NYS Bulk Storage Help Line at 518-402-9543 for assistance.	
(PBS-C5) No underground storage tanks are allowed on-site at a BWT WPCP.	
(PBS-C6) Tanks and ancillary piping installed by the Contractor must be tested for tightness before put in service on-site. All test records and manufacturer documents must be provided to BWT. BWT will incorporate these records into and update the WPCP's SPCC plan. Documentation for start-up must include the manufacturer's life expectancy of the tank and piping and Contractor certification of installation for the tank system.	
(PBS-C7) Provide a list of petroleum, oil, and lubricants and associated ASTs and containers to be brought on-site. Provide the MSDS for each petroleum product to be brought on-site. The WPCP's RI and BWT's Project Management Section will revise or modify the WPCP's SPCC plan as necessary with information provided by the Contractor.	

PBS Checklist	
Contractor Requirements	**Assessment/Comment**
(PBS-C8) Provide a facility layout drawing showing the proposed location of ASTs and containers (55-gallons or greater) storing petroleum, the contents of each, associated piping, and secondary containment systems. Show the location of all petroleum transfer areas and the direction of flow in the event of a spill from any tank, container, containment area, or transfer area. Secondary containment and / or diversionary structures are required for ASTs, containers, and transfer areas. (See below for containment requirements).	
(PBS-C9) Provide written procedures for spill response and the disposal of recovered material in the event of a spill or release to the environment. The written procedures must include Contractor's company contact list with emergency telephone numbers.	
(PBS-C10) Provide a drawing showing the location of Contractor's on-site spill response kit(s) that are adequate to respond to likely spills and releases from petroleum, oil, and lubricants and waste stored or handled on-site.	
(PBS-C11) Provide a list of used oil or associated waste to be generated on-site and the proposed management procedures including handling, storing, and disposal. No on-site disposal of used oil is allowed.	
(PBS-C12) Provide written procedures for loading / unloading contents from tanks. The procedure must address how the Contractor will prevent deliveries to the wrong tank, ensure safe deliveries, and respond to spills and releases.	
(PBS-C13) No damaged equipment or tanks are allowed on-site that may potentially cause a spill or release or otherwise not meet manufactures intended use. Used tanks cannot be reinstalled on-site unless they meet the standards for new tanks cited at 6 NYCRR 614.8. If a used tank meets the standards for new tanks it may be reinstalled if it is thoroughly inspected, internally and externally, and found to be structurally sound and free of deficiencies.	
(PBS-C14) Utilize this Contractor's PBS Checklist to ensure compliance with BWT policy and procedures while working on-site.	
During Contractor's On-Site Work	
(PBS-C15) Display the Contractor's tank registration at the WPCP Administration Building with the WPCP's other tank registration certificates. Ensure the information on the tank registration is consistent with the actual tanks the Contractor has on-site. Allow 90 days for the renewal of the tank registration.	
(PBS-C16) Ensure the tank registration is current; tank registration must be renewed every five years. Notify the NYS DEC and BWT Project Management 30 days prior to adding, replacing, reconditioning, or permanently closing a stationary tank. Fee must be paid by Contractor.	

(PBS-C17) Ensure on-site tanks are protected from physical damage by moving machinery such as fork lifts and trucks. As a best management practice, BWT requires protective posts or similar measures as needed to protect ASTs from moving machinery.	
(PBS-C18) Protect tanks that are subject to melting (i.e., plastic, polyethylene, fiberglass-reinforced plastic) against fire and locate so that any spills or release could not unduly expose persons, structures, or the environment. Contractor must provide a Class B fire extinguisher in close proximity to the tanks as needed to protect against flammable liquids and gases.	
(PBS-C19) ASTs resting on the ground must be approved by the BWT RI and Project Management. All ASTs must be furnished with saddles, support legs, or a foundation pad in accordance with manufacturers' recommendations.	
(PBS-C20) Unless constructed of corrosion-resistant materials, the exterior surface of ASTs must be painted and protected.	

PBS Checklist	
Contractor Requirements	**Assessment/Comment**
(PBS-C21) Provide loading areas and equipment storing 55-gallons or greater with a containment system or diversion structure that is adequate to retain likely spills and releases (i.e., drips, leaks, loading / unloading spills).	
(PBS-C22) Fill ports must be securely locked to prevent unauthorized access. Fill ports installed by the Contractor must be properly labeled according to BWT policy (i.e., color code and symbols; see the NYC DEP PBS Tank and Container Management policy and procedure document).	
(PBS-C23) Provide adequate secondary containment to prevent a discharge from all on-site stationary storage tanks, mobile tanks, and containers. Each secondary containment capacity must be sufficient to hold the volume of the largest tank or container inside the secondary containment plus additional freeboard for precipitation. The secondary containment (floor and walls) must be constructed so that any discharge will not escape the containment system before cleanup occurs.	
(PBS-C24) The secondary containment systems and containers must be designed and constructed to prevent any migration of petroleum out of the system. Clay or soil containment systems with plastic liners are not allowed at a WPCP.	
(PBS-C25) Ensure that secondary containment systems are designed so that overfills from connections, vents, and pressure relief devices occur within the secondary containment system. Also, instrumentation devices (i.e., sight glasses) must be located inside the containment system.	
(PBS-C26) Ensure that secondary containment systems are chemically compatible with the substance stored, on a foundation which prevents settlement, and equipped with a sump, siphon, or valve that is manually controlled from outside the containment or gravity drainage system with the valve locked in a closed position.	
(PBS-C27) Transfer areas (loading and unloading) must have a containment system with a capacity to retain spills and leaks that are likely to occur including spills and leaks from hoses. Containment systems for transfer areas must be sufficient to retain all substances before cleanup occurs.	
(PBS-C28) Discharges of precipitation from secondary containment systems must be uncontaminated; the BWT Shift Engineer must inspect and authorize any discharge of precipitation from the secondary containment to the environment or to the WPCP. The Shift Engineer must complete the SPCC Site Inspection Dike/Drainage Checklist before authorizing a discharge of precipitation from the secondary containment. Failure to follow this procedure could result in a report to the NYC DEP of an illegal Contractor discharge.	

(PBS-C29) Precipitation from secondary containment systems that are contaminated (i.e., visible sheen on the water, analytical data) will not be discharged to the environment and will not be discharged to the WPCP. All contaminated precipitation must be containerized and transported off-site for proper disposal by the Contractor.	
(PBS-C30) ASTs (except day tanks and similar small capacity tanks) must have appropriate ventilation in accordance with tank manufacturer's recommendations. Normal and emergency ventilation must be properly sized in accordance with NFPA 30 requirements.	
(PBS-C31) ASTs (except day tanks and similar small tanks) must have automated (i.e., Veeder Root or approved equal) leak detection, high level alarm, and level indicator.	
(PBS-C32) Installation of ASTs must be in a manner consistent with the New York State Uniform Fire Prevention Code, 9 NYCRR Parts 1002 and 1171.2.	

PBS Checklist	
Contractor Requirements	**Assessment/Comment**
(PBS-C33) Contractors' out of service tanks or containers are not allowed at a WPCP. Contractor is required to remove all out of service and unused tanks within 48 hours unless approved by the WPCP RI. Contractor must demonstrate to the WPCP RI that the tank will be used on-site within a reasonable time period.	
(PBS-C34) All piping must be UL-971 certified and Contractor must provide UL-971 certification letter from the NYC Fire Department. UL-971 must be clearly marked on the piping. On-ground piping and underground piping systems must be approved by the BWT Project Management. Underground piping must be non-metalic, flexible, and double-walled with leak detection.	
(PBS-C35) Aboveground and on-ground piping must be steel with a fiberglass protective coating, must meet the ASTM A 53 Standard, and must be inspected daily for leaks or evidence of a release. On-ground piping must not present a tripping or other safety hazard.	
(PBS-C36) Tank tightness testing and integrity testing of Contractor ASTs are the responsibility of the Contractor and must be performed in accordance with applicable regulations and the testing schedule identified on the tank registration.	
(PBS-C37) All ASTs, fill ports, and mobile tanks must be labeled with required information; labeled pipe contents (i.e., diesel) and flow direction (i.e., arrow pointing to direction of flow); attached warning signs (i.e., No Smoking) at appropriate locations. Required information is provided by the BWT PBS Tank Identification Protocol available from the BWT upon request.	
(PBS-C38) Monthly visual inspections of all Contractor ASTs and associated aboveground piping, containers, and equipment storing petroleum, oils, and lubricants in amounts of 55-gallons or greater must be performed by the Contractor. Monthly inspections shall include inspecting exterior surfaces, pipes, valves, and other equipment for leaks and maintenance deficiencies, cracks, areas of wear, corrosion and thinning, excessive settlement of structures, separation or swelling of tank insulation, malfunctioning equipment, and structural and foundation weaknesses.	
(PBS-C39) All monthly inspections must be documented and readily available for review by BWT upon request. Corrective actions required as a result of the monthly inspections are the responsibility of the Contractor. Contractor shall utilize an inspection form provided by the WPCP SPCC plan or their own if approved in writing by the Contract Supervisor and the WPCP RI.	
(PBS-C40) Training of Contractors personnel in receiving delivery, handling, using or storing petroleum, oil, and lubricants is the responsibility of the Contractor. Training is to be completed at least annually and include a review of the WPCP's SPCC plan as well as Contractors procedures and on-site work instructions.	

(PBS-C41) Contractor will manage all tanks and containers storing used oil by clearly labeling the tank or container as "Used Oil." Used oil will be transported off-site by the Contractor for recycling or disposal. Used oil tanks and containers on-site must have adequate secondary containment systems to ensure spills or leaks do not impact the environment.	
(PBS-C42) Contractor is responsible to notify the Contract Supervisor and the WPCP RI in the event of any changes in tanks, containers, materials brought on-site, or procedures that may require changes to the WPCP SPCC plan.	
(PBS-C43) Contractor is responsible to notify the Contract Supervisor and the Shift Engineer immediately in the event of any spill or release of any petroleum, oil, or lubricants to the secondary containment system, the environment, or contact with personnel.	
(PBS-C44) Contractor will have a spill response kit and emergency response equipment adequate to meet emergency response needs of Contractor's on-site work and petroleum, oil, or lubricant storage.	

PBS Checklist	
Contractor Requirements	**Assessment/Comment**
(PBS-C45) Contractor will cooperate fully with the BWT in any routine inspection or incident investigation involving Contractor's use, storage, or transportation of petroleum, oil, or lubricants.	
(PBS-C46) Contractor will post Contractors emergency contact names and evacuation procedures in close proximity of Contractors work area(s). Contractor will provide the WPCP RI and BWT Project Management with Contractor emergency contact information so they can be attached to the WPCP's SPCC plan.	
After Completion of Contractor's On-Site Work	
(PBS-C47) Provide a written de-mobilization schedule to the Contract Supervisor and the BWT RI at least five business days prior to the commencement of de-mobilization.	
(PBS-C48) Properly drain, close, and prepare all tanks, pipes, fill ports, valves, and containers appropriately for transportation off-site. Contractor is responsible for the safe handling and transportation of tanks, containers, and equipment during de-mobilization.	
(PBS-C49) Demobilize and remove from the WPCP all tanks, fill ports, pipes, drums, totes, and containers used on-site not intended for permanent use at the WPCP. Contractor is responsible to remediate any areas of impacted soil, repair any erosion; and restore the ground surface to the intended slope or contour.	
(PBS-C50) Notify the Contract Supervisor and the WPCP RI of any known or suspected impacted soil, groundwater, or surface water discovered during de-mobilization. Clean up shall be the responsibility of the Contractor.	

EXHIBIT C - BWT CHEMICAL BULK STORAGE (CBS) CHECKLIST OF REQUIREMENTS FOR CONTRACTORS

New York City Department of Environmental Protection Chemical Bulk Storage (CBS) Checklist of Requirements for Contractors					
WPCP Name:		**Contract Supervisor (BEDC or BWT):**		**Date Distributed to Contractor:**	
Contractor Company:		**Contractor Contact:**		**Contact Cell Phone:**	
Contract Supervisor Assessment Date:		**WPCP Responsible Individual (RI):**		**RI's Concurrence Date:**	

CBS Checklist	
Contractor Requirements	**Assessment/Comment**
Contractor is responsible to comply with applicable "Contractor Requirements" for work to be completed on a BWT WPCP. The Contract Supervisor and the WPCP RI will assess the Contractor's compliance. Any findings of non-compliance or partial compliance must be addressed to the satisfaction of the Contract Supervisor and the WPCP RI.	*Contractor requirements are designed to meet applicable NYS CBS requirements and supplement the WPCP's Spill Prevention Report (SPR)*
Before Contractor's On-Site Work	
(CBS-C1) Provide a table identifying temporary aboveground storage tanks (ASTs) and containers storing hazardous substances that are to be brought on-site by the Contractor to complete a construction project. Provide the total capacity, contents, construction material (i.e., steel, fiberglass), secondary containment type, and secondary containment capacity. Include all stationary and non-stationary (mobile) tanks. Provide cut sheets describing specifications of the tanks. Provide an updated table to identify any additions or deletions from the table and as needed to maintain current and accurate information.	
(CBS-C2) Provide the manufacturing specification for each AST to be brought on-site to store hazardous substances. Demonstrate that tank design meets or exceeds one of the following manufacturing standards: API 650, API 620, CAN4-S601-M84, CAN4-S630-M84, ASTM D4097-88, or ASTM D3299-88 or a comparable standard developed by a nationally recognized association or independent testing laboratory. See www.api.org and www.astm.org for tank manufacture standards.	
(CBS-C3) Ensure ASTs to be brought on-site have a useful life for the duration of on-site use and are in sufficient condition to meet or exceed the inspection and testing requirements while on-site.	

(CBS-C4) Provide tank specifications, testing schedule, application, and fees to BWT Project Management. BWT Project Management will attach a letter and submit the application and fees to NYC DEC. All ASTs that store a hazardous substance with a capacity of 185 gallons or greater must be registered with the NYS DEC. Contact the NYS Bulk Storage Help Line at 518-402-9543 for assistance.	
(CBS-C5) No underground storage tanks are allowed on-site at a BWT WPCP.	
(CBS-C6) Tanks and ancillary piping installed by the Contractor must be tested for tightness before put in service on-site. All test records and manufacturer documents must be provided to BWT. BWT will incorporate these records into and update the WPCP's SPR. Documentation for start-up must include the manufacturer's life expectancy of the tank and piping and Contractor certification of installation for the tank system.	
(CBS-C7) Review the regulated hazardous substances cited at Part 597.2 and provide a list of the hazardous substances to be brought on-site. Provide MSDSs for each hazardous substance to be brought on-site. The WPCP's RI and BWT's Project Management section will revise or modify the WPCP's SPR as necessary with information provided by the Contractor.	
(CBS-C8) Provide a facility layout drawing showing: • The proposed location of ASTs and containers storing hazardous substances; • The contents of each; • Associated piping; • Secondary containment systems; • The location of all transfer areas and the direction of flow in the event of a spill from any tank, container, containment area, or transfer area; and The locations for the Contractor's on-site spill response kits adequate to respond to likely spills and releases from hazardous substances and waste stored or handled on-site	
(CBS-C9) Provide the disposal plan for waste generated on-site (i.e., solid waste, special waste, hazardous waste). No on-site disposal of waste is allowed.	
(CBS-C10) Provide written procedures for spill response and the disposal of recovered material in the event of a spill or release to the environment. The written procedures must include Contractors company contact list with emergency telephone numbers.	

CBS Checklist	
Contractor Requirements	**Assessment/Comment**
(CBS-C11) Provide written procedures for loading / unloading contents from tanks. The procedure must address how the Contractor will prevent deliveries to the wrong tank, ensure safe deliveries, and respond to spills and releases.	
(CBS-C12) No damaged equipment or tanks are allowed on-site that may potentially cause a spill or release or otherwise not meet manufactures intended use. Used tanks cannot be reinstalled on-site unless they meet the standards for new tanks cited at 6 NYCRR 599.8. If a used tank meets the standards for new tanks it may be reinstalled if it is thoroughly inspected, internally and externally, and found to be structurally sound and free of deficiencies.	
(CBS-C13) Utilize this Contractor's CBS Checklist to ensure compliance with BWT policy and procedures while working on-site.	
During Contractor's On-Site Work	
(CBS-C14) Display the Contractor's tank registration at the WPCP Administration Building with the WPCP's other tank registration certificates. Ensure the information on the tank registrations is consistent with the actual tanks the Contractor has on-site. Allow 90 days for the renewal of the tank registration.	
(CBS-C15) Ensure tank registration is current; tank registration must be renewed every two years. Notify the NYS DEC and BWT Project Management 30 days prior to adding, replacing, reconditioning, or permanently closing a stationary tank. Fee must be paid by Contractor.	

CBS Checklist	
Contractor Requirements	**Assessment/Comment**
(CBS-C16) Ensure all on-site tanks are: • Of sufficient strength to withstand normal handling and use; • Chemically compatible with the hazardous substances being stored; • Protected from, or resistant to, all forms of internal and external wear, vibration, shock, and corrosion; • Have a stable foundation under all operating conditions and be protected from fire, heat, vacuum, and pressure that might cause a tank failure; and • If fiberglass-reinforced plastic material is used, the material must be of sufficient density and strength to form a hard, impermeable shell which will not crack, wick, wear, soften, or separate under normal service conditions.	
(CBS-C17) Ensure on-site tanks are protected from physical damage by moving machinery such as fork lifts and trucks. As a best management practice, BWT requires protective posts or similar measures as needed to protect ASTs from moving machinery.	
(CBS-C18) Protect tanks subject to melting (i.e., plastic, polyethylene, fiberglass-reinforced plastic) against fire and locate them so that any spills or releases could not unduly expose persons, structures, or the environment. Contractor must provide the appropriate fire extinguisher in close proximity to the tanks as needed to protect against flammable liquids and gases.	
(CBS-C19) Fiberglass-reinforced plastic tanks are recommended for on-site work since they are not subject to corrosion. No tanks are allowed to contact the ground. All tanks must be underlain by an impervious barrier such as a concrete pad or other impervious secondary containment system.	
*(CBS-C20) Un*less constructed of corrosion-resistant materials, the exterior surface of ASTs must be painted and protected by an inhibitive primer coat, intermediate inhibitive, and two or more final coats of paint or other method described in Part 599.8 (f).	
(CBS-C21) Drums, containers, and mobile tanks storing 2,200 pounds or more of a hazardous substance must have a containment system capable of retaining 110% of the largest container with the containment system. Secondary containment systems must be a surrounding dike and impoundment system, remote catch tank or impoundment area, or another system or practice which will collect and contain a leak or spill. Capacity of the secondary containment must be 110% of the largest tank inside the containment. However, all manifold tanks require secondary containment volume of 110% of their entire capacity.	
(CBS-C22) The secondary containment system must be designed and constructed to prevent any migration of hazardous substances out of the system. Clay or soil containment systems with plastic liners are not allowed on-site at a WPCP.	

(CBS-C23) Ensure that secondary containment systems are designed so that overfills from connections, vents, and pressure relief devices occur within the secondary containment system. Also, instrumentation devices (i.e., sight glasses) must be located inside the containment system.	
(CBS-C24) Ensure that secondary containment systems are chemically compatible with the substance stored, on a foundation which prevents settlement, equipped with a sump, siphon, or valve that is manually controlled from outside the containment, or is gravity a drainage system with the valve locked in a closed position.	

CBS Checklist	
Contractor Requirements	**Assessment/Comment**
(CBS-C25) Transfer areas (loading and unloading) must have a containment system with a capacity to retain spills and leaks that are likely to occur including spills and leaks from hoses. Containment systems for transfer areas must be coated with a material compatible with the substance being handled and sufficient to retain all substances before cleanup occurs.	
(CBS-C26) Fill ports must be securely locked to prevent unauthorized access. Fill ports remote to the tank must be labeled with the chemical name, hazard warnings, tank information, and closed and open positions for valves and controllers. Fill port pipes installed by the Contractor must be sized according to BWT policy (hypochlorite – 2 inch; sodium hydroxide – 2.5 inch; ferric chloride – 2 inch; polymer – 3 inch).	
(CBS-C27) Discharges of precipitation from secondary containment systems must be uncontaminated; the BWT Shift Engineer must authorize any discharge of precipitation from the secondary containment to the environment or to the WPCP. Failure to follow this procedure could result in a report to the NYC DEP of an illegal Contractor discharge.	
(CBS-C28) Precipitation from secondary containment systems that are contaminated (i.e., visible sheen on the water, analytical data) will not be discharged to the environment in any case and will not be discharged to the WPCP without written authorization from the WPCP duty operator. All contaminated precipitation must be containerized and transported off-site for proper disposal by the Contractor unless written authorization is received from the WPCP duty operator.	
(CBS-C29) ASTs must have a monitoring system for monitoring leakage between the tank bottom and the secondary containment system.	
(CBS-C30) Installation of ASTs must be in a manner consistent with the New York State Uniform Fire Prevention Code, 9 NYCRR Parts 1002 and 1171.2.	
(CBS-C31) Contractors' out of service tanks or containers are not allowed at a WPCP. Contractor is required to remove all out of service and unused tanks within 48 hours unless approved by the WPCP RI. Contractor must demonstrate to the WPCP RI that the tank will be used on-site within a reasonable time period.	
(CBS-C32) All piping must be designed, labeled, protected, and otherwise constructed in accordance with Part 599.13. On-ground piping and underground systems must be installed with secondary containment and provided with leak monitoring. Piping must pass an inspection as specified by Part 599.16 before being placed in service at a WPCP.	

(CBS-C33) All ASTs, fill ports, valves, and mobile tanks must be labeled with required information; label pipe contents (i.e., Ferric Chloride) and flow direction (i.e., arrow pointing to direction of flow); attached warning signs (i.e., No Smoking) at appropriate locations. Required information is provided by the BWT CBS Tank Identification Protocol available from the BWT Project Management Section.	
(CBS-C34) Daily inspections of ASTs and associated piping for hazardous substances must be completed and documented. Contractor is responsible for retaining daily inspection records for the duration of on-site work. Inspections must include an inspection of the tank and the secondary containment system. Contractor shall submit their inspection form for review and approval by the Contract Supervisor and the WPCP RI. Inspections must include inspecting exterior surfaces, pipes, valves, and other equipment for leaks and maintenance deficiencies, cracks, areas of wear, corrosion and thinning, excessive settlement of structures, separation or swelling of tank insulation, malfunctioning equipment, and structural and foundation weaknesses.	

CBS Checklist	
Contractor Requirements	**Assessment/Comment**
(CBS-C35) Tank tightness testing and integrity testing of Contractor ASTs are the responsibility of the Contractor and must be performed in accordance with applicable regulations and the testing schedule identified on the tank registration.	
(CBS-C36) Annual and five-year inspections are the responsibility of the Contractor. These inspections are comprehensive inspections and tests to evaluate the tank integrity and fitness for service. Annual and five-year inspections must be performed by the Contractor in accordance with regulations and the schedule of testing must be included in the Contractors initial submittals.	
(CBS-C37) Training of Contractors personnel handling, using, or storing hazardous substances is the responsibility of the Contractor. Training is to be completed at least annually and include a review of the WPCP's SPR as well as Contractors procedures and on-site work instructions.	
(CBS-C38) Contractor is responsible to notify the Contract Supervisor and the BWT RI in the event of any changes in tanks, containers, materials brought on-site, or procedures that may require changes to the WPCP's SPR.	
(CBS-C39) Contractor is responsible to notify the Contract Supervisor and the Shift Engineer immediately in the event of any spill or release of a hazardous substance to the secondary containment system, the environment, or contact with personnel.	
(CBS-C40) Contractor will have a spill response kits and emergency response equipment adequate to meet emergency response needs of Contractor's on-site work and hazardous substance storage.	
(CBS-C41) Contractor will cooperate fully with the BWT in any routine inspection or incident investigation involving Contractor's use, storage, or transportation of hazardous substances	
(CBS-C42) Contractor will post Contractors emergency contact names and evacuation procedures in close proximity of Contractors work area(s). Contractor will provide the WPCP RI and BWT Project Management with Contractor emergency contact information so they can be attached by the WPCP's SPR.	
After Completion of Contractor's On-Site Work	
(CBS-C43) Provide a written de-mobilization schedule to the Contract Supervisor and the BWT RI at least five business days prior to the commencement of de-mobilization.	
(CBS-C44) Properly drain, close, and prepare all tanks, pipes, fill ports, valves, and containers appropriately for transportation off-site. Contractor is responsible for the safe handling and transportation of tanks, containers, and equipment during de-mobilization.	

(CBS-C45) Demobilize and remove from the WPCP all tanks, fill ports, pipes, drums, totes, and containers used on-site not intended for permanent use at the WPCP. Contractor is responsible to remediate any areas of impacted soil, repair any erosion, and restore the ground surface to the intended slope or contour.	
(CBS-C46) Notify the Contract Supervisor and the BWT RI of any known or suspected impacted soil, groundwater, or surface water discovered during de-mobilization. Clean up shall be the responsibility of the Contractor.	

SECTION 01 21 20 – EXPANDED WORK ALLOWANCE
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The total amount of the Contract shall include an allowance (the "Expanded Work Allowance" or "EWA") that, subject to compliance with the terms of this Contract, can be used for the items set forth in Article 1.05.B herein (said items to be referred to as the "Expanded Work Items" and this Section 01 21 20 shall be referred to as the "EWA Specification"). Payment for the Expanded Work Items may only be made through the EWA in accordance with this EWA Specification. Except as specifically provided in this EWA Specification, nothing in this EWA Specification alters, or will be deemed to alter, the interpretation or application of the Contract, including but not limited to Articles 21, 24, 25, 26, 28, and 78 thereof.

B. Section Includes:

1. Process
2. Work Eligible for Expanded Work Allowance
3. Work Not Eligible for Expanded Work Allowance

C. The following index of this Section is presented for convenience:

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3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. Eligible EWA payments will be made under Contract Item No. A-3, titled “Expanded Work Allowance.” The Contractor shall only be entitled to payment from the EWA under the conditions and in accordance with the requirements set forth in this EWA Specification. In the event the EWA amount or any portion thereof remains unexpended at the conclusion of the Contract, such amount shall remain the sole property of the City.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Definitions

1. Capitalized terms not otherwise defined in this EWA Specification shall have the meaning ascribed to them in the Contract.

1.05 DESCRIPTION

A. PROCESS

1. Except for those provisions specifically applicable to Expanded Work Items, all other provisions of the Contract applicable to Work shall be applicable to Expanded Work Items. To be eligible for the EWA, all work must be authorized in conformance with this EWA Specification and payment for the Expanded Work Items will not be made without written authorization as set forth in this EWA Specification. This EWA Specification shall not be used to make interim payment for work that is being progressed as disputed Work.

2. The EWA may be utilized only under the conditions set forth in this EWA Specification.

3. The Contractor may request that identified Extra Work be subject to the EWA. If the Engineer determines that use of the EWA is appropriate, in their sole discretion, the Engineer will prepare a written scope document for the Expanded Work Items (“EWA Scope Memo”). Upon EAO approval, the Engineer will issue a Notice of Direction ("NOD") to proceed under the EWA Scope Memo. The EWA Scope Memo will set forth the maximum amount payable from the EWA (“Maximum Amount”) prior to the issuance of a final cost memorandum, in accordance with this Section. The Maximum Amount may be increased from time to time by the Engineer, in their sole discretion, except that the Maximum Amount may not exceed 80% of the Engineer’s estimated total cost for such Work (the “Estimated Cost”) unless and until a final cost and scope is determined and a final cost memorandum (“Final Cost Memo”) executed in accordance with this Section.

4. Neither the Maximum Amount nor the Estimated Cost will be deemed to be the final cost of the Expanded Work Items. The final cost for the Expanded Work Items will be determined in accordance with Article 26 of the Contract as if the Expanded Work Items were Extra Work. The Contractor must submit its detailed price proposal for the Expanded Work Items, calculated in accordance with the Contract, within the time period set forth in the EWA Scope Memo or within 90 Days after the executed EWA Scope Memo is issued to the Contractor, whichever is sooner ("Submission Period").

5. Once the EWA Scope Memo is executed and the Contractor is issued an NOD to proceed with the Work, the Agency will make progress payments for completed work under the EWA Scope Memo, as provided in the Contract, up to the Maximum Amount.

6. The Agency will not make any progress payments for the performance of the Expanded Work Items beyond the Submission Period set forth in sub-Section 4, above, unless and until a final cost and scope has been determined and a Final Cost Memo executed in accordance with this Section. No amounts above the Maximum Amount will be payable from the EWA, unless and until a final cost and scope has been determined and a Final Cost Memo executed in accordance with this Section. In all events, the Contractor shall promptly and diligently comply with the Engineer's direction and perform all Work required by the Contract and the EWA Scope Memo.

7. Upon receipt of the Contractor's detailed cost proposal, the Engineer will evaluate the proposal and initiate negotiations, as necessary, to determine the final cost of the Expanded Work Items in accordance with Article 26 of the Contract as if the Expanded Work Items were Extra Work. The Contractor is responsible to furnish time and material records in accordance with Article 28 of the Contract for all work performed under an EWA Scope Memo until a Final Cost Memo is executed. If the parties cannot agree on a unit price or fixed price, the Contractor will be paid on the basis of time and material records in accordance with Article 26 of the Contract as if the Expanded Work Items were Extra Work, subject to the provisions of Article 28 of the Contract.

8. A Final Cost Memo will be prepared by the Engineer to be executed by the parties. The total net sum of the amounts added and/or credited under the EWA Scope Memo and payment of the finalized Final Cost Memo constitutes full accord and satisfaction for the costs resulting from the Expanded Work Items. In the event the EWA is insufficient to pay the full amount of the Final Cost Memo, the parties agree to execute change order documents for the remaining funds, subject to registration in accordance with the New York City Charter.

9. Upon EAO approval, the Engineer has the power to execute the Final Cost Memo on behalf of the Commissioner. The description of the work

described in the Final Cost Memo shall be considered to be included in the description of the Work as if it were fully set out in the Contract Documents and the Contractor shall perform the Work necessary to complete the Expanded Work Items in the same manner and under the same terms as any other Work described in the Contract Documents.

10. All payments for EWA work will be billed with other Contract Work and paid pursuant to Article 42 of the Contract.

11. No payment will be made for incomplete items included in the EWA Scope Memo and/or the Final Cost Memo.

B. WORK ELIGIBLE FOR AN EXPANDED WORK ALLOWANCE

1. Only the items set forth below shall be eligible for consideration by the Engineer for payment using the EWA:

a. Non-material changes in the Work necessary to complete Contract Work due to the following:

1) Site conditions that significantly differ from those included in the Contract Documents and that could not reasonably have been anticipated by the Contractor (excluding pollution remediation).

2) Overruns of unit price items and quantity increases in accordance with Article 26.

3) NYCDOT traffic stipulations or permit requirements required for the operation of the construction site that significantly differ from those included in the Contract Documents and that could not have been anticipated by the Contractor.

4) Changes to the sizes of materials or changes to specifications of materials from those provided in the Contract Documents that are approved by the Commissioner and/or the Engineer.

b. Non-material changes in the scope of Work directed by the Commissioner that result in a net change in the cost to the Contractor for the Work to be performed under this Contract, including but not limited to for the following:

1) Increased costs of operation and maintenance of the Site due to changed site conditions or environmental hazards at the Site materially differing from any shown on the Contract Drawings or indicated in the Specifications or such conditions or environmental hazards as could not reasonably have been anticipated by the Contractor, which conditions or hazards will materially affect the cost of the Work to be done under the Contract. The attention of the Commissioner must be called immediately to such conditions or hazards before

they are disturbed in accordance with Article 78.2 of the Contract.

2) Construction methodology changes issued in writing by the Engineer.

3) Changes as a result of newly available technology that became available and/or approved for use by the City after the bidding opening was complete.

4) Safety enhancements not regulated or beyond Law.

5) Additional work to address non-regulatory changes in Agency or City policy.

6) Contractor-initiated value engineering that results in reduced scope, more efficient design or more efficient construction in accordance with Contract value engineering requirements concerning the sharing of cost or time changes from such value engineering.

7) The following administrative/regulatory non-material scope changes after Bid submission:

   a) Changes to applicable federal, state and local laws, rules, ordinance, regulations, or requirements of the local authority having jurisdiction, including:

      (1) FDNY regulatory requirements that result in revisions or upgrades to existing standpipes, fire alarm systems, hydrants, pre-combustion gas compressors, or sprinkler systems that are not provided in the Contract documents.

      (2) Changes to DOB regulatory requirements.

      (3) Changes to DEP and NYS DEC regulatory requirements.

      (4) Additions due to Local Law 94 of 2019 with respect to sustainable roof.

      (5) Public Design Commission regulatory requirements resulting in change in material/structure to match overall site scheme.

      (6) Addition of bypasses/shut off valves to avoid interruption of service to adjacent jurisdictions or neighborhoods.

   b) Changes due to utility company requests.

C. WORK NOT ELIGIBLE FOR EWA

1. Items not specifically numerated in Article 1.05.B are ineligible for EWA.
2. Notwithstanding anything in Article 1.05.B, the following work is not eligible for EWA:
    a. Costs related to design errors and/or omissions.
    b. Costs related to pollution remediation.
    c. Costs associated with the purchase of standalone equipment.
    d. Costs for initial outfitting.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor is encouraged to and is authorized to develop, prepare and submit to the Agency Chief Contracting Officer or his/her designee (the "ACCO"), in writing, Value Engineering Proposals (VEPs) for modifying the plans, Specifications or other requirements of the Contract for the sole purpose of reducing the net cost of construction.

B. VEPs shall not impair, in any manner, the essential functions or characteristics of the Project, including but not limited to service life, economy of operation, ease of maintenance, desired appearance, design, and safety standards.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. VEP Cost Sharing and Payment

1. VEP net cost savings and payment shall be determined as follows:

2. "Net Cost Savings": means the total reduction in Contractor cost of performance resulting from the acceptance of the VEP minus allowable Contractor development and implementation costs.

3. The City's cost to review, design and implement the VEP shall be determined by the ACCO and fifty (50%) percent of such cost shall be deducted from the total Contract price as part of a VEP change order.

4. Payment for an accepted VEP shall be reflected in the adjusted total contract price per the following:

   a. Original Contract price for the Work;

   b. Less fifty percent (50%) of Net Cost Savings;

   c. Less fifty percent (50%) of the City's Cost.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Abbreviations / Acronyms:

1. VEP - Value Engineering Proposal

1.05 DESCRIPTION

A. Consideration of VEPs

1. The provisions of this Section shall not be construed to require DEP to consider any VEP, which may be submitted hereunder.

2. Proposed changes in the following will not be accepted as VEPs:

   a. Water/wastewater treatment process

   b. Plant or unit process performance characteristics and capacities

3. If a VEP submitted by the Contractor is similar to a change in the Contract Documents under consideration by DEP for the Project at the time said VEP is submitted, or if such a VEP is based upon or similar to Specifications, policy or details adopted by DEP after the advertisement for the Contract and prior to conceptual discussion between the Contractor and DEP, DEP will not accept such VEP and reserves the right to make such changes without compensation to the Contractor under the provisions of this Section.

4. A VEP that requires a material change in Contract scope will not be considered as an acceptable VEP.

B. The ACCO Is Sole Judge

1. The ACCO will be the sole judge of the acceptability of a VEP.

2. In determining the net cost savings, DEP reserves the right to disregard the Contract bid prices if in the judgment of the ACCO, such prices do not represent a fair measure of the value of Work to be performed or to be deleted.

C. Continuation of Contract Work

1. The Contractor shall continue to perform the Work in accordance with the requirements of the Contract until an executed change order incorporating an accepted VEP has been issued. If an executed change order has not been issued by the date upon which the Contractor's VEP specifies that a decision thereon should be made, or such other date as the Contractor may subsequently have specified in writing, such VEP shall be deemed rejected.

1.06 QUALITY ASSURANCE

A. All approved VEPs shall deliver the same quality of product, finish, or workmanship as originally specified under the Contract.

1.07 SUBMITTALS

A. General

1. The Contractor's VEP submittal shall include the following in order to be considered for approval by the ACCO:

a. Cover letter proposing the VEP and written description.

b. Complete description of the difference between the existing Contract requirements and those proposed, listing of advantages and disadvantages associated with the VEP, and effect, if any, the VEP has on the performance of the Work.

c. Preliminary sketches.

d. List and analysis of the Contract requirements that must be changed if the VEP is accepted, including proposed Specification requirements.

e. A separate, detailed cost estimate showing the affected portions of the existing Contract requirements and the cost savings associated with the VEP. The VEP cost estimate shall include an itemization of the Contractor's development and implementation costs along with all costs attributable to Subcontractors. This cost estimate shall be correlated, where required, with the original detailed estimate breakdown submitted by the Contractor.

f. Description and estimate of the costs DEP may incur implementing the VEP.

g. Prediction of effect the VEP will have on DEP's Operations and Maintenance costs should the VEP be accepted.

h. Statement of time by which a change order must be issued to achieve maximum value and cost reduction, noting any time impact on Contract milestones and the completion date. This statement shall be correlated with, where required, the baseline construction schedule in use for monitoring progress.

i. If the ACCO notifies the Contractor that additional information is required to evaluate the VEP, such information must be provided in a timely manner; otherwise, the VEP will be rejected.

2. The VEP shall be submitted to the ACCO for review and processing.

3. VEPs may be submitted at any time following the Notice to Proceed and up to 90 days prior to the latest accepted date for Substantial Completion.

B. Contract Time

1. Acceptance of a VEP and performance of the Work thereunder shall not extend the time for completion of the Contract unless specifically provided for in the Contract change order implementing the VEP.

C. VEP Design Requirements

1. Upon acceptance of the VEP, the ACCO will incorporate the VEP into the Contract Documents. The cost to revise and update the Contract Documents shall be included in the DEP's cost.

D. VEP Review and Acceptance

1. Within 15 days after the date of submittal of the VEP, the ACCO shall notify the Contractor of the status of the review of the VEP proposal. If DEP requires additional time to evaluate the Contractor's VEP, the ACCO will notify the Contractor of the additional review time required within such 15-day period.

2. The Contractor has the right to withdraw the VEP at any time during the review process.

3. Any VEP may be accepted in whole or part at the ACCO's discretion.

4. DEP expressly reserves the right to adopt a VEP for use on other contracts administered by it.

5. The accepted VEP shall be incorporated into the Contract pursuant to a change order. The change order will include any changes in the quantities of unit bid items and new agreed price items, as appropriate.

6. The ACCO will provide to the Contractor, along with the notification of the acceptance of the VEP, an assessment of DEP's cost in order to finalize VEP cost sharing and payment arrangements as defined in this Section. This will be used in determining the VEP change order amount.

E. Conditions

1. The following conditions shall apply to any VEP accepted by the ACCO:

a. Bid prices may not be based on the anticipated approval of a VEP, and if a VEP is rejected, the Contractor will be required to complete the Contract in accordance with the plans and Specifications at the prices bid.

b. Where a VEP has been approved and implemented by change order but subsequent modifications to the VEP are necessary in order to adjust for unanticipated field or other conditions, any further change order(s) to implement those subsequent modifications will provide for payment for any additional Work at prices no higher than those in the Contractor's bid, as if such Work was being done in accordance with the original Contract requirements.

c. If the Engineer determines that unsatisfactory results are being obtained as a result of Work performed pursuant to an implemented VEP, he/she may reject all or any portion of such Work and direct its removal, and require the Contractor to proceed in accordance with the original Contract requirements. The change order required to "reverse" the VEP shall not entitle the Contractor to compensation for any Work performed under the failed VEP or for its removal. Such rejection or limitation of reimbursement shall not constitute the basis of any claim against DEP.

d. All terms and conditions of the Contract, including quality of the Work and inspection, shall apply to a VEP accepted by the ACCO as if the VEP was included originally.

e. The Contractor shall have no claim against DEP due to or arising from the ACCO's rejection of a VEP.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 27 00 – MEASUREMENT AND PAYMENT
CONTRACT NR-107

PART 1 GENERAL

1.1 SUMMARY

A. The Total Bid Price for the Contract shall include the following items in the Bid Schedule of Prices.

1. Lump Sum Prices (Contract Items LS-1 through LS-3)

2. Unit Price Items (Contract Items UP-1 through UP-17)

3. Allowances (Contract Items A-1 through A-3)

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.

D. The following index of this Section is presented for convenience:

E.

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1.2 PAYMENT

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

1.3 RELATED SECTIONS

A. Not Used

1.4 REFERENCES

A. Not Used

1.5 DESCRIPTION

A. Lump Sum Price Contract Items

1. Contract Item LS-1 - Mobilization

a. Under Contract Item LS-1 - 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.

b. The value for Mobilization, 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 all Allowance Items. Should the Contractor's bid for mobilization exceed 6%, the Mobilization Item shall be adjusted to 6% with any overage added to LS-2 Work Result. In no event will the Total Bid Price for the Contract be adjusted because of this re-allocation.

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

d. 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:

1) Performance and Payment Bonds per Schedule A.

2) Insurance per Schedule A.

3) Preliminary and Final Schedule of Values per Section 01 29 10 – Schedule of Values.

4) Preliminary CPM Schedule per Section 01 32 10 – Progress Scheduling.

5) Final Detailed CPM Schedule per Section 01 32 10 – Progress Scheduling.

6) Submissions pertaining to Environmental, Health, and Safety Requirements per Section 01 35 27 – Environmental Health and Safety Requirements.

7) Installation of the project information panel and its supports per Section 01 58 13 – Temporary Project Signage.

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

f. The payments for Mobilization do not apply to costs associated with change orders.

2. Contract Item LS-2 – Work Result

a. Contract Item LS-2 has been provided on the Bid Schedule of Prices as a lump sum price for all Contract Work not inclusive of Mobilization, De-Mobilization, Unit Prices and Allowance items.

b. Payment under Contract Item LS-2 will constitute full compensation for all labor and materials required to complete all Work under this Contract, with the exception of Mobilization, De-Mobilization, the Unit Price Items and Allowances as specified herein and shown on the Bid Schedule of Prices.

3. Contract Item LS-3 – De-Mobilization

a. Under Contract Item LS-3 – De-Mobilization, the Contractor shall offset all costs necessary to de-mobilize the Work, including but not limited 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 LS-3 – De-Mobilization:

1) Removals pertaining to Temporary Water and Sanitary Services per Section 01 51 11 - Temporary Water and Sanitary Services.

2) Removals pertaining to Temporary Electrical Systems per Section 01 51 30 - Temporary Electrical Systems.

3) Removals pertaining to Temporary Field Office Trailers per Section 01 52 10 - Temporary Field Office Trailers.

4) Removals pertaining to Traffic Control per Section 01 55 26 - Traffic Control.

5) Removals pertaining to Temporary Barriers and Enclosures per Section 01 56 00 - Temporary Barriers and Enclosures.

6) Removals of the project information panel and its supports per Section 01 58 13 - Temporary Project Signage.

7) Final Cleaning per Section 01 74 17 - Cleaning and Site Maintenance.

8) Providing all Operations and Manuals as required under this Contract per Section 01 78 25 – Operation and Maintenance Manuals.

9) Final Record Documents per Section 01 78 39 - Final Record Documents.

4. The value for De-Mobilization, as indicated on the Bid Schedule of Prices, shall not exceed one percent (1%) of the Total Bid Price for the Contract, excluding the bid values for all Allowance Items. Should the Contractor's bid for de-mobilization exceed 1%, the De-Mobilization Item shall be adjusted to 1% with any overage added to LS-2 Work Result. 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 LS-3 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, as set forth in Article 45 of the City of New York Standard Construction Contract, after the Resident Engineer has certified that all Work under this item has been satisfactorily completed.

B. Unit Price Items

1. Contract Items UP-1 through UP-17 have been provided on the Bid Schedule as unit prices for the Contract.

   a. Payment under Contract Items UP-1 through UP-17 will constitute full compensation without limitation for all services, labor and materials, necessary to complete a respective unit of work.

2. The Contractor and the Engineer shall meet and jointly review the Contractor's "pencil copy" of the payment request prior to submission. The payment request shall include the quantity of unit Contract Item UP-1: Underdeck – Concrete Repairs per Type 1 Spall Repair on Dwg. UR-S-300.

   a. Description: Under Unit Price Item UP-1, the Contractor shall perform concrete repairs to the Underdeck per Type 1 Spall Repair to the extents indicated on Dwg. UR-S-300 on the Contract Drawings and as directed by the Engineer during construction.

   b. Measurement for Payment: The Contractor shall be paid per square foot of concrete repair during construction. The quantity of concrete repair measured for payment shall be the square feet of concrete actually repaired as designated by the Contract Drawings and as directed by the Engineer.

3. Item UP-1 – Underdeck – Concrete Repairs per Type 1 Spall Repair on Dwg. UR-S-300

   a. Description: Contractor shall perform concrete repairs to the Underdeck per Type 1 Spall Repair to the extents indicated on Dwg. UR-S-300 on the Contract Drawings and as directed by the Engineer.

   b. Measurement for Payment: The Contractor shall be paid per square foot of concrete repair. The quantity measured for payment shall be

the square feet of concrete actually repaired as designated by the Contract Drawings and as directed by the Engineer.

4. Contract Item UP-2: Underdeck – Concrete Repairs per Type 2 Spall Repair on Dwg. UR-S-300.

   a. Description: Contractor shall perform concrete repairs to the Underdeck per Type 2 Spall Repair to the extents indicated on Dwg. UR-S-300 on the Contract Drawings and as directed by the Engineer.

   b. Measurement for Payment: The Contractor shall be paid per square foot of concrete actually repaired as designated by the Contract Drawings and as directed by the Engineer.

5. Contract Item UP-3: Underdeck – Concrete Repairs per Type 3 Spall Repair on Dwg. UR-S-300.

   a. Description: Contractor shall perform concrete repairs to the Underdeck per Type 2 Spall Repair to the extents indicated on Dwg. UR-S-300 on the Contract Drawings and as directed by the Engineer.

   b. Measurement for Payment: The Contractor shall be paid per square foot of concrete repair. The quantity measured for payment shall be the square feet of concrete actually repaired as designated by the Contract Drawings and as directed by the Engineer.

6. Contract Item UP-4: Underdeck – Concrete Repairs per Type 4 Steel Bar Penetration Repair on Dwg. UR-S-301.

   a. Description: Under Unit Price Item UP-4, the Contractor shall perform concrete repairs to the Underdeck per Type 4 Steel Bar Penetration Repair to the extents indicated on Dwg. UR-S-301 on the Contract Drawings and as directed by the Engineer during construction.

   b. Measurement for Payment: The quantity of concrete repair measured for payment shall be each steel bar penetration actually repaired as designated by the Contract Drawings and as directed by the Engineer.

7. Contract Item UP-5: Underdeck – Concrete Repairs per Type 5 Crack Repair on Dwg. UR-S-301.

   a. Description: Under Unit Price Item UP-5, the Contractor shall perform concrete repairs to the Underdeck per Type 5 Crack Repair to the extents indicated on Dwg. UR-S-301 on the Contract Drawings and as directed by the Engineer during construction.

   b. Measurement for Payment: The Contractor shall be paid per linear foot of concrete repair during construction. The quantity of concrete repair measured for payment shall be the linear feet of concrete

actually repaired as designated by the Contract Drawings and as directed by the Engineer.

8. Contract Item UP-6: Underdeck – Concrete Repairs per Type 6 Spall Repair on Dwg. UR-S-301.

   a. Description: Under Unit Price Item UP-6, the Contractor shall perform concrete repairs to the Underdeck per Type 6 Spall Repair to the extents indicated on Dwg. UR-S-301 on the Contract Drawings and as directed by the Engineer.

   b. Measurement for Payment: The Contractor shall be paid per square foot of concrete actually repaired as designated by the Contract Drawings and as directed by the Engineer.

9. Contract Item UP-7: Underdeck – Concrete Repairs per Type 7 Core Hole Repair on Dwg. UR-S-301.

   a. Description: Under Unit Price Item UP-7, the Contractor shall perform concrete repairs to the Underdeck per Type 7 Cole Hole Repair to the extents indicated on Dwg. UR-S-301 on the Contract Drawings and as directed by the Engineer during construction.

   b. Measurement for Payment: The Contractor shall be paid per each concrete repair during construction. The quantity measured for payment shall be each of the core hole repairs actually repaired as designated by the Contract Drawings and as directed by the Engineer.

10. Contract Item UP-8: Underdeck – Concrete Repairs per Type 8 Drain Pipe Repair on Dwg. UR-S-301.

    a. Description: Under Unit Price Item UP-8, the Contractor shall perform concrete repairs to the Underdeck per Type 8 Drain Pipe Repair to the extents indicated on Dwg. UR-S-301 on the Contract Drawings and as directed by the Engineer.

    b. Measurement for Payment: The Contractor shall be paid per each concrete repair during construction. The quantity measured for payment shall be each of the drain pipe repairs actually repaired as designated by the Contract Drawings and as directed by the Engineer.

11. Contract Item UP-9: Underdeck – Membrane Repairs per Type 1 Major Membrane Repair on Dwg. UR-S-500.

    a. Description: Under Unit Price Item UP-9, the Contractor shall perform membrane repairs to the Underdeck per Type 1 Major Membrane Repair to the extents indicated on Dwg. UR-S-500 on the Contract Drawings and as directed by the Engineer during construction.

b. Measurement for Payment: The Contractor shall be paid per square foot of membrane repair. The quantity measured for payment shall be the square feet of membrane actually repaired as designated by the Contract Drawings and as directed by the Engineer.

12. Contract Item UP-10: Underdeck – Membrane Repairs per Type 2 Local Membrane Repair on Dwg. UR-S-502.

a. Description: Under Unit Price Item UP-10, the Contractor shall perform membrane repairs to the Underdeck per Type 2 Local Membrane Repair to the extents indicated on Dwg. UR-S-502 on the Contract Drawings and as directed by the Engineer during construction.

b. Measurement for Payment: The Contractor shall be paid per square foot of membrane repair. The quantity measured for payment shall be the square feet of membrane actually repaired as designated by the Contract Drawings and as directed by the Engineer.

13. Contract Item UP-11: Underdeck – Membrane Repairs per Type 3 Membrane Seam Repair on Dwg. UR-S-502.

a. Description: Under Unit Price Item UP-11, the Contractor shall perform membrane repairs to the Underdeck per Type 3 Membrane Seam Repair to the extents indicated on Dwg. UR-S-502 on the Contract Drawings and as directed by the Engineer during construction.

b. Measurement for Payment: The Contractor shall be paid per square foot of membrane repair during construction. The quantity measured for payment shall be the square feet of membrane actually repaired as designated by the Contract Drawings and as directed by the Engineer.

14. Contract Item UP-12: Underdeck – Membrane Repairs per Type 4 Membrane Cut Repair on UR-S-502.

a. Description: Under Unit Price Item UP-10, the Contractor shall perform membrane repairs to the Underdeck per Type 4 Membrane Cut Repair to the extents indicated on Dwg. UR-S-502 on the Contract Drawings and as directed by the Engineer during construction.

b. Measurement for Payment: The Contractor shall be paid per square foot of membrane repair during construction. The quantity measured for payment shall be the square feet of membrane actually repaired as designated by the Contract Drawings and as directed by the Engineer.

15. Contract Item UP-13: Caissons – Encasement Repairs on 24’’x 0.50’’ Caissons.

a. Description: Under Unit Price Item UP-13, the Contractor shall perform encasement repairs on 24’’x 0.50’’ Caissons to the extents indicated on the Contract Drawings and as directed by the Engineer during construction.

b. Measurement for Payment: The Contractor shall be paid per linear foot of caisson encasement repair during construction. The quantity measured for payment shall be the feet of caisson encasement actually repaired as designated by the Contract Drawings and as directed by the Engineer.

16. Contract Item UP-14: Caissons – Encasement Repairs on 30’’x 0.50’’ Caissons.

a. Description: Under Unit Price Item UP-14, the Contractor shall perform encasement repairs on 30’’x 0.50’’ Caissons to the extents indicated on the Contract Drawings and as directed by the Engineer during construction.

b. Measurement for Payment: The Contractor shall be paid per linear foot of caisson encasement repair during construction. The quantity measured for payment shall be the feet of caisson encasement actually repaired as designated by the Contract Drawings and as directed by the Engineer.

17. Contract Item UP-15: Caissons – Encasement Repairs on 36’’x 0.50’’ Caissons.

a. Description: Under Unit Price Item UP-15, the Contractor shall perform encasement repairs on 36’’x 0.50’’ Caissons to the extents indicated on the Contract Drawings and as directed by the Engineer during construction.

b. Measurement for Payment: The Contractor shall be paid per linear foot of caisson encasement repair during construction. The quantity measured for payment shall be the feet of caisson encasement actually repaired as designated by the Contract Drawings and as directed by the Engineer.

18. Contract Item UP-16: Caissons – Encasement Repairs on 42’’x 0.75’’ Caissons.

a. Description: Under Unit Price Item UP-16, the Contractor shall perform encasement repairs on 42’’x 0.75’’ Caissons to the extents indicated on the Contract Drawings and as directed by the Engineer during construction.

b. Measurement for Payment: The Contractor shall be paid per linear foot of caisson encasement repair during construction. The quantity measured for payment shall be the feet of caisson encasement actually repaired as designated by the Contract Drawings and as directed by the Engineer.

19. Contract Item UP-17: Caissons – Hole Repairs on Dwg. CR-S-300.

    a. Description: Under Unit Price Item UP-17, the Contractor shall perform caisson encasement hole repairs to the extents indicated on Dwg. CR-S-300 on the Contract Drawings and as directed by the Engineer during construction.

    b. Measurement for Payment: The Contractor shall be paid per each caisson encasement hole repair during construction. The quantity measured for payment shall be each of the hole repairs actually repaired as designated by the Contract Drawings and as directed by the Engineer.

C. Allowances

1. Allowance Contract Items A-1 through A-3

    a. Descriptions of the Work to be performed under the allowances can be 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 Price for the Contract.

    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 Section.

2. Contract Item A-1: Unforeseen Hazardous Materials

    a. Description: To cover the remediation, removal, and disposal of unforeseen hazardous materials identified in Section 01 35 45 – Hazardous Materials Control.

3. Contract Item A-2: Compliance with Unforeseen Regulatory Requirements

    a. Description: If and when directed by the Engineer, the Contractor shall revise and modify the completed Work as required by regulatory agencies having jurisdiction for performing final inspections of the Work subject to the New York City Building, Electrical, and Fire Codes. The Contractor will not be paid for correcting any Work that is determined by the representatives of the regulatory agencies as being non-conforming to the New York City Building, Electrical, and Fire Codes, or approved permit drawings. This allowance shall only be used for modifying the Work requested by the Code Inspector during final inspection and directed by the Engineer, where such modifications represent revisions from the approved permit drawings.

4. Contract Item A-3: Expanded Work Allowance
   a. Description: To cover Work as detailed in Section 01 21 20 – Expanded Work Allowance.

1.6 QUALITY ASSURANCE

A. Not Used

1.7 SUBMITTALS

A. Not Used

1.8 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.9 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Not Used

2.2 MATERIALS / EQUIPMENT

A. Not Used

2.3 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.4 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.1 EXAMINATION / PREPARATION

A. Not Used

3.2 APPLICATION

A. Not Used

3.3 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.4 STARTUP / DEMONSTRATION

A. Not Used

3.5 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 29 10 – SCHEDULE OF VALUES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

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

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	3
1.07	Submittals	3
1.08	Delivery, Storage, and Handling	4
1.09	Spare Parts, Special Tools, and Supplies	4
1.10	Warranty	4
PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	4
2.04	Source Quality Control / Shop Tests	4
PART 3	EXECUTION	4
3.01	Examination / Preparation	4
3.02	Installation	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	5
3.05	Adjusting / Protection / Cleanup	5

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 32 10 – Progress Scheduling

1.04 REFERENCES

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 01 32 10 – Progress Scheduling 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 01 32 10 – Progress Scheduling

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 preliminary SOV shall include, as a minimum, the proposed values estimated by the Contractor for the Work of the Contract which shall be indicated in Table 1 – Preliminary SOV attached to this Section.

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 Work 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, Contractor shall submit 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 minimum required detail of breakdown of the Work 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.

2. Approved change orders reflected in the Logic and Duration Schedule shall each be incorporated by the Contractor 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. The Contractor shall furnish a cross reference listing 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 Section 01 32 10 – Progress Scheduling.

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 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Preliminary Schedule of Values

1. The Contractor shall submit a preliminary SOV for the Engineer's approval within 15 days of the commencement date given in the Notice to Proceed.

B. Final Schedule of Values

1. The Contractor shall prepare and submit a final SOV to the Engineer within 90 days of the commencement date given in the Notice to Proceed. The final SOV shall be based on the accepted preliminary SOV for major Work and it must be in sufficient detail to determine monthly progress payments related to the Work performed as shown in the monthly progress schedule update. The Engineer shall be the sole judge of acceptable SOV figures, details and description of the values established. If, as directed by the Engineer, a greater number of items is required, the Contractor shall

add the additional items to the SOV 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.

C. Cross Reference Listing

1. A cross reference listing shall be submitted as specified herein, in order to assist in the correlation of the SOV, proposed monthly cash flow (per Article 9 of the New York City Standard Construction Contract), and the Logic and Duration Schedule.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

TABLE 1
PRELIMINARY SCHEDULE OF VALUES
(Major Work Results)

I. CONTRACT NR-107

1. LS-1 Mobilization
2. LS-2 Work Result
    a. Icebreakers
        i. Demolition and Removals
        ii. Metals
        iii. Finishes
        iv. Earthwork
    b. Sludge Barge Loading Dock
        i. Demolition and Removals
        ii. Concrete
        iii. Metals
        iv. Woods, Plastics, and Composites
        v. Finishes
        vi. Plumbing
        vii. Electrical
        viii. Waterway and Marine Construction
        ix. Process Interconnections
    c. Underdeck Joint Replacement
        i. Demolition and Removals
        ii. Metals
        iii. Thermal and Moisture Protection
3. LS-3 De-Mobilization
4. UP-1 Underdeck Concrete Repairs, Type 1 Spall Repair, Dwg. UR-S-300
    a. Underdeck Concrete
        i. Demolition and Removals
        ii. Concrete
5. UP-2 Underdeck Concrete Repairs, Type 2 Spall Repair, Dwg. UR-S-300
    a. Underdeck Concrete
        i. Demolition and Removals
        ii. Concrete
6. UP-3 Underdeck Concrete Repairs, Type 3 Spall Repair, Dwg. UR-S-300
    a. Underdeck Concrete
        i. Demolition and Removals
        ii. Concrete
7. UP-4 Underdeck Concrete Repairs, Type 4 Steel Bar Penetration Repair, Dwg. UR-S-301
    a. Underdeck Concrete
        i. Demolition and Removals
        ii. Concrete
8. UP-5 Underdeck Concrete Repairs, Type 5 Crack Repair, Dwg. UR-S-301

a. Underdeck Concrete
    i. Demolition and Removals
    ii. Concrete
9. UP-6 Underdeck Concrete Repairs, Type 6 Spall Repair, Dwg. UR-S-301
    a. Underdeck Concrete
        i. Demolition and Removals
        ii. Concrete
10. UP-7 Underdeck Concrete Repairs, Type 7 Core Hole Repair, Dwg. UR-S-301
    a. Underdeck Concrete
        i. Demolition and Removals
        ii. Concrete
11. UP-8 Underdeck Concrete Repairs, Type 8 Drain Repair, Dwg. UR-S-301
    a. Underdeck Concrete
        i. Demolition and Removals
        ii. Concrete
12. UP-9 Membrane Repairs, Type 1 Major Membrane Repair, Dwg. UR-S-500
    a. Underdeck Membrane
        i. Demolition and Removals
        ii. Metals
        iii. Thermal and Moisture Protection
13. UP-10 Membrane Repairs, Type 2 Local Membrane Repair, Dwg. UR-S-502
    a. Underdeck Membrane
        i. Demolition and Removals
        ii. Metals
        iii. Thermal and Moisture Protection
14. UP-11 Membrane Repairs, Type 3 Membrane Seam Repair, Dwg. UR-S-502
    a. Underdeck Membrane
        i. Demolition and Removals
        ii. Metals
        iii. Thermal and Moisture Protection
15. UP-12 Membrane Repairs, Type 4 Membrane Cut Repair, Dwg. UR-S-502
    a. Underdeck Membrane
        i. Demolition and Removals
        ii. Metals
        iii. Thermal and Moisture Protection
16. UP-13 Caissons – Encasement Repairs on 24’’x0.50’’ Caissons
    a. Caisson Jacketing
        i. Demolition and Removals
        ii. Concrete
        iii. Metals
        iv. Earthwork
17. UP-14 Caisson Encasement Repairs on 30’’x0.50’’ Caissons
    a. Caisson Jacketing
        i. Demolition and Removals
        ii. Concrete

- iii. Metals
- iv. Earthwork

18. UP-15 Caisson Encasement Repairs on 36’’x0.50’’ Caissons
    a. Caisson Jacketing
        i. Demolition and Removals
        ii. Concrete
        iii. Metals
        iv. Earthwork
19. UP-16 Caisson Encasement Repairs on 42’’x0.75’’ Caissons
    a. Caisson Jacketing
        i. Demolition and Removals
        ii. Concrete
        iii. Metals
        iv. Earthwork
20. UP-17 Caisson Hole Repairs on Dwg. CR-S-300
    a. Caisson Hole Repairs
        i. Demolition and Removals
        ii. Concrete
        iii. Earthwork
21. A-1 Unforeseen Hazardous Materials
22. A-2 Modifications to Work Required by Regulatory Bodies
23. A-3 Expanded Work Allowance

TABLE 2
FINAL SCHEDULE OF VALUES
(Minimum Detail Required for Contract NR-107)

I. Lump Sum 01 – Mobilization

1. Schedule of Valves ..... Div. 01
2. Progress Scheduling ..... Div. 01
3. Environmental Health and Safety Requirements ..... Div. 01
4. Temporary Project Signage ..... Div. 01

II. Lump Sum 02 – Work Result

1. Icebreakers
   a. Demolition and Removals
      i. Demolition ..... Div. 02
      ii. Disposal ..... Div. 02
   b. Metals
      i. Galvanizing ..... Div. 05
      ii. Welding ..... Div. 05
      iii. Miscellaneous Metal Fastenings ..... Div. 05
      iv. Structural Steel Framing ..... Div. 05
      v. Metal Fabrications ..... Div. 05
   c. Finishes
      i. Painting ..... Div. 09
   d. Earthwork
      i. Excavation ..... Div. 31
      ii. Fill ..... Div. 31
      iii. Dust, Soil Erosion and Sediment Control ..... Div. 31

2. Sludge Barge Loading Deck
   a. Demolition and Removals
      i. Demolition ..... Div. 02
      ii. Disposal ..... Div. 02
   b. Concrete
      i. Rehabilitation of Cast-in-Place Concrete ..... Div. 03
      ii. Concrete Forming and Accessories ..... Div. 03
      iii. Reinforcing Steel ..... Div. 03
      iv. Cast-in-Place Concrete ..... Div. 03
      v. Marine Concrete ..... Div. 03
      vi. Joints in Concrete ..... Div .03
      vii. Shotcrete ..... Div. 03
      viii. Grouting ..... Div. 03
   c. Metals
      i. Galvanizing ..... Div. 05
      ii. Welding ..... Div. 05
      iii. Miscellaneous Metal Fastenings ..... Div. 05

iv. Structural Steel Framing .....Div. 05
v. Metal Fabrications .....Div. 05
d. Woods, Plastics, and Composites
i. Pultruded FRP Structural Shapes.....Div. 06
e. Finishes
i. Painting .....Div. 09
f. Plumbing
i. Heat Tracing for Plumbing Pipes.....Div. 22
g. Electrical
i. General Electrical Requirements .....Div. 26
ii. Low-Voltage Wires, Cables and Accessories.....Div. 26
iii. Grounding.....Div. 26
iv. Hangers and Supports for Electrical Systems.....Div. 26
v. Raceways and Boxes for Electrical Systems .....Div. 26
vi. Identification for Electrical Systems.....Div. 26
vii. General Electrical Testing .....Div. 26
viii. Low-Voltage Distribution Transformers .....Div. 26
ix. Lighting Fixtures, Devices and Schedules.....Div. 26
h. Waterway and Marine Construction
i. Extruded and Molded Marine Fenders .....Div. 35
ii. Mooring Bollards.....Div. 35
i. Process Interconnections
i. Exposed Piping Installation .....Div. 40
ii. Leakage Testing for Exposed Piping.....Div. 40
iii. Couplings, Adapters, and Specials for Process Piping.....Div. 40
iv. Hangers and Supports for Process Piping.....Div. 40
v. Ductile Iron Process Pipe.....Div. 40
vi. Process Valves Four-Inch Diameter and Larger.....Div. 40
vii. Identification for Process Equipment .....Div. 40
viii. Schedule for Exposed Piping.....Div. 40

3. Underdeck Joint Replacement
a. Demolition and Removals
i. Demolition .....Div. 02
ii. Disposal .....Div. 02
b. Metals
i. Structural Steel Framing .....Div. 05
ii. Metal Fabrications .....Div. 05
c. Thermal and Moisture Protection
i. Joint Protection .....Div. 07
ii. Expansion Joint Cover Assemblies .....Div. 07

III. Lump Sum 03 – De-Mobilization

5. Temporary Water and Sanitary Services.....Div. 01
6. Temporary Electrical Systems.....Div. 01

7. Temporary Field Office Trailers .....Div. 01
8. Traffic Control.....Div. 01
9. Temporary Barriers and Enclosures .....Div. 01
10. Temporary Project Signage .....Div. 01
11. Cleaning and Site Maintenance .....Div. 01
12. Operation and Maintenance Manuals.....Div. 01
13. Final Record Documents .....Div. 01

IV. Unit Price 01 – Underdeck Concrete Repairs Type 1

1. Underdeck Concrete
    a. Demolition and Removals
        i. Demolition .....Div. 02
        ii. Disposal.....Div. 02
    b. Concrete
        i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
        ii. Concrete Forming and Accessories .....Div. 03
        iii. Reinforcing Steel .....Div. 03
        iv. Marine Concrete.....Div. 03
        v. Joints in Concrete.....Div .03
        vi. Shotcrete .....Div. 03
        vii. Grouting .....Div. 03

V. Unit Price 02 – Underdeck Concrete Repairs Type 2

1. Underdeck Concrete
    a. Demolition and Removals
        i. Demolition .....Div. 02
        ii. Disposal.....Div. 02
    b. Concrete
        i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
        ii. Concrete Forming and Accessories .....Div. 03
        iii. Reinforcing Steel .....Div. 03
        iv. Marine Concrete.....Div. 03
        v. Joints in Concrete.....Div .03
        vi. Shotcrete .....Div. 03
        vii. Grouting .....Div. 03

VI. Unit Price 03 – Underdeck Concrete Repairs Type 3

1. Underdeck Concrete
    a. Demolition and Removals
        i. Demolition .....Div. 02
        ii. Disposal.....Div. 02
    b. Concrete
        i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
        ii. Concrete Forming and Accessories .....Div. 03

iii. Reinforcing Steel .....Div. 03
iv. Marine Concrete.....Div. 03
v. Joints in Concrete.....Div .03
vi. Shotcrete .....Div. 03
vii. Grouting .....Div. 03

VII. Unit Price 04 – Underdeck Concrete Repairs Type 4

1. Underdeck Concrete
   a. Demolition and Removals
      i. Demolition .....Div. 02
      ii. Disposal.....Div. 02
   b. Concrete
      i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
      ii. Concrete Forming and Accessories .....Div. 03
      iii. Reinforcing Steel .....Div. 03
      iv. Marine Concrete.....Div. 03
      v. Joints in Concrete.....Div .03
      vi. Shotcrete .....Div. 03
      vii. Grouting .....Div. 03

VIII. Unit Price 05 – Underdeck Concrete Repairs Type 5

1. Underdeck Concrete
   a. Demolition and Removals
      i. Demolition .....Div. 02
      ii. Disposal.....Div. 02
   b. Concrete
      i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
      ii. Concrete Forming and Accessories .....Div. 03
      iii. Reinforcing Steel .....Div. 03
      iv. Marine Concrete.....Div. 03
      v. Joints in Concrete.....Div .03
      vi. Shotcrete .....Div. 03
      vii. Grouting .....Div. 03

IX. Unit Price 06 – Underdeck Concrete Repairs Type 6

1. Underdeck Concrete
   a. Demolition and Removals
      i. Demolition .....Div. 02
      ii. Disposal.....Div. 02
   b. Concrete
      i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
      ii. Concrete Forming and Accessories .....Div. 03
      iii. Reinforcing Steel .....Div. 03
      iv. Marine Concrete.....Div. 03

v. Joints in Concrete.....Div .03
vi. Shotcrete .....Div. 03
vii. Grouting .....Div. 03

X. Unit Price 07 – Underdeck Concrete Repairs Type 7

1. Underdeck Concrete
   a. Demolition and Removals
      i. Demolition .....Div. 02
      ii. Disposal.....Div. 02
   b. Concrete
      i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
      ii. Concrete Forming and Accessories .....Div. 03
      iii. Reinforcing Steel .....Div. 03
      iv. Marine Concrete.....Div. 03
      v. Joints in Concrete.....Div .03
      vi. Shotcrete .....Div. 03
      vii. Grouting .....Div. 03

XI. Unit Price 08 – Underdeck Concrete Repairs Type 8

1. Underdeck Concrete
   a. Demolition and Removals
      i. Demolition .....Div. 02
      ii. Disposal.....Div. 02
   b. Concrete
      i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
      ii. Concrete Forming and Accessories .....Div. 03
      iii. Reinforcing Steel .....Div. 03
      iv. Marine Concrete.....Div. 03
      v. Joints in Concrete.....Div .03
      vi. Shotcrete .....Div. 03
      vii. Grouting .....Div. 03

XII. Unit Price 09 – Underdeck Membrane Repairs Type 1

1. Underdeck Membrane
   a. Demolition and Removals
      i. Demolition .....Div. 02
      ii. Disposal.....Div. 02
   b. Metals
      i. Miscellaneous Metal Fastening.....Div. 05
   c. Thermal and Moisture Protection
      i. Underdeck Membrane.....Div. 07

XIII. Unit Price 10 – Underdeck Membrane Repairs Type 2

1. Underdeck Membrane
    a. Demolition and Removals
        i. Demolition .....Div. 02
        ii. Disposal.....Div. 02
    b. Metals
        i. Miscellaneous Metal Fastening.....Div. 05
    c. Thermal and Moisture Protection
        i. Underdeck Membrane.....Div. 07

XIV. Unit Price 11 – Underdeck Membrane Repairs Type 3

1. Underdeck Membrane
    a. Demolition and Removals
        i. Demolition .....Div. 02
        ii. Disposal.....Div. 02
    b. Metals
        i. Miscellaneous Metal Fastening.....Div. 05
    c. Thermal and Moisture Protection
        i. Underdeck Membrane.....Div. 07

XV. Unit Price 12 – Underdeck Membrane Repairs Type 4

1. Underdeck Membrane
    a. Demolition and Removals
        i. Demolition .....Div. 02
        ii. Disposal.....Div. 02
    b. Metals
        i. Miscellaneous Metal Fastening.....Div. 05
    c. Thermal and Moisture Protection
        i. Underdeck Membrane.....Div. 07

XVI. Unit Price 13 – Caisson Encasement Repairs 24’’x0.50’’

1. Caisson Jacketing
    a. Demolition and Removals
        i. Demolition .....Div. 02
        ii. Disposal.....Div. 02
    b. Concrete
        i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
        ii. Concrete Forming and Accessories .....Div. 03
        iii. Reinforcing Steel .....Div. 03
        iv. Marine Concrete.....Div. 03
        v. Joints in Concrete.....Div .03
        vi. Shotcrete .....Div. 03
        vii. Grouting .....Div. 03
        viii. Epoxy Grout Encasements for Caissons .....Div. 03
    c. Metals

i. Welding.....Div. 05
ii. Miscellaneous Metal Fastenings.....Div. 05
iii. Structural Steel Framing.....Div. 05
iv. Metal Fabrications.....Div. 05

d. Earthwork
i. Excavation.....Div. 31
ii. Fill.....Div. 31
iii. Dust, Soil Erosion and Sediment Control.....Div. 31

XVII. Unit Price 14 – Caisson Encasement Repairs 30’’x0.50’’

1. Caisson Jacketing
a. Demolition and Removals
i. Demolition.....Div. 02
ii. Disposal.....Div. 02
b. Concrete
i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
ii. Concrete Forming and Accessories.....Div. 03
iii. Reinforcing Steel.....Div. 03
iv. Marine Concrete.....Div. 03
v. Joints in Concrete.....Div .03
vi. Shotcrete.....Div. 03
vii. Grouting.....Div. 03
viii. Epoxy Grout Encasements for Caissons.....Div. 03
c. Metals
i. Welding.....Div. 05
ii. Miscellaneous Metal Fastenings.....Div. 05
iii. Structural Steel Framing.....Div. 05
iv. Metal Fabrications.....Div. 05
d. Earthwork
i. Excavation.....Div. 31
ii. Fill.....Div. 31
iii. Dust, Soil Erosion and Sediment Control.....Div. 31

XVIII. Unit Price 15 – Caisson Encasement Repairs 36’’x0.50’’

1. Caisson Jacketing
a. Demolition and Removals
i. Demolition.....Div. 02
ii. Disposal.....Div. 02
b. Concrete
i. Rehabilitation of Cast-in-Place Concrete.....Div. 03
ii. Concrete Forming and Accessories.....Div. 03
iii. Reinforcing Steel.....Div. 03
iv. Marine Concrete.....Div. 03
v. Joints in Concrete.....Div .03
vi. Shotcrete.....Div. 03

vii. Grouting .....Div. 03
viii. Epoxy Grout Encasements for Caissons .....Div. 03

c. Metals
i. Welding .....Div. 05
ii. Miscellaneous Metal Fastenings .....Div. 05
iii. Structural Steel Framing .....Div. 05
iv. Metal Fabrications .....Div. 05

d. Earthwork
i. Excavation .....Div. 31
ii. Fill .....Div. 31
iii. Dust, Soil Erosion and Sediment Control .....Div. 31

XIX. Unit Price 16 – Caisson Encasement Repairs 42’’x0.75’’

1. Caisson Jacketing
a. Demolition and Removals
i. Demolition .....Div. 02
ii. Disposal .....Div. 02

b. Concrete
i. Rehabilitation of Cast-in-Place Concrete .....Div. 03
ii. Concrete Forming and Accessories .....Div. 03
iii. Reinforcing Steel .....Div. 03
iv. Marine Concrete .....Div. 03
v. Joints in Concrete .....Div .03
vi. Shotcrete .....Div. 03
vii. Grouting .....Div. 03
viii. Epoxy Grout Encasements for Caissons .....Div. 03

c. Metals
i. Welding .....Div. 05
ii. Miscellaneous Metal Fastenings .....Div. 05
iii. Structural Steel Framing .....Div. 05
iv. Metal Fabrications .....Div. 05

d. Earthwork
i. Excavation .....Div. 31
ii. Fill .....Div. 31
iii. Dust, Soil Erosion and Sediment Control .....Div. 31

XX. Unit Price 17 – Caisson Hole Repairs

1. Caisson Hole Repairs
a. Demolition and Removals
i. Demolition .....Div. 02
ii. Disposal .....Div. 02

b. Concrete
i. Grouting .....Div. 03
ii. Epoxy Grout Encasements for Caissons .....Div. 03

c. Earthwork

i. Dust, Soil Erosion and Sediment Control.....Div. 31

XXI. Allowance 01 – Unforeseen Hazardous Materials
XXII. Allowance 02 – Modifications to Work Required by Regulatory Bodies
XXIII. Allowance 03 – Expanded Work Allowance

SECTION 01 31 10 – PROJECT PARTNERING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Prime Contractor(s) shall participate in "project partnering" along with DEP and its consultants for this project. Each Prime Contractor should also include its major subcontractors and suppliers in partnering so that these participants may "buy-in" to the concept and work cooperatively with other parties on the project.

B. Partnering is considered by DEP to be important to the overall success of this project. It is also important to this project that the Contractor(s) be equally concerned with safety, quality, performance, budget, and schedule and that they will endorse and adopt Partnering as an effective tool for achieving these objectives.

C. Partnering will be effective only if all parties willingly and enthusiastically enter into this cooperative arrangement which is supported by each entity at the highest level in their organizations.

D. Project partnering and goals;

E. Initial workshop and follow-up;

F. Partnering Facilitator and project charter.

G. The following index of this Section is presented for convenience:

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3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. "Partnering" refers to the team-building required to create mutual trust among the prime contractor(s), subcontractors, representatives of DEP and its consulting firms, and other stakeholders in a construction project, and respect for one another's roles in the project and recognition of the risks inherent in those roles, so that all members of the team (participants) become partners in executing and completing the Work. As a minimum, the participants shall include the following entities in addition to the prime contractor(s) and their subcontractors:

1. The Bureau of Engineering Design & Construction (BEDC), which will represent DEP in the project at all times during the period of the project unless otherwise specified herein.
2. The DEP Bureau or Bureaus which are responsible for operating and maintaining the existing or new facility where the project is to take place.
3. The consulting firm or firms, if applicable, which are hired by DEP to design the construction project, including the preparation of the Drawings and Specifications.
4. The consulting firm or firms, if applicable, which are hired by DEP to manage the construction project.

B. The Partnering "Facilitator" is the mutually agreed upon professional selected to initiate the Partnering effort and assist with the Partnering workshops and other activities as specified herein and as required.

1.05 DESCRIPTION

A. Project Partnering & Goals

1. To be successful, this project must achieve the following goals:
    a. Construction meets the project performance standards as defined in the Drawings and Specifications;
    b. Completion of the project on schedule;
    c. Conformance to budgetary requirements and limitations.
2. Safety, profit, liability limitation, avoidance of litigation, reputation, good will, and other factors are also of significant importance to participants involved in the project.

3. Through Partnering, the participants will agree among themselves as to the primary goals for the project and the methods that will be used to accomplish them. This will require development of a trust relationship, not an adversarial one, among these parties who will be working closely and cooperatively for the duration of the project.

4. Commitment, communication and conflict resolution must be of highest importance for this relationship to succeed. The parties mutually will develop a communication framework and a procedure for addressing conflicts that may arise during the performance of the Work.

   a. Nothing in this Section shall change or modify any other provisions of the Contract.

B. Initial Workshop & Follow-Up Meetings

1. The Contractor for Contract NR-107 shall hold an initial workshop and conduct follow-up meetings, as required under this Article, to facilitate Project Partnering.

2. Initial Workshop: Partnering will include an initial workshop in which the basic requirements for the Partnering relationship will be established. The workshop will be held within 30 days of issuance of the Notice to Proceed (NTP) at a time and date agreed upon by all parties at the site of the work or a mutually agreed upon location. Attendees at the Partnering workshop shall typically include:

   a. Contractor(s)/subcontractors Representatives:

      1) Project Director;

      2) Project Manager;

      3) Superintendent.

   b. DEP Representatives:

      1) Assistant Commissioner(s);

      2) Director(s);

      3) Operating Bureau Chiefs;

      4) Portfolio Manager;

      5) Design; Liaison

      6) Accountable Manager;

      7) Engineers

   c. Construction Management (CM) Consulting Firm Representatives:

      1) Project Director;

      2) Project Manager;

      3) Engineers.

d. Design Engineering Consulting Firm Representatives:

1) Project Director;

2) Project Manager;

3) Engineers

3. Follow-up Meetings: Quarterly half-day Partnering sessions shall be held throughout the project in order to confirm the relationship and assure the Partnering effort continues to be successful. The intent of the on-going sessions is to maintain communication between the key parties and to resolve higher order issues that require decisions at the executive level and areas for improvement. It is not meant to replace the routine project progress meetings or the normal flow of the project.

C. Partnering Facilitator & Project Charter

1. The Contractor for Contract NR-107 shall employ a Partnering Facilitator who will help establish and monitor the Partnering relationship. The Contractor for Contract NR-107 shall pay all costs associated with employing the Partnering Facilitator.

2. The Partnering Facilitator shall initiate the Partnering effort and conduct the Partnering workshops. The Contractor for Contract NR-107 shall pay all costs for facilities used to conduct the workshops.

3. Selection of the Facilitator

a. As soon as practicable after award of the Contract, the City and the Contractor(s) shall meet to discuss the establishment of the formal Partnering process.

b. The Contractor for Contract NR-107 shall propose up to three (3) candidates to select from as Partnering Facilitator.

c. The City and the Contractor(s) shall mutually select one (1) of the three (3) candidates to be the Facilitator.

4. The Facilitator shall develop a project Charter with input from all parties. The Charter shall include, but not be limited to:

a. Statement of goals and objectives for the construction project;

b. Identification of all project participants and descriptions of their roles in the project;

c. The procedures for communicating both normal progress of Work and any barriers to meeting project goals and objectives;

d. A process for resolving conflicts that may arise during the performance of Work. This process is not intended nor shall it be deemed to affect or replace the dispute resolution process set forth in Article 27 of the Standard Construction Contract.

1.06 QUALITY ASSURANCE

A. The Facilitator shall be trained in the recognized principles of Partnering by an accredited institution such as the International Partnering Institute, Associated General Contractors of New York State, or possess equivalent qualifications as determined by DEP.

B. The Facilitator shall have the following professional experience and qualifications:

1. At least five (5) years' experience in Partnering facilitation with a demonstrated track record, including public sector construction; and,

2. Skill set that includes some or all of the following; construction management, negotiations, labor management mediation, and/or human relations.

1.07 SUBMITTALS

A. Within 30 days after the NTP, the Contractor for Contract NR-107 shall provide the resumes of the proposed candidates to select from as Partnering Facilitator containing their full names, contact information, and the following verifiable information:

1. Certification or training;

2. Experience and qualifications;

3. Past facilitation participation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 31 15 – PROJECT COORDINATION
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Contractor Cooperation

B. Coordination Drawings

C. Final Coordination Drawings

D. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used.

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Contractor Cooperation

1. 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 replacing 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.

2. The Contractor shall cooperate fully with the City, the Engineer, and Other Contractors employed on the Work, to effect proper coordination and progress to complete the project on schedule and in proper sequence. To the extent 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.

B. Coordination Drawings

1. Coordination Drawings, including point-to-point field wiring diagrams, shall be completed by all Contractors, within 90 days from the date for the start of Work given in the Notice to Proceed for the General, HVAC, and Electrical Contracts.

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

3. In addition to any reproducible prints required to be furnished or submitted, the Contractor shall submit 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).

4. 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.

5. 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.

6. 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.

7. 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. The purpose of these meetings is to identify and to eliminate any interference among the trades that the Drawings indicate and to avoid any conflicts during installation of the Work.

8. At the completion of the coordination meetings, and after all necessary changes have been made, the Engineer will hold a final coordination meeting, where these Coordination Drawings shall 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 QUALITY ASSURANCE

A. Work on Coordination Drawings

1. All Work on the Coordination Drawings shall be performed 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.

1.07 SUBMITTALS

A. Final Coordination Drawings

1. 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.

2. The record copies of final Coordination Drawings shall be retained by each Contractor as a working reference. All Shop 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 31 25 – WEB BASED PROJECT MANAGEMENT INFORMATION SYSTEM
CONTRACT NR-107

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.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 32 10 – Progress Scheduling

A. Section 01 33 00 – Submittal Procedures

B. Section 01 78 42 – Records in Electronic Formats

1.04 REFERENCES

A. Not Used

1.05 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 EPMIS performance standards, and the higher, recommended levels of performance, are as follows:

   a. File download speed

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

      2) 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

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

      2) 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 Edge 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 EPMIS.

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 and Revit 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 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. EPMIS 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.

1.06 QUALITY ASSURANCE

A. All Contractor representatives participating in workflows and EPMIS 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 and Excel. 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.

1.07 SUBMITTALS

A. Within thirty (30) calendar days of issuance of the Notice to Proceed, 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. System Utilization

1. 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, Section 01 33 00 – Submittal Procedures and Section 01 78 42 – Records in Electronic Formats.

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

3. Shop Drawing and design data documents shall be submitted as CAD or Revit files (in .dwg or .rvt format) and PDF files through the System submittal work flow process. Examples of Shop Drawings include, but are not limited to:

   a. Standard manufacturers' installation drawings;

   b. Drawings prepared to illustrate portions of the Work designed or developed by the Contractor;

   c. Steel fabrication, piece, and erection drawings.

4. 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:

   a. Manufacturers' printed literature;

   b. Preprinted product specification data and installation instructions.

5. 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:
    a. Digging permits and notices for excavation;
    b. Requests for Deviation (RFDs) for product substitutions;
    c. List of contact personnel;
    d. Notices for roadway interruption, Work outside of Normal Project Working Hours, and utility cut overs;
    e. Requests for Information (RFIs);
    f. Network Analysis Schedules and associated reports and updates;
    g. Each schedule submittal specified in Section 01 32 10 – Progress Scheduling 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 Section 01 32 10 – Progress Scheduling.
    h. Plans for safety, demolition, environmental protection, and similar activities;
    i. 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.;
    j. Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.;
    k. Any general correspondence submitted.
6. 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:
    a. Field test reports;
    b. Quality control certifications;
    c. Manufacturers' documentation and certifications for quality of products and materials provided.
7. 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:

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

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

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

8. Financial submittals, such as Schedule of Values, 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:

a. Contractor's Schedule of Values;

b. Contractor's monthly progress payment requests

c. Contract change order proposals requested by the City.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 32 10 – PROGRESS SCHEDULING
CONTRACT NR-107

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
9. Exhibit 1 - Work Breakdown Structure
10. Exhibit 2 - Activity ID Format
11. Exhibit 3 – Schedule Milestones
12. Exhibit 4 – Proposed Activity Codes
13. Exhibit 5 – Project Calendars

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Activity - A representation of a discrete portion of the overall scope of Work or an event through Duration and description.

B. 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.

C. 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.

D. 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.

E. 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.

F. Duration - The amount of time, in workdays, an Activity will take to perform once begun and continuously performed until complete.

G. 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.

H. 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.

I. 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.

J. Fragnet - Fragmentary network: a portion of the project schedule detailing impacts of an event on specific Activities in the broader schedule.

K. 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.

L. 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.

M. Logic - A direct progressive relationship between Activities where one Activity's performance restricts the performance of another Activity.

N. 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.

O. 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.

P. 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

Q. 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.

R. Total Float - The amount of time the start or finish of an Activity can be delayed without affecting the project completion date.

S. Work Breakdown Structure (WBS) - A deliverable-oriented decomposition of a project into smaller components. A WBS also provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.

1.05 DESCRIPTION

A. CPM & Project Schedule Software

1. Critical Path Method – 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 Contractor shall be responsible for preparing and submitting monthly update information regarding schedule Logic, physical Percent Complete, actual

start and finish dates, duration changes to actualized activities, added Activities, change orders and related reports and schedules, including the updated Primavera Project Management (.xer) format electronic file.

B. Work Breakdown Structure (WBS)

1. WBS is a deliverable-oriented decomposition of a project into smaller components. A WBS also provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control. 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.

C. Activities

1. 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.

a. Activities shall conform to the following requirements:

1) 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-one calendar days but may be longer if the detail and complexity of the submittal warrant.

2) 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.

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

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

5) Activities labeled "start," "continue," or "complete," will not be allowed. Lead and lags are not acceptable.

6) Show the following on each Activity, as directed by the Engineer:

a) Activity number consistent with Engineer's provided template and in accordance with **Exhibit B**, attached to this Section.

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

c) Duration in days.

d) 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.

e) 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.

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

g) 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.

2. 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.

3. 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.

D. Activity Code Structure

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

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

3. 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 the review and acceptance by the Engineer.

4. 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.

a. 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.

5. 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.

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

E. Sequence and Interdependence of Work Activities

1. 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:

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

b. Materials, Equipment, and Systems:

1) Vendor submittal/approval;

2) Shop drawing submittal/approval;

3) Release for fabrication;

4) Fabrication period;

5) Witness shop test;

6) Delivery;

7) Installation;

8) Preliminary test;

9) Final test;

10) Operation and Maintenance (O&M) manuals submittal/approval;

11) Equipment training plans and procedures submittal/approval;

12) Equipment training;

13) Systems training plans and procedures submittal/approval;

14) Systems training.

c. Shop and field performance tests and supervisory service Activities;

d. Mobilization and move-in;

e. Preparing and coordinating drawings;

f. Obtaining all required permits;

g. Inspections;

h. Specific Work activities, such as, but not limited to:

1) Sitework;
2) Underground piping;
3) Electrical ductbanks;
4) Structural excavation;
5) Soil testing;
6) Backfill;
7) Placement of sheeting;
8) Pile driving;
9) Formwork erection;
10) Rebar placement;
11) Placing of concrete;
12) Stripping forms;
13) Concrete curing;
14) Installation of process piping and valves;
15) Electrical conduits and wiring;
16) Instrumentation and controls conduits and wiring;
17) Terminations;
18) Maintenance and exercising activities;
19) Other materials and plant equipment;
20) Cleanup.

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

j. Subcontractors' items of Work;

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

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

m. Time allowance for checkout and startup;

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

o. Indicate all coordination activities from related construction contracts;

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

q. Connection to all existing plant systems and equipment;

r. Preparation of final copies of Contractor working drawings;

s. Specific information required by or from the Engineer;

t. All temporary utilities and construction;

u. Required inspections by the Contractor or Engineer;

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

F. Project Calendars

1. 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.

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

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

4. Each calendar should be named @-### _X, where @-### _ represents the project and X summarizes the nature of the calendar. Typically, the number of days per week. See examples in **Exhibit 5**, attached to this Section.

G. Activity Labor and Resource Data

1. 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.

2. 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, terminations – number of terminations, etc.

3. 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.

1.06 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. Within seven days after the NTP, the Contractor shall submit the qualifications of the proposed CPM scheduler for review and approval.

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 activities described in this Section as being performed by the CPM consultant.

2. If, after approval, the Engineer determines that the Contractor's scheduler or 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 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 required to coordinate 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 such schedule, liquidated damages will be assessed against the Contractor in the amount fixed in Schedule A of the General Conditions, unless the Engineer determines that the Contractor is not the cause for the delay in submitting monthly updates or update information per Monthly Progress Meeting and Reports described herein. 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.

1.07 SUBMITTALS

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

B. CPM Schedule

1. The preliminary CPM Schedule shall be submitted **15 calendar days** after NTP. The preliminary CPM Schedule shall include:

a. 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;

b. 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 A** of this Section);

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

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

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

2. 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.

3. 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:

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

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

2) 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.

3) This Baseline Construction Schedule shall identify all Contract milestones.

a) 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.

b) Where the schedule reflects such an early completion date, the schedule may be accepted by the Engineer with the Contractor's understanding that no claim for additional Contract time or an increase in the Contract price shall be made by the Contractor as the result of failure to complete the Work by the earlier date shown on the schedule.

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

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

b) 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.

b. Part 2 - Resource and Cost Loaded Schedule

1) 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.

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

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

c) Cost loading of the schedule is required on a summary level and is not required to the Activity level unless requested by the Engineer. 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.

4. 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.

5. 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.

6. After the acceptance of the Baseline Schedule required by this Section, no changes shall be made to Logic, Duration of actualized activities, or description of Activities therein without acceptance by the Engineer.

7. 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.

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

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

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

      1) 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).

      2) 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).

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

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

9. 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.

C. Narrative Reports

1. 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:

a. A description of scope of the project and how the Work is represented in the schedule activities;

b. A description of the overall sequence of major components of Work;

c. Planned work week;

d. Description of the critical path in the proposed Work plan;

e. Basis of Activity Durations;

f. How weather will be accommodated in the schedule;

g. How, regulatory, operational or third party constraints are accommodated in the schedule;

h. Description of key Project coordination points or events;

i. Discussion of long lead items and basis of time frames for submittals;

j. Description of anticipated means and methods for large quantity production Activities;

k. Potential opportunities and risks and quantify the schedule reduction or expansion;

l. Assumptions/exclusions made in the schedule.

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

a. The Contractor's transmittal letter;

b. Contract complete date status by milestone:

1) Ahead of schedule and number of calendar days;

2) Behind schedule and number of calendar days;

3) Calendar days lost/gained compared with the previous update.

c. Schedule change report organized by milestone and area listing each Activity in the CPM schedule that has been/ will be:

1) Completed during this reporting period;

2) In progress during this reporting period;

3) Scheduled to be performed during the next reporting period.

d. Analysis, organized by milestone and area, of the critical and near critical path/s describing:

1) The nature of the critical/near critical path;

2) Impact on other Activities, milestones and completion dates;

3) Risks and opportunities impacting the critical/near critical paths.

e. List of current and anticipated delays by milestone:

1) Cause of the delay;

2) Corrective actions and schedule adjustments to correct the delay;

3) Impact of the delay on other Activities, milestones and completion dates;

4) 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.

f. Changes in Activity descriptions for non-required work Logic, or Duration for actualized and non-required work 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.

g. Added Activities and the rationale associated with each action;

h. Pending issues and status of other items:

1) Permits;

2) Contract modifications;

3) Change orders;

4) Long lead procurement items;

5) Other.

i. Out of Sequence Report describing the necessity of each Activity relationship shown therein, as described within this Section;

j. Illogical Progress/Restraint Reports (if any);

k. Other project or scheduling concerns;

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

m. Primavera scheduling error report.

D. CPM Progress Meeting and Reports

1. Monthly, on a date established by the Engineer, a CPM Progress Meeting will be held, 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 representative(s) at the meetings shall have the competence and authority to make any necessary decisions and their statement shall commit the Contractor to the agreed procedures, sequencing of Work, coordination and time schedules.

2. Prior to the 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 72 hours prior to the meeting and be distributed by the Contractor in hard copy at the meeting for review.

3. To update the CPM schedule, the Contractor shall:

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

b. 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;

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

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

e. 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:

1) Submittal of Form 1 on the actual date submitted;

2) Contractor pricing of the identified change subsequent to submittal of Form 1;

3) Pricing negotiations;

4) Comptroller review and registration; followed by;

5) Detailed submittal and construction Activities with correct Activity coding as specified within this Section.

4. 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.

5. 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.

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

   b. 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.

6. 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.

7. 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.

8. 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.

9. 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:

    a. Working drawings submittals;

    b. Equipment operation and maintenance manuals submittals;

    c. Witness shop tests;

    d. Delivery of materials and equipment to Site;

    e. Final field tests;

    f. Special tools and lubricant deliveries;

    g. Spare part deliveries;

    h. Instructional services;

    i. Permits;

    j. Final record documents;

    k. Startup and commissioning/testing;

    l. Piping and equipment identification.

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

    a. Submission date (actual or forecast);

    b. Approval date (actual or forecast);

    c. Final submissions (actual or forecast);

    d. Comments (actual or forecast).

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

    a. Drawing submittal date (actual or forecast);

    b. Drawing approval date (actual or forecast);

    c. Release for fabrication date (actual or forecast);

    d. Witness shop test date (actual or forecast);

e. Delivery date (actual or forecast).

E. Remedial Measures and Recovery Schedule

1. 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:

   a. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.

   b. 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.

   c. Reschedule Activities to achieve maximum practical concurrence of accomplishment of Activities, and comply with the revised schedule.

   d. 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.

2. 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.

3. 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.

4. Should the Contractor fall behind schedule, the Engineer may require the Contractor to prepare a recovery schedule for Engineer 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

EXHIBIT 1 - WORK BREAKDOWN STRUCTURE

WBS Code	WBS Name
@-NR107	**@-NR107 – NR Struct. Repairs**
@- NR107.CO	NR107 NR Struct. Repairs - Contract
@-NR107.CO.Mile	NR107 NR Struct. Repairs – Project Milestones
@-NR107.CO.Precons	NR107 NR Struct. Repairs - General Requirements & Project Start-up Submittals
@ NR107.CO.Engineering	NR107 Struct. Repairs Engineering & Procurement
@-NR107.CO.CO	NR Struct. Repairs - Construction
@-NR107.CO.CO.CAI	Caissons Struct. Repairs
@-NR107.CO.CO.CAI.PH1	Phase 1
@-NR107.CO.CO.CAI.PH2	Phase 2
@-NR107.CO.CO.CAI.PH3	Phase 3
@-NR107.CO.CO.CAI.Ph4	Phase 4
@-NR107.CO.CO.UD	Underdeck Membrane & Concrete Struct. Repairs
@-NR107.CO.CO.UD.PH1	Phase 1
@-NR107.CO.CO.UD.PH2	Phase 2
@-NR107.CO.CO.UD.PH3	Phase 3
@-NR107.CO.CO.UD.PH4	Phase 4
@-NR107.CO.CO.IB	Ice Breakers Struct. Repairs
@-NR107.CO.CO.IB.PH1	Phase 2
@-NR107.CO.CO.IB.PH2	Phase 2
@-NR107.CO.CO.IB.PH3	Phase 3
@-NR107.CO.CO.IB.PH4	Phase 4
@-NR107.CO.CO.SBLD	Sludge Barge Loading Dock Struct. Repairs
@-NR107.CO.CO.SBLD.PH1	Phase 1
@-NR107.CO.CO.SBLD.PH2	Phase 2
@-NR107.CO.CO.SBLD.PH3	Phase 3
@-NR107.CO.CO.SBLD.PH4	Phase 4

EXHIBIT 2 – ACTIVITY ID FORMAT

1. Activity ID format: A107ctivity ID's shall be preceded by the Contract identifier: @-NR107 - …
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- @-NR107;
2. Mobilization- @-NR107;
3. Construction Start (start of installation of permanent Work in the field - @-NR107);
4. Project Specific milestones- @-NR107;
5. Substantial Completion- @-NR107;
6. Or other Milestones as directed by the Engineer.

EXHIBIT 4 -- PROPOSED ACTIVITY CODES

1. **@-NR107 _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 – Electrical – Not Used
HVC	6	HVAC Prime Contractor – Not Used
PLB	7	Plumbing Prime Contractor – Not Used

2. **@-NR107 _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	Phase 1 Complete
M3	3	Phase 2 Complete
M4	4	Phase 3 Complete

VALUE	SEQUENCE	TITLE
M5	5	Phase 4 Complete
M6	6	Substantial Completion

3. **@-NR107 _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
CAI	1	Caisson Struct. Repairs - @-NR107
UD	2	Underdeck Membrane & Concrete Repairs - @-NR107
IB	3	Ice Breakers Struct. Repairs - @-NR107
SBLD	4	Sludge Barge Loading Dock Struct. Repairs - @NR107

4. **@-NR107 _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
CAI	1	Caissons Struct. Repairs
IB	2	Ice Breakers Struct. Repairs
UD	3	Underdeck Membrane & Conc Struct. Repairs
SBLD	4	Sludge Barge Loading Dock Struct. Repairs

5. **@-NR107 _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	Existing Conditions
03	3	Concrete
04	4	Metals
05	5	Thermal and Moisture Protection

VALUE	SEQUENCE	TITLE
06	6	Waterway & Moisture Protection

6. **@-NR107 _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. **@-NR107 _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. **@-NR107 _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 sub-Contractor – Not Used
H1	3	HVAC sub -Contractor – Not Used
Continued – to be updated by Contractor in each Progress Schedule		

9. **@-NR107_Point of Contact** DEP Accountable Manager. This Activity Code field should be defined as being seven digits in length.

VALUE	SEQUENCE	TITLE
RB	1	Robert Bye
Continued – to be updated by Contractor in each Progress Schedule		

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

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

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

13. **@-### _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. @-NR107_5D1S - 5 days per week and one shift per day
2. @-NR107_7D - 7 calendar days per week
3. @- NR-107 SD1S Mudline Moratorium - Mudline Moratorium Limited months in calendar year (July 1 – October 31) work can occur.

SECTION 01 32 30 – JOB PHOTOGRAPHS AND VIDEOS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Pre-Construction Photographs, Aerial Photographs and Videos
2. Construction Photographs, Aerial Photographs and Videos
3. Post-Construction Photographs, Aerial Photographs and Videos
4. Informational Video

B. The following index of this Section is presented for convenience:

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PART 2	PRODUCTS	4
2.01	Manufacturers	4
2.02	Materials / Equipment	4
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	7
3.01	Examination / Preparation	7
3.02	Installation	7
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 31 25 – Web-based Project Management Information System

1.04 REFERENCES

A. Definitions

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

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

B. Reference Standards

1. International Organization for Standardization

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

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

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

1.05 DESCRIPTION

A. The 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.

B. A designee of the Engineer will accompany the photographer for the taking of all photographs and videos.

C. 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 150 Photographs and make a 60-minute video showing existing conditions of the entire project site and any adjacent areas which could possibly be disturbed during construction.

D. 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 2,000 Photographs for the project and to visit the site when directed by the Engineer to tape a total of 10-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.

E. 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 150 Photographs and make a 60-minute video showing the completed Work, the entire Project Site and any adjacent areas which were disturbed during construction.

F. Informational Video

1. The 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.

1.06 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.

1.07 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 Contractor shall provide the Engineer with updated images, key plans and Photograph logs on a monthly basis.

B. Submittals shall be made in accordance with Section 01 31 25 - Web-based Project Management Information System.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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 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 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 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 Contractor and the photographer and video recording firm shall contain a provision containing these requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Photographs

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

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

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

a. Project number

b. Project name

c. Contract number and description

d. Unique sequential identifier

e. Description of Vantage point, indication location, direction and other pertinent information

f. General description of what the Photograph represents

g. Global Positioning System (GPS) location data

h. Phase of Construction (i.e. pre-construction, construction or post-construction)

i. Date and time Photograph was taken if not date stamped by camera

j. Name of photographer

k. Name of Department of Environmental Protection witness

4. The 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 Contractor for record management.

B. Videos

1. 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, Contractor, and Engineer.

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

b. 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

c. 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.

2. 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.

3. 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.

4. 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 Contractor at no additional cost to the City.

5. 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.

C. Informational Video

1. 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.

2. 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.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication

1. Photographs

a. 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

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

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 33 00 – SUBMITTAL PROCEDURES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Submittal Categories
2. Schedule of Submittals
3. Letter of Transmittal
4. Contractor Responsibilities
5. Shop Drawings Submittal
6. Approval of Shop Drawings not a Waiver
7. Final Copy – Shop Drawings

B. The following index of this Section is presented for convenience:

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C. The following Schedule, attached after the “End of Section” designation, is a part of this Section:

1. Attachment 01 33 00-1 - Sample Schedule of Submittals

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 31 25 – Web-Based Project Management Information System

B. Section 01 32 10 – Progress Scheduling

C. Section 01 78 39 – Final Record Documents

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

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. Bid Submittals;
3. Certifications;
4. Construction Progress Photos and Videos;
5. Baseline and Monthly CPM Progress Schedules
6. Final Record Documents;
7. Material Safety Data Sheets;
8. Mock Ups;
9. Operation and Maintenance Manuals;
10. Permits;
11. Plans (or Procedures);
12. Preliminary and Final Test Procedures
13. Product Data;
14. Reports;
15. Samples;
16. Schedule of Submittals;
17. Shop Drawings;

a. 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.

18. Shop Test Procedures;

19. Spare Parts;

20. Test Reports;

21. Warranties.

1.06 QUALITY ASSURANCE

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

1.07 SUBMITTALS

A. The Contractor shall submit a schedule of submittals in accordance with the requirements of this Section, for review and approval.

1. The Contractor shall resubmit an updated schedule of submittals to the Engineer for review and approval on the first day of each month until Substantial Completion, unless otherwise directed to submit less frequently by the Engineer.

2. The Schedule of Submittals shall demonstrate coordination with the CPM Schedule submitted under Section 01 32 10 - Progress Scheduling. Changes and updates to the CPM Schedule shall be reflected in the specified resubmissions of the Schedule of Submittals.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. All Submittals shall have identifying titles and bear the 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.

1. The stamp shall contain the following minimum information:

Project Name: _____

Contract No.: _____

Contractor's Name: _____

Date: _____

Item: _____

Section No(s).: _____ Section Title(s): _____

Article No(s). _____ Paragraph No(s).:_____

Contract Drawing No(s): _____

Location: _____

Submittal No.: _____ Review Cycle No.: _____

Shop Drawing Reference No.: _____

Source Company Name: _____

This submittal was reviewed for conformance with the Contract Document requirements and approved by: _____

2. All applicable Specification sections, subsections, articles, paragraphs and drawings shall be noted in the stamp.

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:

a. 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.

b. The Submittal Number shall be a two-part number assigned by the Contractor in the following manner:

1) The first part of the Submittal Number shall consist of 6 to 10 digits that pertain to the applicable Specification section.

a) Include all spaces (and decimal, if applicable) as per the Specification section title.

2) The second part of the Submittal Number shall consist of three digits (the numbers 001 to 999) to number each separate and unique submitted under each Section.

3) A dash shall separate the two parts of the Submittal Number.

4) For example:

a) The submittal number for the third submittal under Section 09 91 00 – Painting, would be 09 91 00-003.

b) The submittal number for the first submittal under Section 40 05 59.16 01 – Stop Logs (Aluminum), would be: 40 05 59.16 01-001.

2. Review Cycle:

a. The review cycle shall be identified by a three-digit number indicating whether a Submittal is the initial submission (i.e., "000") or a resubmission of an earlier Submittal (i.e., "001" or higher).

1) The first resubmission, for example, would be assigned "001"; the second resubmission will be assigned "002"; etc.

b. Liquidated damages will be assessed upon rejection of any Submittal identified as "003" in the review cycle.

C. Submittals shall include appropriate references to all related and pertinent Contract Drawing(s) and Specification Section(s).

D. 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.

E. 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.

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

G. 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 01 78 39 – Final Record Documents.

3.02 IMPLEMENTATION

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 01 31 25 – Web-Based Project Management Information System.

2. Within 30 calendar days from the work commencement date specified in 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. The proposed dates of submittals must be chronologically complementing the CPM schedule.

a. No other Submittals shall be accepted for review until the Schedule of Submittals is received and approved by the Engineer. Submittals that are submitted prior to approval of the schedule of submittals shall be returned "Rejected".

b. The Schedule of Submittals shall be in the form of a table.

1) Each row in the schedule of submittals shall include, but not be limited to, the following data divided into columns:

a) The first part of the submittal number.

b) The second part of the submittal number.

c) The title of the submittal.

d) The review cycle.

(1) As the project progresses, data for resubmittals shall be added as separate rows under each submittal number.

e) The date of submission, anticipated (for future submittals) or actual (for past submittals).

f) The date the submittal is returned.

(1) For future or anticipated submittals, use "N/A".

(2) For past submittals, use the actual date the submittal is returned.

g) The disposition of the submittal:

(1) For future or anticipated submittals, use "N/A".

(2) For past submittals, use the actual disposition (e.g., FAS, FAC, R&R, etc.).

c. Refer to Attachment 01 33 00-1, Sample Schedule of Submittals, for an example schedule of submittals table.

d. The Schedule of Submittals is intended to be exhaustive, including all anticipated future submittals with reasonable estimates for submittal dates.

e. The Schedule of Submittals shall demonstrate coordination with the CPM Schedule submitted under Section 01 32 00 - Progress Scheduling.

3. Submittals 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 Project Management Information System to submit all documents as directed by the Engineer and as described in Section 01 31 25 – Web-Based Project Management Information System.

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 Section of the Specifications is being submitted, a separate transmittal letter shall accompany the material being submitted under each Section. To the extent possible, letters of inquiry concerning certain phases of the Contract shall also deal with only one 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 before transmitting them to the Engineer for review and approval.

a. Prior to transmitting each submittal to the Engineer:

1) The Contractor shall ensure proper coordination of the Work submitted.

2) The Contractor shall ensure that each submittal is in accordance with the requirements of this Section.

3) The Contractor shall ensure that each submittal is in accordance with each and all applicable submittal requirements of the corresponding Specification section(s) and/or drawings.

4) The Contractor shall ensure that each submittal contains sufficient documentation and information, presented plainly and clearly, to verify each and all requirements that are contained within the Specification Section(s) or shown on the Contract Drawing(s) prior to transmission to the Engineer.

b. Regardless of what a manufacturer, fabricator, subcontractor, etc. transmits to the Contractor, it is the Contractor's exclusive responsibility to ensure completeness of the submittal package prior to transmitting the package to the Engineer for review.

1) Packages that are incomplete, whether by failing to include all materials required to be submitted by the pertinent Specification section(s) and/or contract drawings, or whether failing to transmit any and all information needed to verify every feature, detail, etc. that is specified and/or shown, may be returned "Rejected" for the Contractor to resubmit.

c. A note shall appear on the first page of each submittal indicating that the Contractor has made this check.

1) Shop Drawings not so checked and noted shall be returned to the Contractor with a disposition of 'Rejected' for noncompliance with the requirements of the Contract Documents.

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 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 only determines its overall agreement with the information given in the Contract Documents. Approval of any Submittal by the Engineer does not constitute a representation that the Submittal was found to conform to all requirements of the Contract

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" x 34" 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. The Contractor shall make good, repair or replace any damaged or injured items, structural, mechanical, electrical, architectural or landscaping, promptly and effectively to the satisfaction of the Engineer and at no extra cost to the City.

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 covering 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 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 their seal and signature.

E. Shop Drawings Approval

1. Shop Drawings submitted 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 or apparatus shown or indicated.

4. If the Contract Documents specify that a submittal (or a portion thereof) shall bear the signature and seal by a registered professional engineer, then in order for said submittal to be considered complete, the requisite documents must bear the signature and seal of a registered professional engineer at the time of submittal.

   a. The submittal of draft documents for review without signature and seal is unacceptable. Such documents shall be considered

incomplete and shall be returned with a disposition of "Rejected" without review.

5. Materials or equipment shall not be ordered nor shall any Work be done by the Contractor before the materials, the equipment and the Shop Drawings as herein required have been approved by the Engineer.

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

- Furnish as Submitted (FAS)
- Furnish as Noted (FAN)
- Furnish as Corrected (FAC)
- Revise and Resubmit (R&R)
- Rejected (R)
- For Information Purposes Only (FIO)

a. If a Submittal is acceptable, it will be marked "Furnish as Submitted", "Furnish as Noted", 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", "Furnish as Noted", 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.

1) Upon return of a Submittal marked "Furnish as Corrected", the Contractor shall make the corrections indicated, and resubmit the Shop Drawings to the Engineer.

2) Upon return of a Submittal marked "Furnish as Noted", the Contractor shall make the corrections indicated, but does not need to resubmit the Shop Drawing to the Engineer unless the Contractor disagrees with the corrections noted.

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.

d. The "Rejected" notation is used to indicate material or equipment that is not acceptable. Upon return of a Submittal so marked, the Contractor shall repeat the initial approval procedure utilizing acceptable material or equipment.

e. The "Rejected" notation is also used for submittals where the Contractor did not review the submittal for completeness prior to transmission to the Engineer as specified in this Section.

f. Shop Drawings or other Submittals not bearing the Engineer's "Furnish as Submitted", "Furnish as Noted", 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", "Furnish as Noted", or "Furnish as Corrected" drawing or Submittal.

7. 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.

8. 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.

9. 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 resubmissions of Submittals, and the Engineer's review and returning the approved Submittals to the Contractor.

10. It is the Contractor’s responsibility to review and confirm compliance with the contract documents prior to submitting each submittal. Any delays, due to the quality of submittals requiring multiple cycles for review and approval, will be the responsibilities of 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.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

ATTACHMENT 01 33 00-1
SAMPLE SCHEDULE OF SUBMITTALS

Submittal Number:		Name:	Review Cycle:	Date Submitted:	Date Returned:	Disposition:

SECTION 01 35 27 – ENVIRONMENTAL, HEALTH AND SAFETY REQUIREMENTS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for the Contractor to provide its employees and 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.

B. Attachments

1. Exhibit A – Standard Environmental, Health and Safety Requirements Specifications

2. Exhibit B – Bidder's EHS Safety Record and Program Review Questionnaire

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment

1.03 RELATED SECTIONS

A. Section 01 57 16 - Temporary Pest Control

B. Section 31 23 16 - Excavation

1.04 REFERENCES

A. Definitions

1. "Competent Person" means one who is capable of identifying existing and 35 27predictable 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.

2. "EHS Resources" shall mean the Contractor's EHS Professional(s) and its EHS Site Representative (EHS Rep), as approved by the BEDC 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 BEDC EHS as set forth in this Section.

3. "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).

4. "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.

5. "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.

6. "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.

7. "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.

8. "Observation" shall mean an opportunity to improve that does not entail an event included as a hazardous identification, near miss, or incident.

9. "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.

B. Reference Standards

1. 29 CFR 1926 - Safety and Health Regulations for Construction (Subpart Z – Toxic and Hazardous Substances), Standard No. 1926.1153 - Respirable Crystalline Silica

1.05 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, regulations, DEP Policies and BEDC EHS Standards.

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 Project Contractor employees. 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. All on-duty employees and those of its Subcontractor issued DEP identification badges must visibly wear the badge at the waistline or above. The Contractor must supply a safe means for wearing badges such as break away lanyards or where the badge may be a safety hazard during the scope of Work, an exemption to wearing the badge will be made as approved by the EHS Regional Manager (RM). Exemptions will be documented in the EHASP and JHA for the specified work activity.

3. 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.

4. 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.

5. 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 BEDC web-based PMIS. Poorly performing Subcontractors will affect the Contractor's performance evaluations and ability to obtain future contracts with DEP.

6. 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 BEDC 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.

7. 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.

8. 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.

9. 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.

10. 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 Contractor may submit a request in writing to the Engineer to waive the requirement of a separate EHS Rep at each site and permit other Contractor employees who are Qualified Individuals to monitor the EHS activities of the employees and to assume all of the responsibilities of the full-time site EHS Rep, if it can show that one EHS Rep can effectively manage multiple sites. 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 b through d 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.

11. 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.

12. 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.

13. The Contractor and all Subcontractors are responsible for daily cleanup of their immediate Work areas in accordance with BEDC'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.

14. 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.

15. When working with (i.e. the cutting, grinding, drilling, chipping, demolition/removal) masonry materials containing respirable crystalline silica (i.e. brick and concrete), the Contractor shall perform work utilizing specified engineering and work practice control methods in accordance with 29 CFR 1926.1153.

B. Environmental Health and Safety Plan (EHASP)

1. The Contractor shall have a written EHASP prepared and signed by both the SP and the EP in accordance with the BEDC 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 BEDC for review and approval prior to the start of any work. JHAs will be developed as the Work

progresses, in accordance with the BEDC JHA Standard, and will supplement the Contractor's EHASP.

C. Emergency Action Plan

1. The Contractor shall work with the Construction Manager and Other Contractors to develop a single cohesive construction EAP in accordance with BEDC's EAP Standard.

a. 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.

b. The Contractor is responsible for evaluating and ensuring that all identified emergency resources are adequate and appropriate for the potential rescues/emergencies needed.

D. Spill Prevention Program (SPP)

1. The Contractor shall establish a Spill Prevention Program (SPP) for the prevention of releases of petroleum, hazardous substances or other pollutants. The SPP shall include awareness training for all personnel on measures designed to reduce, minimize and eliminate the potential for releases.

2. The Contractor shall establish sound work practices and implement appropriate measures to achieve release prevention and control of releases when they do occur.

3. Section 1.07 Submittals lists the requirements of the SPP.

4. Facilities or construction sites with chemical bulk storage (CBS) tanks or containers registered with the New York State Department of Environmental Conservation (DEC) are required to have a Spill Prevention Report (SPR) as per 6 NYCRR 598(1.9).

5. 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.

E. Spill Prevention, Control, and Countermeasure (SPCC) Plan

1. Facilities or construction sites that will store, handle, or manage a combined aboveground storage capacity of 1,320 gallons of oil, or a completely buried oil storage capacity of over 42,000 gallons, are required to have an SPCC Plan. Contractors shall follow 40 CFR part 112 Oil Pollution Prevention Regulation to determine if their project site qualifies for an SPCC Plan. All SPPC Plans require the certification of a Professional Engineer (P.E.). Section 1.07 Submittals lists the requirements for SPCC Plans.

1.06 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. Marine Safety Professional (MSP): Qualifications of the Marine 3 Environmental Safety Professional shall include a minimum of 10 years of relevant construction experience, of which at least five years must be spent exclusively in marine construction with emphasis in EHS management, and successful completion of the following training courses: 1) BEDC EHS Standards 2) Thirty-hour OSHA Construction Outreach Training, or OSHA Authorized Instructor.) BEDC Spill Prevention and Control;

a. In addition to the above requirements, the MSP will provide proof, through certification and completion of marine specific training, that s/he is knowledgeable in the requirements of the following regulations and consensus standards: 1) Association of Diving Contractors, International Consensus Standards for Commercial Diving and Underwater Operations. 2) US Department of Transportation, US Coast Guard CFR 46, Commercial Diving Operations – General Provisions. 3) US Department of Labor, Occupational Safety and Health Administration Commercial Diving Standards, 29 CFR Part 1910, Subpart T. 4) New York State approved Boating Safety Course.

b. The MSP shall be fully cognizant of all relevant governmental regulatory agency regulations that may apply to the diving operation and the diving mode employed. S/he shall be fully knowledgeable of the Health and Safety Plan as specified herein.

c. If diving is required, the MSP shall be formally trained in commercial diving either through:

1) A formal course of instruction at a public or private accredited school (including military school) commercial diving school or;

2) A minimum of five years of documented on-the-job experience in the conduct of commercial diving activities, not to include time as topside support or diving tending.

d. The MSP 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.

e. The MSP will be on site during any in water, near, or above water activity.

3. 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.

4. Safety Professional (SP): Persons recognized as an SP 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.

5. Environmental Professional (EP): Persons recognized as an EP 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). In addition, when soils are excavated for onsite or offsite reuse in NYS, the QEP shall be present onsite to monitor contractor compliance with soil management plans, such as the Field Sampling Plan and Soil Excavation, Reuse, Transport and Disposal Plan (SERTD Plan) specified in 31 23 16 – Excavation.

6. 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)

7. 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. BEDC 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. BEDC spill prevention and control;

g. Control of hazardous energy sources (lockout/tagout);

8. 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)

9. The EHS Professionals (SP, EP, or both) 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.

B. 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(s) and EHS Rep will be evaluated by BEDC 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.

1.07 SUBMITTALS

A. Environmental Health and Safety Plan (EHASP)

1. 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.

2. Initial submission of the EHASP shall be provided as an electronic copy (either Word or Acrobat format) to the Engineer.

3. The EHASP submittal shall be reviewed, and comments shall be provided to the Contractor upon completion of the review.
    a. The Contractor shall work with the Engineer to address all comments in order to obtain EHASP approval.
4. Upon receipt of final approval, the Contractor shall provide one electronic copy (either Word or Acrobat format) of the EHASP to the Engineer.
5. The EHASP shall be available to all of the Contractor's employees working on the Contract.
6. 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.
7. The Contractor shall adhere to the requirements of BEDC 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.
8. The Contractor must notify the Engineer and BEDC 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. Emergency Action Plan (EAP)
1. Each BEDC project shall have a site-specific EAP in accordance with the BEDC Standard on Emergency Action Plan (EAP) Standard.

C. Contractor EHS Employees
1. The Contractor shall submit to BEDC EHS for approval, the names of the EHS Professional(s) and EHS Rep(s) to be employed. These include the SP, EP, ESP, EHS Rep and ESW as described in section 1.06.
    a. BEDC EHS may request and conduct an interview of the candidates prior to approval.
    b. The Contractor shall submit the resumes, copies of certifications, a signed certification of employee training, along with other qualifications of the EHS Professionals 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.

c. 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.

D. 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.

E. Monthly Contractor EHS Report

1. The Contractor shall submit, on or before the 7th 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. Petroleum bulk storage (PBS) inventory and registration certificates (if applicable).

d. Local Law 77 and DEP Bureau of Environmental Compliance air permits.

e. Summary of audit data including trending and analysis along with root cause and corrective actions/training identified.

f. Summary of the regulatory inspections, notices of citations and penalties, NOVs, or any other outside agency violations (which occurred and were provided to BEDC in accordance with this Section).

g. Statements by the SP and EP discussing their review of the monthly report(s) and recommendations for improvement, as necessary.

h. SP/EP Monthly Report shall include the following:

1. Date of the monthly walkthrough inspection
2. Observations including photographs of any deficiencies identified
3. Proposed methods of correction for deficiencies
4. List of corrective actions implemented from the deficiencies noted in the previous month’s report
5. Attach monthly PBS inspection (EP), if applicable.

6. Report shall be signed by the Contractor's SP/EP

i. Detailed information regarding each pesticide application during the prior month, as specified in Section 01 57 16 - Temporary Pest Control.

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.

F. Spill Prevention Program (SPP)

1. At a minimum, the Contractor shall include within the SPP the following:

a. Proper materials handling, labeling and container storage inspection practices for all products including hazardous and universal waste.

b. 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.

c. Follow manufacturer recommended preventive Maintenance Procedures (MPs) and where none exist, develop in-house equipment specific MPs.

d. Inspection for and purging of residual materials in piping, tanks and other equipment prior to disassembly, demolition and disposal.

e. Supervision of fuel and chemical deliveries. These deliveries shall only be permitted during normal Project work hours or as otherwise approved by the Engineer.

f. The SPP shall include a detailed summary of anticipated petroleum and chemical storage. The information shall include capacity, contents, description and secondary containment provided.

g. If the spill is large and cannot be cleaned up by onsite personnel, provide the name and contact details for the spill cleanup contractor.

h. Include an emergency contact list and hierarchy of contacts in the SPP for spills and incident notification.

i. Provide means and methods for cleaning up anticipated spills.

j. Facilities or construction sites with chemical bulk storage (CBS) tanks or containers registered with the New York State Department of Environmental Conservation (DEC) are required to have a Spill

Prevention Report (SPR) as per 6 NYCRR 598(1.9). The SPR must be an attachment of the SPP.

G. Spill Pollution Prevention and Countermeasures (SPCC) Plan

1. If required by EPA 40 CFR 112.1, the Contractor shall prepare a SPCC Plan that details the equipment, workforce, procedures, and steps to prevent, control, and provide adequate countermeasures to a discharge. The Plan must include:

   a. A SPCC Cross-Reference table that includes Provisions, Plan Section, and Page/Appendices

   b. A description of the physical layout and a facility diagram showing the location and contents of each fixed oil storage container and mobile or portable container storage area, transfer stations, and connecting piping;

   c. The type of oil in each fixed container and its storage capacity. For mobile or portable containers, either provide the type of oil and storage capacity for each container or provide an estimate of the potential number of mobile or portable containers, the types of oil, and anticipated storage capacities;

   d. Discharge prevention measures including procedures for routine handling of products (loading, unloading, and facility transfers, etc.);

   e. Discharge or drainage controls such as secondary containment around containers and other structures, equipment, and procedures for the control of a discharge;

   f. Contact list and phone numbers for the facility response coordinator, National Response Center, cleanup contractors with whom you have an agreement for response, and all appropriate Federal, State, and local agencies who must be contacted in case of a discharge.

   g. Description of spills, corrective actions taken and plans to prevent reoccurrence.

   h. A prediction of the direction, rate of flow, and total quantity of oil that could be discharged where experience indicates a potential for equipment failure;

   i. A description of containment and/or diversionary structures (e.g. berms) or equipment to prevent discharged oil from reaching “navigable waters.”

   j. Where appropriate, a demonstration that containment and/or diversionary structures or equipment are not practical;

   k. A complete discussion of the spill prevention and control measures applicable to the facility and/or its operation including procedures for

routine handling of the products (loading, unloading and facility transfers);

l. Inspection procedures and records of inspections

m. Security features including fences, locked/guarded gates, locked master flow/drain valves, locked non-operating pumps, capped loading connections and lighting;

Countermeasures for discharge discovery, response and cleanup (both the facility's and those that would be required of a contractor);

n. Methods of disposal of recovered materials in accordance with legal requirements;

o. An emergency contact list, including spill response contractors and all appropriate Federal State, and local agencies who must be contacted in case of a discharge; and

p. A demonstration of the Responsible Individual's approval (signature) and certification by a licensed professional Engineer.

q. If the SPCC Plan calls for additional facilities, procedures, methods, or equipment not yet fully operational, the preparer must discuss these items in separate paragraphs, and must explain separately the details of installation and operational start-up.

2. The Operating Bureau/Responsible Individual is responsible for review of the facility's SPCC Plan at least once every five years. Any amendments to the SPCC Plan must be implemented as soon as possible, but not later than six months following preparation of any amendment. The Contractor is responsible for informing the CM/BEDC of oil quantity changes and updating the SPCC Plan, as necessary.

3. 3. Training requirements. Annual SPCC Training certificates shall be submitted to the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. EHS Equipment

1. 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.

2. 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.

B. Personal Protective Equipment

1. 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 BEDC EHS PPE Standard. The Contractor shall continuously provide and maintain adequate PPE.

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. EHS Staff Duties

1. The Contractor's EHS staff (SP, EP and EHSR) are responsible for overseeing and managing the Contractor's safe and environmentally compliant performance of all Work.

2. EHS Professional(s)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, at a minimum monthly, in accordance with the Contractor's EHS Plan or as directed by the Engineer.

3. 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.

4. The SP shall visit the Site prior to developing the Contractor's EHASP. The SP 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 BEDC EHS Site Orientation Standard.

5. The EHS Professionals 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 Professionals shall review hazards, JHAs, and the foremen's and superintendent's preparation and communication of JHAs to workers. The EHS Professionals shall also review the Project team's compliance with, and adherence to EHS requirements, as well as their proactive approach and planning for EHS.

6. The EHS Professionals 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.

7. The EHS Professionals are 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 SP/EP checklist provided in the EHASP. Any findings that cannot be resolved immediately will be assigned to the EHS Rep for follow-up. The EHS Professionals are expected to communicate with the EHS Rep to ensure all identified findings are closed out. The EHS Professionals' 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.

8. The EHS Rep will coordinate with the EHS Professionals 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 BEDC 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.

9. The ESP shall be at the Site full time during all shifts whenever electrical work is in progress. The ESP is responsible for electrical safety planning and enforcing Contractor compliance with electrical safe work practices.

10. The EHS Rep shall be at the job Site full time whenever work is in progress during all shifts.

11. The SP's and EHSR's responsibilities are as follows:

    a. The SP 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 SP shall either recommend retraining or removal of the EHS Rep from the Project by submitting a letter to the Engineer and the Contractor.

    b. 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 Professionals are 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 BEDC EHS when requested.

    c. Both the SP and EHSR 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.

    d. All Contractor employees shall be instructed by the SP 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). EHSRs and EHS Professionals will attend regularly scheduled meetings held by the Engineer and BEDC EHS including, but not limited to, the EHS Pre-Construction Meeting.

    e. 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.

f. Verify implementation of the BEDC Emergency Action Plan (EAP) Standard.

g. Develop an effective Site communication plan that includes, signage, and verbal and written communication of EHS issues and notices.

h. Post all appropriate notices regarding EHS regulations at Site location(s) which afford maximum exposure to all personnel at the job Site.

i. 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.

j. The EHS Rep shall 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 shall be tailored to the EHS hazards and conditions on the Site, and shall include a comments section to include findings not specifically listed on the checklist.

k. 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 SP 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.

l. Notify the Engineer and BEDC EHS immediately of all inspections by regulatory agencies, and submit to the Engineer and BEDC EHS copies of all EHS reports, citations, and NOVs from regulatory agencies and insurance companies within one workday of receipt.

m. Implement an effective fire protection and prevention program at the Site throughout all phases of the construction Work in accordance with BEDC'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.

n. 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 BEDC's Site Orientation Standard and DEP's Contractor Selection and Management Policy.

o. Perform all tasks and responsibilities as identified in the EHASP.

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

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 BEDC-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.

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.

3.04 STARTUP / DEMONSTRATION

A. Visitors

1. 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.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

Exhibit A

Standard Environmental, Health and Safety Specifications
Rev 4, 6/23/2022

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

Rev 4, 6/23/2022

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: _____

ATTACHMENT A

STANDARD ENVIRONMENTAL, HEALTH AND SAFETY SPECIFICATIONS

To be included in all contracts where applicable

STANDARD ENVIRONMENTAL, HEALTH AND SAFETY SPECIFICATIONS

1. Scope

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Note: if the bidder is not required to maintain such information, it shall provide an explanation for the exemption.

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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.

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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.

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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

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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;

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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.

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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.

* * * * * *

ATTACHMENT B

BIDDER'S EHS SAFETY RECORD AND PROGRAM REVIEW

QUESTIONNAIRE

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 01 35 45 – HAZARDOUS MATERIALS CONTROL
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Known Hazardous Materials
2. Unforeseen Hazardous Materials
3. Hazardous Materials Investigation and Remediation
4. Hazardous Waste Management and Regulatory Compliance

B. The following index of this Section is presented for convenience:

C.

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D. The following attachments, included after the End of Section designation, are a part of this Section:

1. Attachment A – Tables 1-3 from the Limited Asbestos, Lead Paint, and PCB Survey Report for the North River WRRF Underdeck Structural and Marine Improvements Project, Contract NR-107, May 2025
2. Attachment B – Hazardous Materials Sampling Locations from the Limited Asbestos, Lead Paint, and PCB Survey Report for the North River WRRF

Underdeck Structural and Marine Improvements Project, Contract NR-107, May 2025

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 27 00 – Measurement and Payment

B. Section 01 35 27 – Environmental, Health and Safety Requirements

C. Section 01 41 00 - Regulatory Requirements

D. Section 01 74 20 – Construction Waste Management

E. Section 02 24 20 - Soil Sampling and Analysis

F. Section 02 82 05 – Asbestos Management

G. Section 02 83 05 – Lead Management

H. Section 02 84 05 – PCB Management

1.04 REFERENCES

A. Definitions

1. 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)).

2. 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.

1.05 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.ed 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. Regardless, 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 01 35 27 – 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. 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 Hazardous Waste Management Policy and the following Specifications:

a. Asbestos-containing material shall be handled in accordance with Section 02 82 05 – Asbestos Management.

b. Lead-containing paint shall be handled in accordance with Section 02 83 05 – Lead Management.

c. PCB-containing material shall be handled in accordance with Section 02 84 05 – PCB Management.

d. If not handled under the above Sections, Universal waste and other regulated wastes shall be handled in accordance with Section 01 74 20 – Construction Waste Management.

3. Asbestos, lead and PCB results are as summarized in Tables 1 through 3, as provided at the end of this Section (Attachment A). Sample locations are also provided at the end of this Section (Attachment B). Additional details pertaining to the hazardous materials investigation are provided in the Limited Asbestos, Lead Paint, and PCB Survey Report for the North River WRRF Underdeck Structural and Marine Improvements Project, Contract NR-107, May 2025. The Limited Asbestos, Lead Paint, and PCB Survey Report Hazardous Materials and Mitigation Report is expressly excluded from and is not a part of this Contract and is available for information purposes only. All hazardous material remediation shall be performed by the Contractor.

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 via implementation of

the approved sampling plan. 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. 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.

    a. Universal waste and other regulated wastes shall be handled in accordance with Section 01 74 20 – Construction Waste Management.

5. 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 submit a facility letter of acceptance. The Contractor shall also provide advance copies of the waste manifest(s) and Hazardous Waste Land Disposal Restrictions (LDR) Notification and Certification Form(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. On the date of shipment, the Contractor shall submit copies of the completed manifest, signed and dated by the initial transporter, in accordance with federal and state requirements, to the DEP for signature. 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 01 27 00 – Measurement and Payment.

1.06 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. Spill prevention and cleanup contingency measures to be implemented.
7. Work plan for waste management, on-site storage, removal and disposal.
8. Detailed schedule indicating the beginning and completion dates for each activity and each Work area, including time for clean-up, inspection, and monitoring activities.

1.07 SUBMITTALS

A. The following items shall be submitted as described above for the Engineer's approval:

1. Initial Site Inspection Report and Summary Site Inspection Report
2. Remediation Plan for Unforeseen Hazardous Materials, when required.
3. Three (3) cost proposals from hazardous materials specialists for remedial action work, when required.
4. EHASP upgrades as needed in accordance with Section 01 35 27 – 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

Attachment A

Tables 1 – 3 from the Limited Asbestos, Lead Paint, and PCB Survey Report for the North River WRRF Underdeck Structural and Marine Improvements Project, Contract NR-107, June 2025

Table 1
Asbestos Sampling and Analysis Summary
North River WRRF Underdeck Structural and Marine Improvements Project

Sample / Homogeneous Material Number	Material	Location	Asbestos Percentage
1A	Hardware Coating - Concrete	Fender System - Type A	NAD
1B	Hardware Coating - Concrete	Fender System - Type A W/D	NAD
1C	Hardware Coating - Concrete	Fender System - Type B	NAD
1D	Hardware Coating - Concrete	Fender System - Type B1	NAD
1E	Hardware Coating - Concrete	Fender System - Type B2	NAD
1F	Hardware Coating - Concrete	Fender System - Type B3	NAD
1G	Hardware Coating - Concrete	Fender System - Type C	NAD
2A	Hardware Coating - Asphalt	Fender System - Type A	NAD
2B	Hardware Coating - Asphalt	Fender System - Type A W/D	NAD
2C	Hardware Coating - Asphalt	Fender System - Type B	NAD
2D	Hardware Coating - Asphalt	Fender System - Type B1	NAD
2E	Hardware Coating - Asphalt	Fender System - Type B2	NAD
2F	Hardware Coating - Asphalt	Fender System - Type B3	NAD
2G	Hardware Coating - Asphalt	Fender System - Type C	NAD
3A	Weight Block – Upper Concrete	Fender System - Type B	NAD
3B	Weight Block – Upper Concrete	Fender System - Type B1	NAD
3C	Weight Block – Upper Concrete	Fender System - Type B2	NAD
3D	Weight Block – Upper Concrete	Fender System - Type B3	NAD
4A	Weight Block – Lower Concrete	Fender System - Type B	NAD
4B	Weight Block – Lower Concrete	Fender System - Type B1	NAD
4C	Weight Block – Lower Concrete	Fender System - Type B2	NAD
4D	Weight Block – Lower Concrete	Fender System - Type B3	NAD
5A	Waterproof Membrane	Fender System - Type A	NAD
5B	Waterproof Membrane	Fender System - Type A	NAD
5C	Waterproof Membrane	Fender System - Type A W/D	NAD
5D	Waterproof Membrane	Fender System - Type B	NAD
5E	Waterproof Membrane	Fender System - Type B1	NAD
5F	Waterproof Membrane	Fender System - Type B2	NAD
5G	Waterproof Membrane	Fender System - Type B2	NAD
5H	Waterproof Membrane	Fender System - Type B3	NAD
5I	Waterproof Membrane	Fender System - Type C	NAD
6A	Concrete Skim	Fender System - Type A	NAD
6B	Concrete Skim	Fender System - Type A	NAD
6C	Concrete Skim	Fender System - Type A	NAD
7A	Black Tar Sheeting	Fender System - Type B1	NAD
7B	Black Tar Sheeting	Fender System - Type B1	NAD
7C	Black Tar Sheeting	Fender System - Type B1	NAD
8A	Rubber Fender	Fender System - Type A W/D	NAD
8B	Rubber Fender	Fender System - Type A W/D	NAD
8C	Rubber Fender	Fender System - Type A W/D	NAD

Note: NAD = No Asbestos Detected

Table 2
Lead Sampling and Analysis Summary
North River WRRF Underdeck Structural and Marine Improvements Project

Sample Number	Paint Color	Substrate	Location	Lead Concentration (% by weight)
NR-107 #1 LBP	Black	Steel	Marine Level – Mooring, Black Cleat	ND
NR-107 #2 LBP	Black	Steel	Marine Level – Mooring, Black Bollard	ND

Note: ND = None Detected

Table 3
PCB Material Sampling and Analysis Summary
North River WRRF Underdeck Structural and Marine Improvements Project

Sample Number	Material	Location	PCB Concentration (parts per million)
PCB NR-107 #1	Waterproof Membrane	Marine Level - Fender System, Type A	ND
PCB NR-107 #2	Waterproof Membrane	Marine Level - Fender System, Type B	ND
PCB NR-107 #3	Waterproof Membrane	Marine Level - Fender System, Type B2	ND
PCB NR-107 #4	Hardware Coating - Asphalt	Marine Level - Fender System, Type B1	ND
PCB NR-107 #5	Rubber Fender – Rub Rail	Marine Level - Fender System, Type A W/D	ND
PCB NR-107 #6	Black Tar Sheeting on Wood	Marine Level - Fender System, Type B1	ND
PCB NR-107 #7	Black Paint	Marine Level – Mooring, Black Cleat	ND
PCB NR-107 #8	Black Paint	Marine Level – Mooring, Black Bollard	ND

Attachment B

Hazardous Materials Sampling Locations from the Limited Asbestos, Lead Paint, and PCB Survey Report for the North River WRRF Underdeck Structural and Marine Improvements Project, Contract NR-107, May 2025

EXISTING FENDERING AND MOORING - ARRANGEMENT PLAN

SCALE: 1"=100'-0"

AKRF – Approximate Location of Sample	
Material	**Symbol**
ACM Sample Location	1A
LBP Sample Location	#1 LBP
PCB Sample Location	PCB #1

Not to Scale

AKRF
440 Park Avenue South, New York, NY 10016

NR-107 - North River WRRF Underdeck Structural and Marine Improvement Project
Manhattan, New York

ACM, LBP, and PCB Sampling Locations

DATE **4/10/25**

PROJECT NO. **230651**

FIGURE **2**

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Site Video Surveillance
2. Security Guard Services
3. Compliance with DEP Bureau of Police and Security Contractor Site Security Guidelines

B. Contractor shall comply with all Site Security Procedures described herein.

C. The Contractor shall provide electronic safety and security equipment for physical security, access control, intrusion detection and video surveillance purposes as specified and directed by the Engineer.

D. The Contractor shall furnish personnel, uniforms, equipment and supplies necessary to provide Security Guard Services at the Site, as described herein. The services shall be provided as specified and as directed by the Engineer.

E. The following index of this Section is presented for convenience:

F.

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G. Attachments

1. DEP Bureau of Police and Security Contractor Site Security Guidelines

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Definitions

1. Visitor: A person visiting the project Site who is not employed by the Department of Environmental Protection, New York Police Department, Fire Department of New York, emergency medical services, the Contractor, or Subcontracted to the Contractor.

1.05 DESCRIPTION

A. Site Video Surveillance

1. The Contractor shall provide Site video surveillance to cover the project area. Site video surveillance shall be provided 24 hours per day, 7 days per week, 365 days per year.

2. Site video surveillance recordings and live viewing capability shall be available via internet browser for the duration of the project and at the direction of the Engineer.

3. Live access to site video surveillance shall be provided to the Engineer. Access to Site video surveillance at all times shall be provided to the Engineer, DEP Police Chief, and DEP Police Deputy Chief.

4. Site video surveillance shall be password protected.

a. Each user must have a unique user ID and password to login. Shared or generic accounts are prohibited.

b. All user accounts should be standard accounts with the minimum necessary access. Administrative access should only be granted where absolutely required.

c. Passwords must be a minimum of 8 characters for regular account and 15 characters for administrator privilege account, containing at least one upper case letter, one lower case letter, one number and one special character.

d. Login credentials must be removed for any user whose responsibilities on the project change, making it unnecessary to have video access and/or those whose involvement with the project ends.

5. DEP will have the option to make Site video surveillance equipment and system permanent at end of construction.

B. Prior to the start of Work, the Contractor shall appoint a Security Point of Contact (SPOC) to liaise with DEP Bureau of Police and Security (BPS) on all security related matters. An alternate SPOC (ASPOC) shall also be appointed by the Contractor in the case of SPOC absence or unavailability. SPOC/ASPOC will be responsible for ensuring Site security compliance.

C. Security Guard Services

1. The 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 Guard Service starts, it shall remain in continuous operation until project close-out.

2. The Contractor shall employ Security Guard Services specifically and exclusively to safeguard the Site and prevent access by unauthorized persons in accordance with General Conditions, Article 9. The Security Services shall be provided 24 hours per day, 7 days per week, 365 days per year. The Security Services shall include at least one (1) uniformed security guard per shift.

3. Guards shall be stationed at a guard booth.

4. Guards shall be unarmed.

5. The security guard shall be provided based on an 8-hour shift. No security guard shall be scheduled by the Contractor for more than twelve (12) hours in any twenty-four (24) hour period, including placements at other assignments.

6. The 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.

a. Supervision of all security personnel must also be provided by the entity that directly employs them.

7. All security personnel must pass a security clearance from the DEP Police Detective Bureau and obtain a DEP Non-Employee Photo Identification Card. DEP Non-Employee Photo Identification Cards will be issued by DEP Police Detective Bureau or at the DEP Security Office, 96-05 Horace Harding Expressway, Corona, NY.

a. Security clearances are valid for one year after which re-clearance is required.

b. DEP Non-Employee ID Card must be worn on the outermost garment and fully displayed by all security personnel while on Site.

c. New York State Guard Licenses must be in possession of the guard while on duty and presented on demand when requested by an authorized person.

8. The Contractor shall ensure that meal breaks are provided for each guard and shall provide a relief guard during the guard's meal break.

a. This requirement may be waived by the Engineer during non-working construction hours as long as the Site can be satisfactorily secured, i.e. gates/doors locked, interior alarm system activated.

b. Guard will be required to punch out upon taking break, and punch in at the end of break.

9. Contractor and/or Security Guard Company shall have trained back-up guards and supervisors available to ensure continuous, uninterrupted service in the event a guard and/or supervisor is not present for duty.

10. All Work pursuant to this Contract shall be performed in compliance with all applicable Federal, State and local laws and regulations.

11. Security guard shall have a means of communications to contact 9-1-1, DEP Police where applicable, and any emergency contacts that DEP may provide at all times.

a. If a cell phone is used for communication, this designated phone must remain with the post at all times while security coverage is being performed.

12. If the Site security procedures require, in addition to performing security functions, each security guard may be expected to perform the duties of a Fire Guard and be certified as such per Section 1.06 (A)(2)(n).

D. Compliance with DEP Bureau of Police and Security Contractor Site Security Guidelines

1. The Contractor shall comply with the DEP Bureau of Police and Security Contractor Site Security Guidelines, attached at the end of this Section.

2. Security clearance or approval for temporary access shall be obtained from DEP Bureau of Police and Security for all Contractor personnel working at the Site(s) before personnel will be permitted to access the Site. Refer to the DEP Bureau of Police and Security Contractor Site Security Guidelines for:

a. Procedures required to obtain security clearance and associated Security Clearance Form; and

b. Procedures required to obtain approval for temporary access and associated Temporary Access Form.

1.06 QUALITY ASSURANCE

A. Qualifications

1. The 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.

   a. The Security Guard Firm may not subcontract any of the Work.

   b. The collaboration of two or more Security Guard companies as a joint venture is permissible as long as there is a common name and uniform with an established single responsible person in charge or all security personnel posted.

   c. Comply fully with the New York State General Business Law (GBL) Article 7 and 7-A Entitled Security Guard Act.

   d. Possess a valid license issued by the New York State Department of State ("NYSDOS License"), to act as a Private Investigator or Watch Guard and Patrol Agency.

   e. Be fully licensed under New York State Law General Business Law Article 7, Section 70, and Licenses Paragraph Number 2 entitled Private Investigators and Watch, Guard and Patrol Agencies, and Article 8 entitled Process Server to provide the required security guards. The Contractor shall provide a copy of the NYSDOS eleven (11) digit unique identification number prior to commencement of the Work.

   f. The City will immediately terminate the Subcontract and Contractor shall engage a new subcontractor if the NYSDOS License is suspended or revoked for any reason. The Contractor cannot substitute another Private Investigator and Watch, Guard or Patrol Agency License if the Subcontractor's NYSDOS license is suspended or revoke.

   g. 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.

2. The Contractor shall ensure that all assigned security guards are licensed security guards registered under New York State law and meet the following criteria:

   a. Guards shall be at least eighteen (18) years of age.

   b. Possess a high school diploma or possess a General Equivalency Diploma.

c. Have at least one year of experience as a Uniformed Unarmed Security guard including a minimum of 1,750 hours of service preferably in a similar setting. This requirement can also be waived by the BPS Security Division at its discretion or for candidates with prior military service with an honorable discharge (DD214).

d. Possess a valid current New York State issued Driver License, Learner's Permit or Non-Driver I.D. card.

e. Have a current New York State Security Guard License

f. Possess and maintain valid Certification for the specific position to which they are assigned. Some examples include: FDNY Handle Motor Fuel-Gas Station P-15 Certification, Certificate of Fitness for Fireguard Shelters F-44, or MARSEC (Maritime Security)/TWIC Transportation Worker Identification Credential certifications. The Contractor is responsible for determining and complying with correct certification.

g. 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.

h. All guards shall have undergone fingerprinting pursuant to New York Department of State, Division of Licensing Services regulations.

i. Guards shall be in excellent physical condition and shall supply medical certification of fitness and good health prior to assignment. This shall include an annual medical examination including a urine drug screen test performed by a licensed testing laboratory approved by the City. The drug screen test shall test for the following substances: amphetamines, barbiturates, benzodiazepines, cocaine, marijuana, methadone, methaqualone, opiates, PCP's propazphene.

j. Guards shall have no record of mental illness, history of residence in a psychiatric institution, or history of drug or alcohol abuse.

k. 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 Documents.

l. Guards shall perform their duties in full uniform.

m. Guards shall possess an OSHA Construction Safety and Health certificate (10 hour minimum)

n. Guards must have the appropriate Fire Guard Certification applicable to the construction Site they are assigned to. Contractor

is required to determine certification required by the local authority having jurisdiction. (Examples of such certifications include Certificate of Fitness (CoF) F01 – Citywide Fire Guard for Impairment, F02 - Fire Guard of Shelters, F60 – Fire Guard for Torch Operations, F92 – Supervise and Fire Guard Boatyards and Marinas).

3. 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.

B. Training

1. Contractor shall ensure that all guards employed under this Contract receive training as per Article 7-A, Section 89-n of the New York State General Business Law and the New York State Security Guard Act of 1992.

2. All Site security personnel must have received the following training prior to posting:

a. State Required training:

1) 8 Hour Pre-Assignment

2) 16 Hour OJT (on the job training)

3) Current 8 Hour Annual

b. Training must also include the following:

1) Proper confrontation to include procedures for courteous reception and questioning of individuals; procedures to restrict ingress and egress routes while maintaining a professional bearing and decorum; and procedures to conduct body and package searches in an appropriately non-aggressive and inoffensive manner.

2) Radio communication principals and radio use.

3) Laws of arrest, search and seizure (New York State).

4) Use of force for New York State

5) Procedures to be followed in reporting a violation of law to a duly constituted law enforcement agency

6) Procedures for reporting an unusual occurrence incident, including familiarization of the incident report and the “who, what, when, where and why” method of reporting

7) Recognition of security and safety hazards, and fire protection and prevention including fire alarm procedures

8) Appropriate use of installed fire equipment and emergency evacuation procedures

9) Emergency response and evacuation procedures.

10) Bomb threat procedures.

11) Fire alarm procedures and appropriate use of installed fire equipment

12) Ethics and law

13) Identifying and reporting sexual harassment and discrimination and workplace violence

14) Prohibition of Fraternizing with DEP's and contractor's staff and visitors

15) Terrorism Awareness Training

16) Observation and detection of potential hostile surveillance

17) Operation of an x-ray machine

18) Operation of proper screening with a magnetic wand

19) Operation of a magnetometer (walk through metal detector)

20) Operation of electronic barriers and gate

21) Control center operations where applicable

3. Copies of all applicable training materials, including examinations, must be provided anew to DEP whenever changed.

4. Records of training sessions must be maintained by the Contractor. Copies of training session records must be sent to DEP Project Manager within seventy-two (72) hours of the completion of training.

5. Prior to posting, all security guards must receive a site specific 2-hour orientation conducted by the DEP BPS Security Manager and/or authorized representative(s).

   a. This requirement may be waived on a site-by-site basis at the discretion of DEP BPS Director of Security and/or appointed authorized representative(s).

   b. Subsequent security guards assigned to the Site after the beginning of security coverage shall receive a similar orientation by the Contractor SPOC/ASPOC. The Contractor must appoint a "Trainer" to conduct orientations for future security personnel assigned to the Site.

6. 2-Hour Orientation - Requirements

   a. Security Personnel Requirements

1) Roster of 6 security guards shall be sent to initial training, to account for future sick, vacation, resignations, etc. at the post
2) Attendees shall possess a of NYS Security Guard License
3) Inquire if any are active or retired Police Officers and of gun possession
4) Authorized representative of security company shall be in attendance
5) Prime Contractor SPOC or authorized representative shall be in attendance

b. Other Requirements

1) Temporary guard booth shall be in place and powered.
2) 24-hour means to communicate with 911 and DEP Police Ashokan, Eastview, or Hillview Precinct (if upstate or at designated In-City sites)
3) Working flashlight must be available.
4) 24-hour contact information for Security Company shall be provided.
5) Means of time accountability shall be in place, i.e., time clock that is punched every hour and generates report.

7. 2-Hour Orientation Agenda must include at a minimum:

a. Introduction

b. General Requirements:

1) Expectations and responsibilities for security officers
2) Review of requirements

c. Specific Post Orders

1) Requirements of the site(s)
2) Patrol / Access Control Procedures
3) What to look for
4) How to contact DEP Police (at sites where applicable)
5) Use of Log Book
6) Recording Key Punches
7) Reporting Spills
8) Evacuations

d. Tour of Site(s):

1) Familiarization of post and surrounding area

e. Distribution of Security Post Orders:

1) Contractor Security Point of Contact (SPOC)/(ASPOC)

2) Authorized Security Company Representative

3) Post

f. Acknowledgement Statement Form: Upon the completion of the orientation, the following must sign the form:

1) Security Guard(s)

2) Authorized Security Company Representative

3) Contractor (SPOC)/(ASPOC)

a) The originals shall be submitted to the Engineer.

8. Annual Training Requirements:

a. 8-Hour Annual In-Service Training (all security personnel both armed and unarmed)

b. 8-Hour Annual Firearms Training (all armed security personnel)

C. Qualifications for Security Guard Supervisors

1. In addition to meeting all the qualification requirements of a Uniformed Unarmed Security Guard, Supervisors shall meet all of the following qualifications:

a. Be at least 21 years old

b. Have at least one year of supervisory experience in any field; and

c. Have a minimum of two (2) years of additional experience in any one or any combination of the following:

1) Experience as a security guard with a documented successful work history

2) Experience as an armed guard/watchman

3) Experience in the Armed Forces, Military Reserves, National Guard or as a State Guard, with honorable discharge or equivalent

4) Experience as a probation officer, corrections officer, police officer, or park ranger, attendance at an accredited institution of higher learning in criminal justice, police science or a related field (completion of 24 credits may be substituted for one year of required service.

D. Standards of Conduct

1. Contractor(s) shall ensure and certify that all assigned staff complies with the following:
   a. Meet the requirements of all federal, state and local laws, including the N.Y.S. General Business Law § 70 et seq. and § 89-e et seq., and any successor legislation, including but not limited to, the satisfactory completion of the specified fingerprint checks
   b. Have no physical conditions that would hamper the performance of assigned duties
   c. Be able to stand for a minimum of four (4) consecutive hours
   d. Be free from communicable disease
   e. Hear within normal speech range and volume
   f. Possess a valid social security number
   g. Not be under indictment for any felony or any other offense specified in the N.Y.S. General Business Law §§ 81 or 89-h
   h. Be physically able to wear and to be properly trained in the use of all protective equipment
   i. Possess mental alertness and emotional stability
   j. J Have passed a background investigation conducted by the Contractor(s), consisting of: FBI fingerprint check; seven (7) year prior employers check; out-of-state criminal records check; personal references check; New York State criminal background checks; and driver's license check
   k. Have tested negative, both prior to employment and on an annual basis thereafter, to random Controlled Substance Use (CSU) testing, for the presence of the following substances and/or their metabolites on a clinical drug test administered by a lab licensed by the State of New York to administer such examinations: amphetamines; barbiturates; benzodiazepines; cocaine; cannabinoids; methadone; methamphetamines; opiates; phencyclidine; propoxyphene; and tricyclic antidepressants. Copies of the test results must be placed in the employee's personnel file and be provided to the User Agency upon request.
   l. Annual CSU testing required under these Contract(s) will be of a random nature, whereby CSU testing is carried out each year on a random date, without prior notification to the respective employee or their supervisor.
   m. All CSU testing will be conducted in accordance with all legal standards, as required under Local, State and/or Federal laws for the industry.

n. All Security Personnel testing positive will be immediately removed from their post and eliminated from any future assignments under this Contract.

o. In the event a security guard is required to ingest prescription medication, it is the Contractor's responsibility to ensure that the guard is fit for duty and that the appropriate documentation is made available to the DEP. Such medication must be carried in the original prescription container, with the pharmacist's label affixed thereto. specifying the pharmacy name, prescription number, doctor's name, drug name and control number. Additionally, it is the Contractor's responsibility to ensure that guards are not assigned for duty while under the influence of any medication that could impair their ability to carry a firearm and/or perform required job duties.

1.07 SUBMITTALS

A. Within 14 days after the Notice to Proceed, the Contractor shall submit to the Engineer the Security Surveillance Plan for approval.

B. Within thirty (30) days of the Notice to Proceed, the Contractor shall submit to the Engineer the Security Service Firm for approval.

C. Within twenty-four (24) hours of retaining the Security Service Firm, the 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 high school diploma or General Equivalency Diploma
10. Military record (if applicable)
11. Documentation of prior employment
12. Copy of New York State fingerprint card

13. Record of security training, pursuant to the Security Guard Act to include 8-hour annual training for the duration of the Contract.

14. Medical certification of fitness and good health

    a. Contractor and/or Security Guard Company shall ensure that all guards and supervisors undergo and pass a physical exam administered by a physician licensed to practice medicine in the State of New York. Such physical exams shall take place no earlier than twenty (20) days before Contractor and/or Security Services Company hires such guard or supervisor.

    b. Contractor and/or Security Services Company shall further ensure that all guards and supervisors currently employed by them, successfully pass an annual post hiring medical examination administered by a physician licensed to practice medicine in New York State. Such annual physical exams shall take place within (30) days of the anniversary date of the prior physical.

15. Drug screen test results for the past 12 months or since employment, whichever is shorter.

16. Result, if any, of criminal record check.

17. Proof of successfully passed security clearance from DEP BPS Police Detective Unit.

D. The above referenced files shall be made accessible and delivered to the Engineer within twenty-four (24) hours of the request.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Reporting

1. All unusual occurrences that require a security guard to take official action must be reported immediately to the police and the Engineer as appropriate.

2. It is the responsibility of the Contractor to keep all reports in a binder according to location.

B. Site Security

1. Additional Security

    a. Should the Contractor consider the security requirements outlined above inadequate, it may provide such additional security as it deems necessary. The additional cost of such approved increased protection shall be paid by the Contractor.

    b. Nothing contained herein shall diminish in any way the responsibility of the Contractor for safeguarding and protecting its own personnel, work, materials, tools and equipment.

c. 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 included by the Contractor in the price bid for the Contract.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Video Surveillance

1. Pan-Tilt-Zoom (PTZ) Cameras

a. Outdoor PTZ IP Security Camera

1) Resolution: 3840 x 2160 UltraHD 4K to 640 x 360.

2) Lens: f=3.9 – 46.8 mm, F1.8 – 2.0 autofocus, automatic day/night, horizontal field of view: 70.7° - 6.2°.

3) Minimum illumination: Color - 0.45 lux at 30 IRE F1.8, B/W – 0.03 lux at 30 IRE F1.8.

4) Pan/tilt/zoom: Pan: 360° endless, 0.05° - 750°/s. Tilt: plus 20 to minus 90°, 0.05° - 500°/s, 12x optical zoom and 12x digital zoom total 144 zoom.

5) Video compression: H.264 (MPEG-4 Part 10/AVC), Motion JPEG.

6) Casing: IK08, IK10 housing and mounting. IP66 and NEMA 4X-rated repaintable metal aluminum casing, polycarbonate clear dome.

7) Power: High Power over Ethernet, max. 37W, High PoE Midspan 1- port: 100-240V AV, max. 74 W.

8) Operating conditions: -40 °F to 140 °F, with 60-W midspan.

b. Outdoor Fixed IR Illuminated Bullet Camera

1) Resolution: 3712x2784 10 MP to 160x90.

2) Lens: Canon 12–48 mm, F1.7–4.0, 4K Horizontal field of view: 90°–21°, Vertical field of view: 49°–12°, 10MP Horizontal field of view: 86°–20°, Vertical field of view: 62°–15°, Autofocus (zoom triggered), auto-iris, automatic day/night.

3) Day and night: Automatically removable infrared-cut filter.

4) Minimum illumination: Color: 0.03 lux at 50 IRE F1.7, B/W: 0.006 lux at 50 IRE F1.7, 0 lux with IR illumination on

5) Video compression: H.264, Motion JPEG.

6) Casing: IP66-/IP67-, and NEMA 4X-rated, IK10 impact-resistant aluminum enclosure with integrated dehumidifying membrane, weather shield with black anti-glare coating Color: White NCS S 1002-B.

7) Power: Power over Ethernet (PoE) IEEE 802.3at Type 2 Class 4, Typical 13.3 W, max 24.0 W.

8) Operating conditions: -40 °F to 140 °F.

2. Analytics

a. Motion detection

1) Onboard Analytics: Include video motion detection.

3. Video Storage

a. Video storage shall be local recording to a DVR/NVR with both local and internet-based access.

b. Minimum recording retention time is 30 days.

c. Power: 24-hour power supply battery backup.

B. Security Guards

1. Uniform and Appearance

a. The Contractor shall furnish distinctive and appropriate complete uniforms to all security guards and supervisory security personnel at no cost to DEP. All assigned personnel must have standard, matching uniforms. All supervisors' uniforms must be distinctive from guards' uniforms, (i.e., contain different color shirt than guard) and contain rank insignia.

b. The uniform and appearance shall be as follows:

1) Uniform shirts (long sleeve or short sleeve, depending on weather conditions). The Contractor(s)' shoulder patch shall be on the sleeves and a security square badge with name plate shall be worn on the front

2) Uniform trousers;

3) A black tie (snap or button type only);

4) Black shoes

5) For staff assigned indoors, a uniform blazer with the Contractor's shoulder patch on the left breast pocket and a metal badge with name plate to be worn on the front;

6) For staff assigned outdoors, a uniform jacket with the Contractor's shoulder patch on the sleeves and a metal badge with name plate to be worn on the front, and a cap with badge (baseball style caps are acceptable) – the cap must be worn front-facing and "squared," not tilted or slanted.

7) Appropriate clothing for inclement weather, i.e. rain boots, rain coat, winter hat (must clearly identify the wearer as a security guard).

8) Appropriate safety equipment that site requires in performance of duties, i.e. hard hat, safety vest, safety goggles, steel toed boots (must clearly identifies the wearer as a security guard.)

c. All items of uniform shall be maintained in a clean, well-pressed condition.

d. Contractor must provide appropriate fitting uniform for guards who are pregnant.

2. Equipment

a. Working flashlight – with replacement batteries available

b. Post Log Book

1) Contractor shall provide log books according to specifications: 8.5 inches by 14 inches hard covered bound with lined pages inside

2) Must be present and remain at security post.

3) All log entries made by security officers must be in permanent black ink. Use of correction fluid such as Wite-Out is not permitted. Mistakes in entries are to have a single line drawn through them and initialed.

4) Security Supervisors and those charged with overseeing security at a site (SPOC/ASPOC) must sign their names and entry and exit times in the logbook in red ink.

5) Log books shall be continuously maintained by Contractor's personnel and shall contain the following chronological entries:

a) Signature of each employee coming on duty

b) Signature of each employee going to and from meal break

c) Signature of each employee going off duty

d) Results of all patrols

e) Documentation of all incidents, which must include the following:

(1) Time of incident(s)

(2) Description of incidents and their outcome

(3) An account of Security Guard actions during the incident(s)

(4) Names of persons and/or entities contacted, arrival and departure times of any police units, fire department and/or other respondents, and signatures of the Contractor(s)' supervisory personnel, and DEP Project Manager and DEP Director of Security and/or appointed authorized representative.

(5) Notations of Security Guard actions during the incident(s)

f) Names of persons and/or entities contacted, arrival and departure times of any police units, fire department and/or other respondents, and signatures of the Contractor(s)' supervisory personnel, and DEP Project Manager and DEP Director of Security and/or appointed authorized representative.

g) Notations of supervisory visits during any shift must include arrival and departure times, nature of visits and areas visited.

h) Notes of all occasions when vehicles or personnel representing the NYC Police Department, the NYC Sheriff's Department or the New York State Police are observed entering or are present at User Agency sites. Notes must include the license plate numbers

or vehicle numbers, if possible, time spent on and off the grounds, and details of any conversations held;

i) Notes of any emergency situations that occurs and an account of all developments and their resolution; and

j) Documentation of inquiries from news media, radio, or TV. All inquiries from Press, news media, radio or TV, etc., shall be directed to contact the DEP Press Office at (718) 595-7867

6) Log Books are the property of DEP and must be submitted to the designated DEP representative if so requested.

7) Only persons directly involved with security operations are authorized to read log book. Only authorized persons may remove log book from Site. Authorized persons are Bureau of Police and Security and OIG. Notification of removal and new location must be made to all parties above by authorized person removing log book

8) When completely filled, it must be turned over to most senior DEP Person in charge of security at the Site for proper storage (or DEP Resident Engineer).

C. Communication Equipment

1. Contractor shall possess device systems for use at each site as defined. In any facility or location where two or more guards are assigned to work simultaneously, the Contractor shall provide portable hand-held two-way radios for use by each guard. Contractor shall also provide appropriate training and accessories such as batteries, chargers, and carrying case. Such radios shall be fully operational at all times. The radio must be fully charged at the beginning of each shift. Such radios shall be licensed by the Federal Communication Commission (FCC) on a business or public safety band. Such radios and accessories shall be provided in sufficient quantities to ensure that there is at least one operable, fully charged radio and case for each guard and supervisor on each shift. DEP must approve all equipment prior to use.

2. DEP's BPS Deputy Commissioner and/or their authorized representative(s) may also require that one or more radios be made available to the DEP's management personnel, at no cost to DEP, to maintain contact with the Contractor's security guards on Site and to monitor their radio transmissions. Where radios are required for the DEP's personnel, such radios must be made to operate on the same frequency as that assigned to the guards and will include cases and fully charged operable radios on each shift. Upon completion of service, such radios will be returned to the Contractor.

3. In addition, Contractor shall supply least one (1) working cellular phone capable of transmitting and receiving calls at an assigned post for use by guards on duty. Contractor's personnel shall provide the phone number for the post cell phones to the DEP before each shift. All expenses associated with the use of cellular phones are to be assumed by the Contractor.

4. At Sites with no radio or cellular communication capability, Contractor shall provide a communication methodology to meet the DEP minimum requirements for guards to contact 911 and necessary notifications at no additional cost to the City.

5. All communication equipment must be in good operating condition and shall be supplied with a necessary back-up source.

6. The communications equipment must be tested regularly to ensure its functionality at the Site. If not functioning, the Contractor is required to replace it within four hours. Testing and equipment replacement must be noted in the post log book.

D. Electronic Timekeeping/Guard Tour System

1. Provide Timekeeping/Guard Tour system (electronic, turnkey acceptable if conditions do not warrant electronic) that is accessible to DEP BPS Security Division when requested.

2. Must be able to operate in an all-weather environment.

3. Records of all tours are the property of DEP and must be made available and accessible to DEP Project Manager and BPS Security Division when requested.

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 APPLICATION

A. Security Guard Duties and Responsibilities

1. Security guards shall use discretion, courtesy, tact, and necessary force when protecting DEP locations.

2. Reporting to Post – all security guards reporting to post shall:

a. Arrive at scheduled starting time neat and professional in appearance.

b. Be in complete uniform displaying company logo.

c. If arriving at post for first-time contact the most senior DEP person on Site responsible for security or Contractor SPOC/ASPOC

d. Obtain any other necessary information from prior shift.

e. Review Post Log Book from previous shift and print their name. Identify and be familiar with:

1) Summary of incidents that took place the previous shift

2) Ongoing situations

3) Actions pending

4) Special instructions

5) Check all required post equipment to make sure it is in working order. Report to most senior DEP person on Site responsible for security, prime contractor SPOC/ASPOC, and your company supervisor any equipment not working. Enter all information in Post Log Book.

f. Safeguard all keys and equipment used during the normal course of their duties:

1) A working phone both landline and/or cellular or Nextel

2) A working two-way radio if used

3) A working flashlight

4) Whistle

5) Log Book

6) Pen(s)

7) All job-related contract information including postings

8) Any other equipment assigned related to job duties, i.e. keys

3. Post Assignment:

a. Be familiar with all site-specific post orders (can be found at security post)

b. Follow Log Book procedures as outlined.

c. Shall protect persons or property from:

1) Harm

2) Theft

3) Other unlawful activity

d. Respond to a security system alarm

e. Observe, detect, and report unlawful or unauthorized activity

f. Control, by street or other patrol service, access to property including:

1) Employees

2) Contractors

3) Visitors

4) Vehicles

5) Traffic

g. Enforce security policies, rules, regulations and procedures.

h. Areas of responsibilities can include:

1) Site buildings

2) Existing assets

3) Trailers

4) Grounds

5) Appurtenances, and occupants

i. Protect areas of responsibility against:

1) Fire

2) Vandalism

3) Theft

4) Loitering

5) Trespass

6) Burglaries/Unlawful Entry

7) Bodily harm

8) Building systems malfunctions and deficiencies (water leaks, open windows, lights out)

9) Hostile surveillance

10) Terrorism threats

j. Assist in emergency evacuations, both drill and actual – know evacuation routes and primary/secondary assembly areas.

k. Respond to emergencies, summoning assistance and obtaining professional assistance, in accordance with DEP Site procedures, in the event of injury or illness to anyone on the protected premises

l. Assist DEP and public safety personnel in case of any emergency such as fire, bomb threat, assault, or civil disturbance.

m. Prepare reports to be submitted to DEP on accidents, fires, thefts, breaches in a building's security/ protection, building incidents and potentially hazardous conditions.

n. Perform other such duties as may be prescribed such as:

1) Attend to parking facilities

2) Escort duties

3) Observe/ screen Visitors

4) Issue passes

5) Check IDs

6) Operating vehicle barrier gates, magnetometers, security x-ray machines and handheld security wands

7) Controlling gates, doors and lighting as required

o. Conduct patrols as required and dictated by site-specific post orders.

p. Upon intrusion by an unidentified person, Security Guards shall make an inquiry as to the authorization to enter the premises and take the necessary action as follows:

1) Provide the individual with temporary identification, or

2) Request the intruder to vacate the premises, or

3) If a threatening situation or criminal activity occurs, notify 911 and DEP Police (if location is upstate or at a designated In-City Site) and other contacts as proscribed by site specific post orders.

q. Security guards going off duty shall pass along all relevant information and instructions to the relieving security guard prior to leaving any post.

r. A post is never to be left unattended without official permission except if at end of tour and no relief is scheduled.

s. Access control: Follow Site specific access control policies:

1) Identify all persons entering and leaving Agency construction locations and may be required to operate X-ray or scanning equipment in the course of maintaining access

control, including the inspection of bags, packages, parcels, etc.

2) Perform vehicle inspections (interior, trunk, undercarriage, etc.) during heightened security alerts, or when instructed to do so. Any vehicle entering or exiting a DEP site is subject to a search.

3) Check for valid DEP identification cards of all personnel attempting to enter the Site on foot or in vehicle. Admit only those who are permitted to use this entrance.

4) Verify a person's right to enter the Site with appropriate DEP Site personnel and/or prime contractor SPOC/ASPOC if identification card cannot be presented or is expired. Confiscate any expired identification cards and return to DEP Security Office if post is In-City or DEP Police Detective Bureau if post is Upstate or at designated In-City Sites

5) Do not assume that anybody wearing an official-looking uniform or is driving a vehicle that appears official has a valid reason to enter the Site. Inquire with appropriate DEP Site personnel and/or Prime Contractor SPOC/ASPOC

6) Make sure that all non-Site personnel (including DEP Employees who do not work at the Site) sign in

7) Deliveries – Follow Site specific delivery procedures. Confirm and verify all deliveries with appropriate DEP Site personnel and/or prime contractor SPOC/ASPOC. Do not automatically assume that anybody wearing an official-looking uniform has a reason to enter the Site. Inquire with appropriate DEP Site personnel or Contractor SPOC/ASPOC

8) Deny access to unauthorized persons at all specified locations.

9) Removal of Property – Confirm a person's right to remove property from the Site. If uncertain, verify with appropriate DEP Site personnel or Contractor SPOC/ASPOC.

10) Check that Contractors are scheduled to work. Verify names of all contractor personnel, identification, and have all sign in. Have them wait to be escorted by a DEP person or Contractor SPOC/ASPOC unless directed otherwise by appropriate DEP Site personnel or Contractor SPOC/ASPOC.

t. Report all irregularities, suspected irregularities, hazards, and potential hazards to most senior DEP person on Site and /or Contractor SPOC and DEP Police (if location is upstate or at a designated in-City Site):

1) This means:

a) any situation that is not typically part of the normal course of operations observed, heard, or smelled at the Site;

b) Could possibly cause harm to a person;

c) Damage to Site property; or

d) Broken or malfunctioning equipment.

2) Immediately report all safety violations to DEP Project Manager or authorized representative(s)

3) Suspicious Behavior – defined as unexplained conduct. Report all suspicious, unusual, or dangerous activities to DEP Police (if location is upstate or at a designated In-City Site). Report also to most senior DEP person on Site and/or Contractor SPOC/ASPOC

a) This includes vehicles, people, sounds, smells, and spills.

4) In Emergencies, Dial 911 and DEP Police (if location is upstate or at a designated In-City Site at 1-914-593-7500 or 1-888-426-7433 without delay). Also notify most senior DEP person on Site and/or prime contractor SPOC

u. Press Inquiries / Requests for Information – Do not speak to any news/media/ or press person or any inquisitive citizen regarding any matter or matter of security pertaining to DEP: Instead:

1) Refer to DEP Press Office at (718) 595-7867

2) Notify DEP Police (if location is upstate or at a designated In-City Site) and/or most senior DEP person on Site, and/or prime contractor SPOC.

3) Log all observations and/or incidents occurring in the Post Log Book. Include names of all people notified with and if necessary all 911/EMS operator numbers and police badge numbers.

v. Answer all questions from the DEP regarding events witnessed at their work location whether or not those events directly involved the performance of their official duties.

w. Submit sworn statements regarding any incident witnessed by the guard involving the commission of a crime or the threat thereof.

x. Surrender to Office of Inspectors General (OIG) and law enforcement any documents, weapons or other evidence obtained while performing their official duties or while witnessing any events at their work locations during their assigned hours of work.

y. Cooperate fully with DEP and law enforcement in regard to any investigations, administrative, and/or judicial proceedings resulting from said investigations

z. Provide name, company, and location while reporting anything or answering post telephones or radios.

aa. Upon completion of shift immediately leave the Site and do not remain in the work area.

B. Prohibited Post Behavior

1. While not an exhaustive list, below are examples of behaviors and item possession that could subject the security guard to immediate and prompt removal from the Contract and even arrest and criminal prosecution.

a. Reporting to work intoxicated or under the influence of any illegal drugs

b. Consuming or possessing alcohol or illegal drugs

c. Smoking inside Security Booth or onsite except in designated smoking areas

d. Being in possession of any non-job related issued weapon, even if legal. No firearms are permitted on DEP Property even with carrier's permit (exception are appropriately issued weapons to armed guards that are formally approved)

e. Sleeping of any kind or other inattentive behavior

f. Being in non-designated areas of the Site and / or unauthorized use to Site equipment

g. Being on Site when not on duty; guard must vacate Site when shift ends

h. Having personal visitors

i. Making personal phone calls except in an emergency

j. Leaving post without proper notification and authorization

k. Failure to follow job-related directions

l. Possessing or operating any device that distracts from post responsibilities

m. Plugging in of any non-job issued electronic equipment to a Site outlet

n. Revealing details about security procedures or unusual incidents to unauthorized persons

o. Speaking to the press or unauthorized persons

p. Any other conduct or items possessed not listed above that might compromise job performance.

C. Fire Guard Duties and Responsibilities

1. Fire Guards' responsibilities include reducing the threat of fires in a variety of locations within a facility. They are also responsible for ensuring that all fire safety regulations are obeyed.

2. Fire Guards are required when fire sprinklers are not installed or when fire sprinklers are malfunctioning, including at construction Sites.

3. Fire Guards must be present when an automatic fire protection system is shut down while being repaired.

4. Fire guards shall have ability to manually operate each alarm station on the premises.

5. Duties include, but not limited to:

a. Assist in the evacuation of the location in the event of fire or other critical situation.

b. Provide clear and concise instructions to building occupants to ensure safe and orderly evacuations.

c. In the case of a fire, responsible for activating the fire alarm; notifying the Fire Department and, if applicable, the facility's Fire Safety Director.

d. Direct fire fighters to the scene of the fire.

D. Security Guard Supervisor's Duties and Responsibilities

1. Supervisors shall direct and monitor the performance of security guards at the Sites, as directed by DEP, to ensure that security guards are performing their duties in accordance with the Contract.

2. Supervisors assigned under the Contract shall be the person designated, in writing, to have the authority and training to supervise all levels of employees on a day-to-day basis.

3. The Contractor and/or the Security Services Company shall be responsible for the necessary supervision of the Guards and shall make unannounced visits to the properties for the purpose of monitoring each guard's performance. A Supervisor's Report, summarizing their findings (including

times and dates of visit), shall be submitted to the DEP Project Manager on a monthly basis.

4. The Contractor and/or Security Services Company shall provide a supervisor who shall randomly visit the Site at least once per week alternating between all three shifts. The supervisor shall sign in the log book in red ink at the security post provided upon arrival, the DEP visitor log in the DEP Trailer, and communicate with DEP Project Manager. The supervisor will ensure all employees are present, attentive to their duties, and in conformance with the requirements of the Contract.

5. Supervisors shall make unannounced inspections of guards at the Site a minimum of at least once within a twenty-four (24)-hour rotation in order to ensure that the guards are acting in conformance with terms and conditions of the Contract.

6. Supervisors shall monitor to ensure that the guards are properly uniformed, alert and aware of and performing the required duties.

7. Supervisors shall not simultaneously perform the duties of security guard.

8. A written report, to include the date, time, and results of supervisory inspections shall be transmitted electronically to DEP Project Manager within three (3) days following each inspection. Supervisors shall note their times of arrival and departure in the log book provided by DEP as well as in their Memo Book and must punch in and out on a time clock, if/when required.

E. Rejection/Dismissal of Staff

1. Designated officials of DEP (Project Manager and/or authorized representative(s) may reject staff for any reason.

2. DEP may reject, dismiss or request removal of any personnel supplied by the Contractor and/or Security Guard Company from their assignment by notifying the Contractor. Upon such notification, Contractor shall be required to remove the employee(s) immediately or by such time as is designated by DEP.

3. Any guard or supervisor who has been rejected by DEP shall not be redeployed to any other DEP Site without written permission of BPS Security Division.

4. Guards and supervisors dismissed from duty must be replaced within four (4) hours of dismissal.

3.03 FIELD TESTING / QUALITY CONTROL

A. Recordkeeping

1. Contractor(s) shall maintain business records pursuant to Rules and Regulations of Title 19 NYCRR, Section 170.8, entitled Business Records for Private Investigator, Watch, Guard and Patrol Agencies. The personnel record for each employee assigned to work hereunder must contain the following and be available for review upon request by DEP.
2. Name and home address
3. Employment application
4. Date of birth
5. Unique employee identification number
6. Color photograph (from photo ID card)
7. Birth certificate
8. High school diploma or GED
9. NYS fingerprint card
10. Record of basic training as required by the NYS Security Guard Act of 1992; FDNY; etc.
11. Medical exam certificate
12. Clinical drug test results to include urine analysis
13. Results of annual drug screening
14. Results of background investigation
15. Color copy of a valid current armed security guard license issued by the State of New York (where applicable)
16. Color copy of a valid current security guard license issued by the State of New York
17. Color copy of a valid current New York State driver's license, or New York State Non-Driver ID Card for those security guards not operating a motor vehicle or who do not have a Driver License
18. Pursuant to the Title 19 NYCRR, Section 170.5, entitled "Principal Business Address," all Contractors shall maintain a principal place of business within New York State, which shall contain the employee and business records for any licensed activities conducted within New York State. A residence may not be considered as a principal business address.
19. The Contractor must provide above records to DEP Project Manager and DEP BPS Security Division upon request.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the sustainability requirements of this Project.

B. The intent is for sustainability goals to be achieved in a manner that ultimately provides a safe and healthy environment for building occupants and community members with minimal negative impact on the local, regional and global environment.

1. Third party sustainability verification will not be pursued for this Project. The Institute for Sustainable Infrastructure's (ISI) Envision v3 Rating System will be used as a guiding framework for achieving the sustainability goals identified for this Project.

C. Attachments

1. Attachment A: Sustainability Construction Documentation

2. Attachment B: Environmental Materials Reporting Form

D. The following index of this Section is presented for convenience:

E.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 01 52 10 – Temporary Field Office Trailers

C. Section 01 52 40 – Field Office Equipment and Supplies

D. Section 01 74 20 – Construction Waste Management

E. Section 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete

F. Section 03 21 00 – Reinforcing Steel

G. Section 03 31 29 – Marine Concrete

H. Section 03 32 00 – Joints in Concrete

I. Section 03 60 00 - Grouting

J. Section 05 05 23.02 – Miscellaneous Metal Fastenings

K. Section 05 50 00 – Metal Fabrications

L. Section 09 91 00 – Painting

M. Section 31 23 23 – Fill

N. Section 31 25 10 – Dust, Soil Erosion and Sediment Control

O. Section 35 56 13.16 – Extruded and Molded Marine Fenders

1.04 REFERENCES

A. ISI's Envision Version 3 (V3) as released on April 17, 2018, is the Envision framework used and referenced herein.

1.05 DESCRIPTION

A. General

1. The Contractor shall comply with sustainability requirements as indicated in this Section, other Specifications and Contract Drawings. The Contractor shall meet all sustainability requirements as stipulated in Attachment A through the New Material Sustainable Implementation Plan and the Sustainability Construction Documentation.

2. The Contract Documents are not intended to limit alternative means of achieving sustainability requirements. Suggestions from the construction team during Project meetings for implementing sustainability goals are encouraged.

3. All new materials shall be procured in accordance with the Environmentally Preferred Purchasing guidelines per Local Laws 118-121 of 2005.

1.06 QUALITY ASSURANCE

A. The Contractor shall designate a Sustainability Coordinator on staff who shall be responsible for sustainability compliance and coordination.

1. The Sustainability Coordinator should preferably be an Envision Sustainability Professional (ENV SP). The Sustainability Coordinator shall be responsible for sustainability considerations described in this section, including the New Materials Sustainable Implementation Plan and the Sustainability Construction Documentation.

1.07 SUBMITTALS

A. New Materials Sustainable Implementation Plan

1. The Contractor shall develop and implement the New Materials Sustainable Implementation Plan for the Project, where new materials refer to any item, supply, equipment, or other physical object being newly purchased for the single-use or long-term use for the duration of the Project.

2. The New Materials Sustainable Implementation Plan shall provide a method for how the Contractor plans to meet the requirements stipulated in Attachment A for recycled material, regional material, and sustainably sourced content.

3. The Contractor shall prepare and submit the New Materials Sustainable Implementation Plan for review and approval by the Engineer thirty (30) days after receipt of Notice to Proceed and prior to the selection of any new materials.

4. The Contractor shall use the Sustainable Material Content Plan (SMCP) as reference for the development of the New Materials Sustainable Implementation Plan. The SMCP is generated by the Engineer and included in the bid exhibit documents. The SMCP is expressly excluded from and is not a part of this Contract and is available for information purposes only.

5. The following equations shall be used to calculate values to input in the Environmental Materials Reporting Form (EMRF) (Attachment B):

a. Equation 1: Percent Recycled Content

$$Percent\ Recycled\ Content = \frac{Estimated\ Material\ Weight\ from\ Recycled\ Source}{Estimated\ Total\ Material\ Weight} \times 100$$

b. Equation 2: Overall Percent Recycled Content

$$Overall\ Percent\ Recycled\ Content = \frac{Estimated\ \ Total\ Material\ Weight\ from\ Recycled\ Sources}{Estimated\ Total\ Project\ Material\ Weight} \times 100$$

c. Equation 3: Percent Regional Content

$$Percent\ Regional\ Content = \frac{Estimated\ Material\ Weight\ Sourced\ Regionally}{Estimated\ Total\ Material\ Weight} \times 100$$

d. Equation 4: Overall Percent Regional Content

$$Overall\ Percent\ Regional\ Content = \frac{Estimated\ Total\ Material\ Weight\ Sourced\ Regionally}{Estimated\ Total\ Project\ Material\ Weight} \times 100$$

e. Equation 5: Percent Sustainably Sourced Content

$$Percent\ Sustainably\ Sourced\ Content = \frac{Estimated\ Material\ Weight\ Sustainably\ Sourced}{Estimated\ Total\ Material\ Weight} \times 100$$

f. Equation 6: Overall Percent Sustainably Sourced Content

$$Overall\ Percent\ Sustainably\ Sourced = \frac{Estimated\ Total\ Material\ Weight\ Sustainably\ Sourced}{Estimated\ Total\ Project\ Material\ Weight} \times 100$$

6. The New Materials Sustainable Implementation Plan shall include estimates of recycled material content, regional material content, and sustainably sourced content as described:

   a. Recycled material content estimate:

      1) Identify the percentage of recycled content of at least five (5) materials which will meet the recycled content requirements as stipulated in Attachment A.

      2) The total recycled material shall be estimated by including the total proposed weight in tons of all new materials and supplies procured for the Work, excluding mechanical equipment, electrical equipment, and plumbing equipment and their components, and excluding plants, soils, rocks, and water.

      3) The estimated recycled content shall be calculated in tons per Attachment B – EMRF.

   b. Regional material content estimate:

      1) Identify the percentage of regional content of at least five (5) materials which will meet the regional content requirements as stipulated in Attachment A.

      2) Regional content shall be defined per material by a distance of the supplier from the Site requirement in radii as the crow flies from the Project Site, as listed in Table 1.

Table 1: Regional Content Requirements

Material	Distance from the Site Requirement
Soils and mulches	50 miles
Aggregates, Sands	50 miles
Concrete	100 miles
Plants	250 miles
Other materials (excluding equipment)	500 miles
Mechanical, electrical, plumbing	N/A

3) The total regional material content shall be estimated by including the total proposed weight in tons of all new materials and supplies procured for the Work, excluding mechanical equipment, electrical equipment, and plumbing equipment and their components.

4) The estimated regional content shall be calculated in tons per Attachment B - EMRF.

c. Sustainably sourced content estimate:

1) Identify the percentage of sustainably sourced content of at least five (5) materials which will meet the sustainably sourced content requirements as stipulated in Attachment A.

2) Sustainably sourced content shall be defined as procuring materials, supplies, and equipment from a manufacturer that is demonstrably protective of human health and the environment. Demonstrably protective may include third party sustainability certification programs, environmental product declarations, or corporate sustainability policies. Examples of qualifying requirements include but are not limited to:

a) Environmental management systems consistent with ISO (International Organization for Standardization) 14001

b) Product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

c) Third-party verified sustainability program (e.g., Forest Stewardship Council (FSC), Green Seal, EcoLogo, Underwriters Laboratory, National Biosolids Partnership (NBP), Concrete Sustainability Council (CSC), etc.)

d) Third-party verified corporate sustainability report consistent with the Global Reporting Initiative (GRI) Sustainability Report or equivalent.

3) The total sustainably sourced material shall be estimated by including the total proposed weight in tons of all new materials, supplies, and equipment procured for the Work.

4) The estimated sustainably sourced content shall be calculated in tons per Attachment B - EMRF.

B. Sustainability Construction Documentation

1. The Sustainability Coordinator shall prepare and submit the initial, monthly and final Sustainability Construction Documentation.

2. Initial Sustainability Construction Documentation for materials containing recycled, regional, and/or sustainably sourced content listed under Article 1.03 RELATED SECTIONS.

a. Completed EMRF (Attachment B) to be submitted for each individual material

3. Monthly and Final Sustainability Construction Documentation shall be submitted for materials containing recycled, regional, and/or sustainably sourced content listed under Article 1.03 RELATED SECTIONS.

a. The Monthly Sustainability Construction Documentation shall be submitted to the Engineer on the 1st day of each month following Notice to Proceed.

b. At Project closeout, the Sustainability Construction Documentation shall be completed and submitted to the Engineer.

c. The Monthly and Final Sustainability Construction Documentation shall include the following items:

1) A cover sheet that describes updates since the last submission, how the new materials reporting documentation differs from the New Materials Sustainable Implementation Plan, and a projection of how the Project is projected to meet the requirements stipulated in Attachment A.

a) The Contractor shall meet the requirements stipulated in Attachment A.

2) The EMRF (Attachment B) and supplementary articles including shop drawings, specifications and receipts/invoices for materials containing recycled, regional, and/or sustainably sourced content. The Contractor shall work with the vendor to obtain the supplementary articles. The Contractor shall save such original documents for the life of the Project plus two (2)

year(s). The specifications shall include the following, as applicable:

a) Name of the product

b) Name of the manufacturer

c) Weight of the material

d) Percentage of recycled content (either post-industrial or post-consumer recycled content)

e) Location of the manufacturer

f) Manufacturer's sustainable qualifying documentation

d. Construction waste information shall be collected per requirements described in Section 01 74 20 – Construction Waste Management.

e. Local Law 77: DEP Monthly Report Form 1, as described and included as Attachment A in Section 01 14 00 – Work Restrictions.

f. Local Law 77: DEP Monthly Report Form 2, as described and included as Attachment A in Section 01 14 00 – Work Restrictions.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not used.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not used.

1.10 WARRANTY

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

A. Not used.

3.02 APPLICATION

A. Not used.

3.03 FIELD TESTING / QUALITY CONTROL

A. Sustainability Coordinator duties:

1. The Sustainability Coordinator shall attend a minimum of three (3) on-site coordination meetings. The Sustainability Coordinator shall make available for review at each meeting a set of Contract Drawings and Specifications, the New Materials Sustainable Implementation Plan and the updated Sustainability Construction Documentation.

   a. The first meeting will be a preconstruction meeting to review the New Materials Sustainable Implementation Plan, and establish roles including the Sustainability Coordinator and the Engineer.

   b. The second meeting will be a pre-closeout meeting to review the Sustainability Construction Documentation for completeness and identify any outstanding issues relating to requirements stipulated in Attachment A.

   c. The third meeting will be a closeout meeting to review the completed Sustainability Construction Documentation.

3.04 STARTUP / DEMONSTRATION

A. Not used.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. In order to comply with project sustainability requirements during cleanup of Work Area, 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 approved Plan detailed in Section 01 74 20, Construction Waste Management. Waste removal shall also comply with all federal, state, and local regulations, as well as DEP EHS Policies and Procedures.

1. 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 and Recycling of Private Caster-Collected Waste (September 1993).

2. 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.

END OF SECTION

Attachment A

Sustainability Construction Documentation

Indicator	Minimum Required Level[1]	Envision Credit Reference	Reporting Template
Recycled Material	25%[2]	RA1.2	Attachment B
Regional Material	30%[3]	-	Attachment B
Sustainable Procurement	25%[4]	RA1.1	Attachment B
Waste Reduction	95%[5]	RA1.4	Section 01 74 20 – Construction Waste Management, and Section 01 35 27 – Environmental Health and Safety Requirements

3. Minimum required level was established based on project-specific goals
4. Based on all new materials or supplies, procured during the Work, excluding mechanical, electrical, and plumbing equipment and their components, and excluding plants, soils, rocks, and water
5. Based on all new materials or supplies, procured during the Work, excluding mechanical, electrical, and plumbing equipment
6. Based on all new materials, supplies, equipment, or anything procured during the Work
7. Total material streams contributing to Project diversion goal must be recycled, reused, and/or salvaged

Attachment B

Environmental Materials Reporting Form (EMRF)

Material	Type/ Product	Recycled Content			Regional Content				Sustainably Sourced Content				
		Total weight (tons)[1]	Total Recycled Material Content (%)[2]	Total Recycled Content (tons)	Total weight (tons)[3]	Source of material (miles from project site)	Total Regional Material Content (%)[4]	Total Regional Content (tons)	Total weig ht (tons)	Manufacturer/ Supplier Certifications[5]	Certificate Obtained? (yes/no)	Total Sustainably Sourced Content (%)[6]	Total Sustainably Sourced Content (tons)
Total			-			-	-			-	-	-	
Percentage of Recycled, Regional, or Sustainably Sourced Content by weight[7]													

1. Total weight of material for recycled content shall not include landscaping material such as planting soil, mulch or sodding, and mechanical, electrical, and plumbing equipment, as stipulated in Article 1.07.A.6.a.2
2. Per Article 1.07.A.5.a Equation 1
3. Total weight of material for regional content estimates shall not include mechanical, electrical, and plumbing equipment, as stipulated in Article 1.07.A.6.b.3
4. Per Article 1.07.A.5.c, Equation 3 and Article 1.07.A.6.b Table 1: Regional Content Requirements
5. May include third party sustainability certification programs, environmental product declarations, or corporate sustainabilty policies; option to include “no certification” if the manufacturer / supplier is not demonstrably protective of human health and the environment
6. Count as sustainably procured content if “yes” cerification has been obtained; Per Article 1.07.A.5.e, Equation 5

7. Per Article 1.07.A.5.b-e, Equation 2 (recycled), Equation 4 (regional), and Equation 6 (sustainably sourced); final percentages shall be greater than or equal to the Minimum Percentage by weight as provided in Attachment A

SECTION 01 41 00 – REGULATORY REQUIREMENTS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Inspection by City, State and Federal Government

B. Permits, Licenses, Work Approvals and Certificates

C. Electrical Inspections, 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

J. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 57 00 – Temporary Controls

1.04 REFERENCES

A. Not Used

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. DEP has initiated applications for some permits. The Contractor shall be responsible for following up on and updating these permit applications, as needed, and for initiating and obtaining all other 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 that have been initiated and/or acquired by DEP during the design phase are listed below.

1) United States Army Corps of Engineers – Nationwide Permit 1 – Aids to Navigation

2) United States Army Corps of Engineers – Nationwide Permit 3 – Maintenance

3) United States Army Corps of Engineers – Nationwide Permit 6 – Survey Activities

4) United States Army Corps of Engineers – Nationwide Permit 25 – Structural Discharges

5) United States Army Corps of Engineers – Nationwide Permit 33 – Temporary Construction, Access, and Dewatering

6) United States Army Corps of Engineers – Wastewater Quality Control Permit

7) United States Army Corps of Engineers – Protection of Waters Permit – 401 Water Quality Certification

8) United States Army Corp of Engineers – Nationwide Permit 32 – Completed Enforcement Actions

9) NYSDEC – Protection of Waters Permit Docks, Moorings or platforms (Construct or Place)

10) NYSDEC – Protection of Waters Permit Navigable Waters (Excavation of Fill)

11) NYSDEC – Tidal Wetlands Permit

12) NYSDEC – Natural Heritage Program Consultation

13) NYCDEP – City Environmental Quality Review Environmental Assessment Statement

14) NYCPDC – Public Design Commission Final Approval

3. All Work performed under the Contract shall conform to the applicable rules and regulations of the Electrical Division, New York City Department of Buildings; the Building Laws of the City of New York 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 and/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 NYC Department of Buildings (DOB) for electrical Work furnished under this Contract. Proof of filing for the certificate shall be submitted to the Engineer in the form of notification email issued by the DOB 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 local Borough Office via DOBNOW Inspections, requesting that a final inspection be made.

3. Prior to final Substantial Completion, the Contractor shall provide evidence to the Engineer that a Certificate of Inspection, which is signed by the Borough Superintendent of the DOB Electrical Division has been filed in the Office of the Comptroller of the City and certifies that:

a. All material and workmanship comply in every respect with the rules and regulations of the Electrical Division, Department of Buildings and the New York City Electrical Code.

b. All materials and workmanship comply in every respect with the Contract Documents approved by the Electrical Division, Department of Buildings 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 current latest edition of the applicable requirements of the New York City Administrative Code, the National Electrical Code (NFPA 70), ANSI, ASTM, IEEE, NEMA, OSHA, UL and the Contract Documents and the documents specified elsewhere in the specifications. 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.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 WILGENERAL

1.01 SUMMARY

A. Section Includes:

1. Abbreviations and Acronyms
2. Definitions
3. Reference Standards

B. The following index of this Section is presented for convenience:

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C. The following tables, located after the "End of Section" designation, are a part of this Section:

1. Table 01 42 00-1 – Abbreviations
2. Table 01 42 00-2 – Acronyms
3. Table 01 42 00-3 – Standards Developing / Publishing Organizations

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. References applicable to all Specification Sections are listed in Tables 01 42 00-1 through -3, located after the "End of Section" designation, and include the following:

B. Use of the abbreviations or acronyms in Tables 01 42 00-1 through -3 is optional.

1. Reference to a technical society, organization, body, or code may be made in the Specifications by using the acronyms listed in Table 01 42 00-3 or by using the full organization name.

C. Use of Reference Standards:

1. All Work shall comply with the standards referenced, except as follows:

a. Where more stringent requirements are shown or specified, and/or

b. Where more stringent requirements are required by Law.

2. Referenced standards shall be current as of the time of bidding the Contract Documents, unless otherwise specified.

3. Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization, or body, the reference shall be construed to mean the latest standard, code, specifications or tentative specification adopted and published, unless otherwise specified by the Engineer.

4. When no reference is made to a code, standard or specification, the standards of the ASTM or the IEEE shall govern.

5. 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 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.

6. The Contractor shall obtain copies of the referenced standards when required by the Contract Documents.

D. Additional references and definitions may be defined in individual Sections, and these additional references and definitions shall be applicable only to the Work specified under those Sections.

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.

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

TABLE 01 42 00-1
LIST OFABBREVIATIONS

alternating current	a-c
ampere	A
antemeridian	a.m.
Architectural Barriers Act	ABA
Americans with Disabilities Act	ADA
Americans with Disabilities Act Accessibility Guidelines	ADAAG
ante meridian	a.m.
average	avg
biochemical oxygen demand	BOD
five-day biochemical oxygen demand	BOD_5
brake horsepower	bhp
British thermal unit	Btu
building information model	BIM
carbonaceous biochemical oxygen demand	CBOD
five-day carbonaceous biochemical oxygen demand	$CBOD_5$
chemical oxygen demand	COD
Centigrade (or Celsius)	C
chlorinated polyvinyl chloride	CPVC
chlorofluorocarbons	CFC
Code of Federal Regulations	CFR
computer-aided drafting and design	CADD, or CAD
consecutive calendar day(s)	ccd
cubic inch	cu in
cubic foot	cu ft
cubic yard	cu yd, or CY
cubic feet per minute	cfm
cubic feet per second	cfs
day(s)	d
decibel	db
degree Centigrade (or Celsius)	degrees C, ^oC, or deg C
degrees Fahrenheit	degrees F, ^oF, or deg F
diameter	dia
direct current	d-c
dollars	$
each	ea
efficiency	eff
Fahrenheit	F
feet	ft
feet per hour	fph, or ft/hr
feet per minute	fpm
feet per second	fps, or ft/sec

TABLE 01 42 00-1
LIST OFABBREVIATIONS
(Continued)

figure	fig
flange	flg
foot-pound	ft-lb
gallon	gal
gallons per hour	gph, or gal/hr
gallons per minute	gpm or gal/min
gallons per second	gps or gal/sec
gram	g
grams per liter	g/L
Hertz	Hz
horsepower	hp or HP
hour	hr
human-machine interface	HMI
inch	in.
inches of mercury	in. Hg
inches water gage	in. w.g.
inch-pound	in.-lb
inside diameter	ID
iron pipe size	IPS
thousand pounds	kips
thousand pounds per square inch	ksi
kilovolt-ampere	kva
kilowatt	kw
kilowatt-hour	kwhr or kwh
linear foot	lin ft or LF
liter	L
Leadership in Energy and Environmental Design (USGBC)	LEED
maximum	max
mercury	Hg
milligram	mg
milligrams per liter	mg/l or mg/L
milliliter	ml
millimeter	mm
million gallons per day	mgd or MGD
million gallon	MG
minimum	min
national pipe thread	NPT
net positive suction head	NPSH

TABLE 01 42 00-1
LIST OFABBREVIATIONS
(Continued)

net positive suction head available	NPSHA
net positive suction head required	NPSHR
nitrogen oxide (total concentration of mono-nitrogen oxides such as nitric oxide (NO) plus nitrogen dioxide (NO_2)	NOx
nominal pipe size	NPS
number	no.
operator interface terminal	OIT
ounce	oz
ounce-force	ozf
outside diameter	OD
parts per hundred	pph
parts per million	ppm
parts per billion	ppb
polyvinyl chloride	PVC
post meridian	p.m.
pound	lb
pounds per square inch	psi
pounds per square inch absolute	psia
pounds per square inch gauge	psig
pounds per square foot	psf
process control system	PCS
programmable logic controller	PLC
revolutions per minute	rpm
second	sec
specific gravity	sp gr, or SG
square	sq
square foot	sq ft, sf, or ft^2
square inch	sq in., or in^2
square yard	sq yd, or SY
standard	std
standard cubic feet per minute	scfm
thousandth of an inch	mil
total dynamic head	TDH
totally-enclosed fan-cooled	TEFC
volt	V
volts alternating current	vac
volts direct current	vdc
volatile organic compounds	VOC

TABLE 01 42 00-2
LIST OFACRONYMS

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
ABS	American Bureau of Shipping
ACI	American Concrete Institute
ACRI	Air Conditioning and Refrigeration Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHDGA	American Hot Dip Galvanizers Association
AISC	American Institute of Steel Construction
AISE	Association of Iron and Steel Engineers
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM Des.	American Society for Testing and Materials Designation
AWS	American Welding Society
AWWA	American Water Works Association
BEC	Bureau of Electrical Control
CFR	Code of Federal Regulations
CRSI	Concrete Reinforcing Steel Institute
DEMA	Diesel Engineer Manufacturers Association
DIPRA	Ductile Iron Pipe Research Association
DOD	Department of Defense
FED Spec.	Federal Specification
FM	Factory Mutual
IEEE	Institute of Electrical & Electronics Engineers
IPCEA	Insulated Power Cable Engineer's Association
ISO	International Organization for Standardization
MIL -Spec	Military Specification (Department of Defense)
MTA	Metropolitan Transportation Association
NAVY Spec.	Navy Department Specification
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NIST	National Institute of Standards and Technology
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
NYCBC	New York City Building Code
NYCEC	New York City Electrical Code
NYCDOT	New York City Department of Transportation

TABLE 01 42 00-2
LIST OFACRONYMS
(Continued)

OSHA	Occupational Safety & Health Administration (U.S. Department of Labor)
PANYNJ	Port Authority of New York and New Jersey
PPS	Power Piping Society
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
UL	Underwriters Laboratories, Inc.
UNS	Unified Numbering System of Alloys
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	Unites States Environmental Protection Agency

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS

AIR-CONDITIONING, HEATING, & REFRIGERATION INSTITUTE (AHRI) 2111 Wilson Blvd. Suite 500 Arlington, VA 22201 Phone: 703-524-8800 Fax: 703-562-1942 ahrinet.org	THE ALUMINUM ASSOCIATION (AA) 1400 Crystal Dr. Arlington, VA 22202 Phone: 703-358-2960 aluminum.org
AMERICANHORT 2130 Stella Ct. Columbus, OH 43215 Phone: 614-487-1117 americanhort.org	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) 444 North Captial St., NW Suite 249 Washington, DC 20001 Phone: 202-624-5800 transportation.org
AMERICAN BEARING MANUFACTURERS ASSOCIATION (ABMA) 330 N. Wabash Ave. Suite 2000 Chicago, IL 60611 Phone: 202-367-1155 americanbearings.org	AMERICAN BUREAU OF SHIPPING (ABS) ABS World Headquarters ABS Plaza 16855 Northchase Dr. Houston, TX 77060 Phone: 281-877-6000 Fax: 281-877-4976 eagle.org
AMERICAN CONCRETE INSTITUTE (ACI) 38800 Country Club Dr. Farmington Hills, MI 48331-3439 Phone: 248-848-3700 Fax: 248-848-3701 concrete.org	AMERICAN CONCRETE PIPE ASSOCIATION (ACPA) 8445 Freeport Pkwy. Suite 350 Irving, TX 75063 Phone: 972-506-7216 Fax: 972-506-7682 concretepipe.org
AMERICAN GALVALNIZERS ASSOCIATION (AGA) 6881 South Holly Cir. Suite 108 Centennial, CO 80112 Phone: 720-554-0900 Fax: 720-554-0909 galvanizeit.org	AMERICAN GAS ASSOCIATION (AGA) 400 North Capitol St., NW Suite 450 Washington, DC 20001 Phone 202-824-7000 aga.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA) 1001 N. Fairfax St. Suite 500 Alexandria, VA 22314-1587 Phone: 703-684-0211 Fax: 703-684-0242 agma.org	AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) 130 East Randolph St. Suite 2000 Chicago, IL 60601-2001 Phone: 866-275-2472 aisc.org
AMERICAN IRON AND STEEL INSTITUTE (AISI) 25 Massachusetts Ave., NW Suite 800 Washington, DC 2001 Phone 202-452-7100 steel.org	AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) 1899 L St., NW 11th Floor Washington, DC 20036 Phone: 202-293-8020 Fax: 202-293-9287 ansi.org
AMERICAN PETROLEUM INSTITUTE (API) 1220 L St., NW Washington, DC 20005-4070 Phone: 202-682-8000 api.org	AMERICAN SOCIETY OF HEATING, REFRIGERATING and AIR-CONDITIONING ENGINEERS (ASHRAE) 1791 Tullie Cir., NE Atlanta, GA 30329 Phone: 404-636-8400, 800-527-4723 Fax: 404-321-5478 ashrae.org
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) 2 Park Ave. New York, NY 10016-5990 Phone: 800-843-2763 asme.org	AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE) 18927 Hickory Creek Dr., Suite 220 Mokena, IL 60448 Phone: 708-995-3019 Fax: 708-479-6139 asse-plumbing.org
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) P.O. Box C700 West Conshohocken, PA 19428-2959 Phone: 610-832-9500 Fax: 610-832-9555 astm.org	AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) 1801 Alexander Bell Dr. Reston, VA 20190 Phone: 800-548-2723 asce.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

AMERICAN WATER WORKS ASSOCIATION (AWWA) 6666 W. Quincy Ave. Denver, CO 80235 Phone: 303-794-7711, 800-926-7337 Fax: 303-347-0804 awwa.org	AMERICAN WELDING SOCIETY (AWS) 8669 NW 36 St. # 130 Miami, FL 33166-6672 Phone: 305-443-9353, 800-443-9353 awsnow.org
AMERICAN WOOD PROTECTION ASSOCIATION (AWPA) P.O. Box 361784 Birmingham, AL 35236-1784 Phone: 205-733-4077 Fax: 205-733-4075 Secure Fax: 205-733-4078 awpa.com	ASPHALT INSTITUTE (AI) 2696 Research Park Dr. Lexington, KY 40511-8480 Phone: 859-288-4960 Fax: 859-288-4999 asphaltinstitute.org
ASSOCIATION FOR IRON AND STEEL TECHNOLOGY (AIST) 186 Thorn Hill Rd. Warrendale, PA 15086-7528 Phone: 724-814-3000 Fax: 724-814-3001 aist.org	NEW YORK CITY DEPARTMENT OF BUILDINGS BUREAU OF ELCTRICAL CONTROL (BEC) 1 Centre Street Room 2324 New York, NY 10007 Phone 212-669-8338 buildingviolation.com/newyork.html
NEW YORK CITY BOARD OF STANDARDS AND APPEALS (BSA) 250 Broadway 29th Floor New York, NY 10007 Phone: 212-386-0009 www1.nyc.gov/site/bsa/index.page	THE BRICK INDUSTRY ASSOCIATION (BIA) 12007 Sunrise Valley Dr. Suite 430 Reston, VA 20191 Phone: 703-620-0010 gobrick.com
CALIFORNIA REDWOOD ASSOCIATION (CRA) 347 Healdsburg Ave. Suite L Healdsburg, CA 95448 calredwood.org	CAST IRON SOIL PIPE INSTITUTE (CISPI) 2401 Fieldcrest Dr. Mundelein, IL 60060 Phone: 224-864-2910 cispi.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

THE CHLORINE INSTITUTE (CI) 1300 Wilson Blvd. Suite 525 Arlington, VA 22209 Phone: 703-894-4140 Fax: 709-894-4130 chlorineinstitute.org	CODE OF FEDERAL REGULATIONS (CFR) U.S. Government Publishing Office 732 N. Capitol St., NW Washington, DC 20401-0001 Phone: 202-512-1800, 866-512-1800 Fax: 202-512-210 ecfr.gov/cgi-bin/ECFR
COMPRESSED GAS ASSOCIATION (CGA) 14501 George Carter Way Suite 103 Chantilly, VA 20151 Phone: 703-788-2700 Fax: 703-961-1831 cganet.com	CONCRETE REINFORCING STEEL INSTITUTE (CRSI) 933 North Plum Grove Rd. Schaumburg, IL 60173-4758 Phone: 847-517-1200 Fax: 847-517-1206 crsi.org
CONVEYOR EQUIPMENT MANUFACTURERS ASSOIATION (CEMA) 5672 Strand Ct. Suite 2 Naples, FL 34110 Phone: 239514-3441 cemanet.org	U.S. ARMY CORPS OF ENGINEERS (USACE) Engineer Research and Development Center (Formerly Waterways Experiment Station) 3909 Halls Ferry Rd. Vicksburg, MS 39180-6199 Phone: 601-634-2355 erdc.usace.army.mil/Library/
DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA) P.O. Box 19206 Golden, CO 80402 Phone: 205-402-8700 dipra.org	FM APPROVALS 1151 Boston-Providence Turnpike P.O. Box 9102 Norwood, MA 02062 Phone: 781-762-4300 Fax: 781-762-9375 fmapprovals.com
GENERAL SSERVICES ADMINISTRATION FEDERAL SPECIFICATIONS (FS) 1800 F St., NW Washington, DC 20405-0001 Phone: 703-605-2566 Fax: 202-219-3004 fedspecs.gsa.gov/FedSpecs_Federal_Specifications_page	HYDRAULIC INSTITUTE (HI) 6 Campus Dr. Floor 1 North Parsippany, NJ 07054 Phone: 973-267-9700 Fax: 973-267-9055 pumps.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

ILLUMINATING ENGINEERING SOCIETY (IES) 120 Wall St. 17th Floor New York, NY 10005-4001 Phone: 212-248-5000 Fax: 212-248-5017 ies.org	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) Phone: 800-701-4333 ieee.org
MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS) 127 Park St., NE Vienna, VA 22180-4602 Phone: 703-281-6613 msshq.org	METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA) 1300 Sumner Ave. Cleveland, OH 44115-2851 Phone: 216-241-7333 Fax: 216-241-0105 mbma.com
Materials and Equipment Acceptance (MEA) Division, New York City Department of Buildings 280 Broadway 7th Floor New York, NY 10007 Phone: 212-566-5000 www.nyc.gov	MILITARY SPECIFICATIONS (MIL-SPECs) DLA Document Services, Building 4/D 700 Robbins Ave. Philadelphia, PA 19111-5094 Phone: 215-737-8000 quicksearch.dla.mil
NATIONAL ASSOCAITION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM) 800 Roosevelt Rd. Building C, Suite 312 Glen Ellyn, IL 60137 Phone: 630-942-6591 Fax: 630-790-3095 naamm.org	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) 1300 N. 17th St. Suite 900 Arlington, VA 22209 Phone: 709-841-3200 nema.org
NATIONAL ELECTRICAL CODE (NEC or NFPA 70) See National Fire Protection Association	NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 1 Batterymarch Pk. Quincy, MA 02169-7471 Phone: 800-344-3555 Fax: 800-593-6372 nfpa.org

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) 100 Bureau Dr. Stop 1070 Gaithersburg, MD 20899-1070 Phone: 301-975-2758 nist.gov	NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA) 900 Spring St. Silver Spring, MD 20910 Phone: 240-485-1165 nrmca.org
NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA) 10255 W. Higgins Rd. Suite 600 Rosemont, IL 60018-5607 Phone: 847-299-9070 Fax: 847-299-1183 nrca.net	NATIONAL SANITATION FOUNDATION INTERNATIONAL (NSF) 789 N. Dixboro Rd. Ann Arbor, MI 48105 Phone: 734-769-8010, 800-673-6275 Fax: 734-769-0109 nsf.org
NEW YORK CITY DEPARTMENT OF BUILDINGS 2014 CONSTRUCTION CODES: BUILDING CODE 280 Broadway New York, NY 10007 Phone: 212-566-5000 www1.nyc.gov/site/buildings/codes/2014-construciton-codes.page#bldgs	NEW YORK CITY DEPARTMENT OF BUILDINGS 2011 ELECTRICAL CODE 280 Broadway New York, NY 10007 Phone: 212-566-5000 www1.nyc.gov/site/buildings/codes/electrical-code.page
U.S. DEPARTMENT OF LABOR – OCCUPATIONAL SAFETY AND HEALTH (OSHA) 200 Constitution Ave., NW Washington, DC 20210 Phone: 800-321-6742 OSHA.gov/law-regs.html	PLASTIC PIPE AND FITTINGS ASSOCIATION (PPFA) 800 Roosevelt Rd. Building C, Suite 312 Glen Ellyn, IL 60137 Phone: 630-858-6540 Fax: 630-790-3095 ppfahome.org
PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI) 200 W. Adams St. Suite 2100 Chicago, IL 60606 Phone: 312-786-0300 pci.org	PORCELAIN ENAMEL INSTITUTE (PEI) P.O. Box 920220 Norcross, GA 30010 Phone: 770-676-9366 Fax: 770-409-7280 porcelainenamel.com

TABLE 01 42 00-3
STANDARDS DEVELOPING / PUBLISHING ORGANIZATIONS
(Continued)

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA) 4201 Lafayette Center Dr. Chantilly, VA 20151-1219 Phone: 703-803-2980 Fax: 703-803-3732 smacna.org	SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) 400 Commonwealth Dr. Warrendale, PA 15096 Phone: 724-776-4841 Fax: 724-776-0790 sae.org
STEEL DECK INSTITUTE (SDI) P.O. Box 426 Glenshaw, PA 15116 Phone: 412-487-3325 Fax: 412-487-3326 sdi.org	STEEL DOOR INSTITUTE (SDO) 30200 Detroit Rd. Westlake, OH 44145 Phone: 440-899-0010 Fax: 440-892-1404 steeldoor.org
THE SOCIETY FOR PROTECTIVE COATINGS (SSPC) 800 Trumbull Dr. Pittsburgh, PA 15205 Phone: 877-281-7772 Fax: 412-444-3591 sspc.org	STEEL TANK INSTITUTE and STEEL PLATE FABRICATORS ASSOCIATION (STI/SPFA) 944 Donata Ct. Lake Zurich, IL 60047 Phone: 847-438-8265 steeltank.com
STEEL WINDOW INSTITUTE (SWI) 1300 Sumner Ave. Cleveland, OH 44115-2851 Phone: 216-241-7333 Fax: 216-241-0105 steelwindows.com	TILE COUNCIL OF NORTH AMERICA (TCNA) 100 Clemson Research Blvd. Anderson, SC 29625 Phone: 864-646-8453 Fax: 864-646-2821 tcnatile.com
UNDERWRITERS LABORATORIES (UL) 333 Pfingstem Rd. Northbrook, IL 60062 Phone: 847-272-8800 Fax: 847-509-6249 ul.com	WESTERN WOOD PRODUCTS ASSOCIATION (WWPA) 1500 SW 1st Ave. Suite 870 Portland, OR 97201 Phone: 503-224-3930 Fax: 503-224-3934 wwpa.org

SECTION 01 43 05 – CONTRACTOR'S WORK QUALITY
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Contractor's Quality Assurance / Quality Control Management Plan
2. Defective Work, Equipment or Materials
3. Welding Certification and Welding Inspection
4. Inspection and Testing of Concrete
5. Leakage Tests
6. Contractor's Surveyor

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 43 10 – Quality Assurance Inspection

1.04 REFERENCES

A. AWS – D1.X American Welding Society

B. ASME American Society of Mechanical Engineers

C. NYS Steel Construction Manual

1.05 DESCRIPTION

A. Contractor Quality Assurance / Quality Control Plan

1. The Contractor shall establish, execute and submit to the engineer a Quality Assurance / Quality Control (QA/QC) Management 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.

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 email shall be provided, as required by the Engineer.

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 the 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.

6. All welding must conform to the requirements of AWS D1.X, ASME Code or New York State Steel Construction manual as applicable and as approved by the engineer. 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:

      1) For all field welding, all required permits and safety plans shall be in place and adhered to.

      2) All shop welding shall be performed in accordance with the relevant work-specific requirements in the Specifications and Contract Drawings.

      3) 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 Quality Assurance Section 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.

      4) Any deviation from the above shall not be permitted without a written waiver from the Engineer or the Engineer's designee.

b. 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:

c. All welds shall be inspected visually by the engineer in accordance with Section V of the ASME Code, or D1.1, Clause 6, Table 6.1 as approved by the engineer.

C. Inspection and Testing of Concrete

1. Inspection and testing of concrete shall be in accordance with the relevant work-specific requirements in the Contract.

D. 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 requirement in the Contract.

E. Contractor's Surveyor

1. The 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 required for the Work, in advance of the construction; and to perform other surveying services for the Work. 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 field verify all existing survey monuments including benchmarks within the area of the Work. All existing survey monuments and benchmarks shall be protected from damage during the performance of the Work. If any damage occurs to existing survey monuments or benchmarks, the Contractor shall notify the Engineer, survey, and replace in kind.

3. The Contractor shall furnish, install and maintain survey platforms, targets, benchmarks, stakes, monuments and similar facilities to be used by the Contractor in its performance of the Work and by the Engineer in the performance of its inspection services.

4. The Contractor shall perform all survey Work required before, during and after the construction Work; and shall re-establish same if disturbed and bear the entire expense of rectifying work improperly installed due to not maintaining, not protecting, or removing without authorization such established platforms, targets, benchmarks, stakes, and monuments.

5. The Engineer shall be notified before the establishment of any line, elevation or grade.

6. Survey Before Completion of Structure.

a. The Contractor shall file with the New York City Department of Buildings in the borough where Work is being done, or with the New York City Department of Small Business Services, or the local AHJ, a survey by a licensed surveyor showing the location of the new structure before completion of the structure, pursuant to Section 28.118.4 of the New York City Building Code or applicable local codes or regulations for projects outside New York City. One copy of the application and the survey shall be furnished to the Engineer.

b. This survey shall show the location of the structure, the elevation of the first tier of beams or of the first floor, the finished grades of the open spaces on the plot, the established curb level, and the location of all other structures on the plot, together with the location and boundaries of the lot or plot upon which the structure is constructed.

1.06 QUALITY ASSURANCE

A. A Quality Management Plan must be submitted for review and approval.

1.07 SUBMITTALS

A. Quality Assurance / Quality Control Management Plan

1. Within 15 days after the commencement work date given in the Notice to Proceed (NTP), the Contractor shall provide its QA/QC management plan to the Engineer for approval. 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.

2. 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. 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.

3. The QA/QC plan should consist of the following quality elements:

a. Roles and Responsibilities, communication protocols

b. Management and Production Inspections

c. Off-Site Supplier Quality

d. Vendor Capability Inspections

e. Notification and Coordination with DEP

f. Inspection Instructions

g. Traceability

h. Pre-Activity Meeting

i. Initial Inspections

j. Witness Shop Testing and QA Inspections

B. QA Acceptance / Shipping / Material Marking and Identification

1. On-Site Receiving and Materials / Equipment Control
2. Material / Equipment Receiving
3. CMTRs / Certificate of Compliance
4. Traceability
5. On-Site Storage, Care, and Maintenance
6. QA/QC Process and Operational Procedures
7. Submittal Management
8. Request for Information (RFI)

C. Five-Phases of Inspection Procedures

1. Phase 1 – Client Pre-Activity Meeting
2. Phase 2 – Initial Inspections
3. Phase 3 – On-Going Inspections
4. Phase 4 – Witness Shop Test Inspection and QA Inspections
5. Phase 5 – Final Inspections – Punch lists

D. Inspection and Test Plan (ITP)

1. 1. Build Work Plan Procedure
2. Checklist and Hold Point Procedure
3. Witness and Hold Points
4. Control of Measuring and Calibrated Test Equipment Procedure
5. Reporting and control non-conforming work

E. Control and Responsibility

1. Non-Conformance Reporting (NCR) Disposition
2. QC Verification
3. Documentation

F. Root Cause Analysis (RCA) Process

1. Thresholds for RCA
2. Process
3. Preventive Action Plan
4. Implementation

5. Measurement of Effectiveness

G. Continuous Improvement

1. Recognition and Accountability
2. Measurement and Monitoring
3. Performance and Issues Matrix
4. Management Reviews
5. Audit and Assessments

H. Welding Control

1. Full Compliance with Specifications and Applicable Codes

I. Additional Submittals

1. When requested by the Engineer, the Contractor shall submit the following information prior to entering into a supply or service contract.
    a. Contract number, supplies or services to be provided and a general description of the proposed item(s), such as trade name, type, etc. 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.
    b. Experimental and test data required to support the claimed performance of the supplies.
    c. 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.
    d. 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All materials and equipment must be received, stored in a safe and adequate environment as per approved procedures.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. All Work of assembly, installation, and construction shall be done in a neat, first class, and workman like manner. Material, fixtures, fittings, supplies, equipment or Work required by the Contract Drawings that does not agree with the Specifications will not be accepted, and the Contractor shall supply the required quality. 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, the Contractor 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 contract, as are appropriate.

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. Notice of Intent to Commence Manufacture

1. 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 Section 01 43 10 – 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.

2. 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.

B. 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.

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. All materials and equipment must be protected and wrapped during transport, storage, and post installation.

END OF SECTION

SECTION 01 43 10 – QUALITY ASSURANCE INSPECTION
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Quality Assurance Inspection

2. Inspection Expenses

B. The following index of this Section is presented for convenience:

C.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 43 05 - Contractor's Work Quality

B. Section 01 31 25 - Web-Based Project Management Information System

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. List of Equipment Subject to Quality Assurance (QA) Inspection

1. DEP's Bureau of Engineering Design and Construction, Quality Assurance Section intends to perform QA inspection for specific items being supplied under this Contract.

2. The selected equipment is subject to QA inspection by the Quality Assurance 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.

3. See Table 1 - List of Equipment Scheduled for Quality Assurance Inspection, attached at the end of this Section.

B. 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 Contract 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.

C. 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, DEP Bureau of Engineering Design and Construction.

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.

D. *"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 Quality Assurance, DEP Bureau of Engineering Design and Construction, 96-05 Horace Harding Expressway, Corona, New York 11368. 718-595-3000"*

1. For items designated for QA inspection, the Contractor shall submit each purchase order to the Engineer when placed with the manufacturer or dealer. Submittals of preliminary/initial shop drawings, with detailed assembly drawings and bill of materials, shall be provided to the Quality Assurance 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 Section will issue inspection instructions to the Contractor (a copy of which will also be sent to the manufacturer/supplier.)

2. 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. Advanced notice shall be provided in accordance with Article 3.02D. The inspection instructions will indicate what specific phases of manufacture, QA inspections, and/or tests that the Quality Assurance Section inspectors intend to witness.

3. The Contractor shall provide Quality Assurance Section with the approved shop drawings as soon as possible after receiving approval from the Engineer. The Quality Assurance Section reserves the right to issue revisions/clarifications to the original inspection instructions based on the approved drawings, and/or as deemed necessary.

4. 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.

5. 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.

E. 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.

2. If a retest is required, the cost shall be borne by the Contractor.

3. When Quality Inspections are waived by the Engineer, the manufacturer's 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.

4. All equipment and material shall be identified with serial numbers and/or approved permanent type identification marks.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. 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 Delivery, Storage, and Handling

B. 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) un-machined 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All materials & equipment must be received, stored in a safe & adequate environment as per approved procedures

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. 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, machining, etc., and all other articles required under this Contract during all stages of fabrication and testing.

B. 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.

C. Testing Compliance

1. Contractor’s testing personnel shall make the necessary inspections and tests.

2. 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.

D. 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.

2. A minimum notice of two (2) weeks shall be provided for items of domestic manufacture and eight (8) weeks for items of foreign manufacture.

E. 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 unless otherwise approved.

2. Testing shall be scheduled during the normal eight (8) hour day shift with adequate advance notice of intent to schedule tests shall be given to the Engineer.

F. 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.

G. 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.

H. 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.

I. Contractor's Responsibility for Schedule Reports

1. The Engineer shall be provided with detailed daily and weekly schedules of manufacturing 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 performed without such sufficient advance notice to the Engineer is subject to rejection.

J. 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.

K. Approval of Inspection Activities prior to Shipping

1. 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.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. All materials and equipment must be protected & wrapped during transport, storage & post installation.

END OF SECTION

Appendix

TABLE 1
LIST OF EQUIPMENT SCHEDULED FOR QA INSPECTION

Specification Reference		**Equipment Scheduled for QA Inspection**
Section No.	**Section Title**	
05 12 00	Structural Steel Framing	Structural Steel Framing
05 05 13.01	Galvanizing	Galvanization of Icebreaker and Galvanization of Fender Mounting Panels
05 05 23.02	Miscellaneous Metal Fastening	Anchor Bolts, Bolts, Stainless Steel Bolts
06 51 05	Pultruded FRP Structural Shapes	Pultruded FRP Structural Shapes
35 56 13.16	Extruded and Molded Marine Fenders	Extruded and Molded Marine Fenders
40 05 06	Couplings, Adapters, and Specials for Process Piping	Couplings, Adapters, and Specials for Process Piping
40 05 07	Hangers and Supports for Process Piping	Hangers and Supports for Process Piping and Temporary Sludge Line
40 05 19	Ductile Iron Process Pipe	Ductile Iron Process Pipe
40 05 53	Process Valves Four Inch Diameter and Larger	Plug Valves

SECTION 01 43 20 – APPROVAL OF PRODUCT MANUFACTURERS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for the use of Product Manufacturers of materials and equipment and the substitution requirements for the use of equivalent materials and equipment.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. A “Named Manufacturer” is defined as 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.

1.05 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 Contract Documents 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:

1) Information substantiating the request for approval of a substitution is not submitted within said 14-day period, or

2) 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 approval of List of Equipment/Material Manufacturers form.

C. List of Named Manufacturers 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, which will be considered by the Engineer in evaluating a proposed “or equal”, shall address the following factors:

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.” 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.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 51 11 – TEMPORARY WATER AND SANITARY SERVICES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances to furnish, install, and test all temporary water services and temporary sanitary services, complete and operational.

B. The following index of this Section is presented for convenience:

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1.07	Submittals	2
1.08	Delivery, Storage, and Handling	3
1.09	Spare Parts, Special Tools, and Supplies	3
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PART 2	PRODUCTS	3
2.01	Manufacturers	3
2.02	Materials / Equipment	3
2.03	Fabrication / Assembling / Finishes	3
2.04	Source Quality Control / Shop Tests	3
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Implementation	3
3.03	Field Testing / Quality Control	3
3.04	Startup / Demonstration	3
3.05	Adjusting / Protection / Cleanup	3

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. The Contractor shall provide and maintain temporary city water and sanitary services for the use of Contractor's personnel on the Site. In addition, the Contractor shall provide all water required to perform the Work of this Contract.

1. 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.

2. Temporary Water Services:

a. The Contractor shall extend branch piping with outlets located so City water is available by hoses with threaded connections. The Contractor shall be responsible for preventing all temporary pipes and hoses from freezing.

b. The 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 Contractor shall provide sufficient potable quality drinking water for all personnel employed by the Contractor at the Site.

B. The 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.

1. It shall be the 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 Contractor shall remove all temporary water and sanitary services at the completion of the Work.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 51 30 – TEMPORARY ELECTRICAL SYSTEM
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

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. Attachments

1. Schematic Diagram for Temporary Electrical System Arrangement

D. The following index of this Section is presented for convenience:

E.

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3.02	Installation	6
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 27 – Grounding

1.04 REFERENCES

A. Temporary electrical system shall comply with the latest applicable provisions and recommendations of the following:

1. Electrical Code of the City of New York.
2. NFPA 70, National Electrical Code.
3. National Electrical Safety Code.
4. Local Codes
5. NYC Local Law 18 of 2014
6. Local Utility Requirements
7. OSHA Regulations

1.05 DESCRIPTION

A. System Description

1. The Electrical 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.
2. Arrangements shall be made with the Utility immediately after notice to commence work in accordance with these Specifications.
3. 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.
    a. The distribution from each meter to the Contractor's field office and shops at the site shall be the responsibility of each Contractor.
    b. The distribution from one (1) meter to Engineer's field office shall be the responsibility of the Electrical Contractor.
    c. The distribution from one (1) meter to the construction temporary light, power, and security system shall be the responsibility of the Electrical Contractor.
4. Each Contractor shall be responsible for making arrangements with the Utility to have a sealed meter installed and for payment of same.
5. The energy charges for each Contractor's field office and shop usage shall be the responsibility of each Contractor.
6. Energy charges associated with the work areas general power and lighting and the security site lighting shall be the responsibility of the Electrical

Contractor. Energy charges associated with the Engineer's field office shall be the responsibility of the Electrical Contractor.

7. Each Contractor requiring additional temporary power and light, beyond that provided under by the Electrical 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.

B. Design Requirements

1. The Electrical Contractor shall provide all systems and circuits in accordance with the Electrical Code of the City of New York, NFPA 70, the National Electrical Safety Code, local codes, utility codes, and OSHA requirements.

2. The temporary electrical system shall be provided in accordance with the following design requirements:

a. Each Contractor and the Engineer's trailer shall have a separate branch.

b. 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.

c. 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 Contract Drawings or stated in the Specifications, the system shall be arranged to provide a minimum lighting intensity of 5 foot-candles in these areas.

d. 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.

e. See attached schematic diagram for Temporary Electrical System Arrangement.

1.06 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 Electrical Contractor shall maintain in proper working order and repair the temporary electrical system.

D. The Electrical Contractor shall modify, extend, and relocate the temporary electrical system components, as needed, to support construction activities

E. The Electrical Contractor shall remove the temporary electrical system when directed by the Engineer.

1.07 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 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 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.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Electrical Service Connection

1. The Electrical 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:

a. Enclosures shall be rated NEMA 3R.

b. Meter pans shall be suitable for revenue meters furnished by the utility.

c. Circuit breakers shall be thermal magnetic type. Circuit breakers shall be equipped with lockable handles.

d. Disconnect switches shall be fused type with current limiting fuses. Disconnect switches shall be equipped with padlocking features.

e. All equipment shall be approved by the Utility.

2. The Electrical Contractor shall also provide the following other equipment at the service point:

a. 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.

b. 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.

c. 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.

B. Raceways and Wiring

1. All conductors shall be 600 volt, enclosed in properly sized raceways or be routed aerially using Type AC, MC or TC cable.

2. 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.

3. Raceways where used shall be suitably sized for the conductors. Raceways shall be rigid metallic type.

4. Aerially routed cables shall be messenger supported from solid wood poles or other recognized means. Messenger shall be high strength galvanized steel.

5. 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.

C. Lighting Fixtures and Devices

1. Receptacles (GFI type) shall be grounded type, 120 volt, 20 ampere suitable for hand tools such as drills, hammers and grinders.
2. All temporary lighting shall use high-efficacy lamps in compliance with NYC Local Law 18 of 2014, as specified below:
   a. 60 lumens per watt for lamps over 40 watts;
   b. 50 lumens per watt for lamps over 15 watts but less than or equal to 40 watts; and
   c. 40 lumens per watt for lamps 15 watts or less.
3. 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.
4. 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.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Grounding

1. The temporary systems shall be grounded in accordance with the requirements of Section 26 05 27 – Grounding.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 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.

3.03 FIELD TESTING / QUALITY CONTROL

A. Operation

1. The Electrical 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.

2. 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.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Maintenance

1. The temporary electrical system shall be maintained and repaired until it is no longer required.

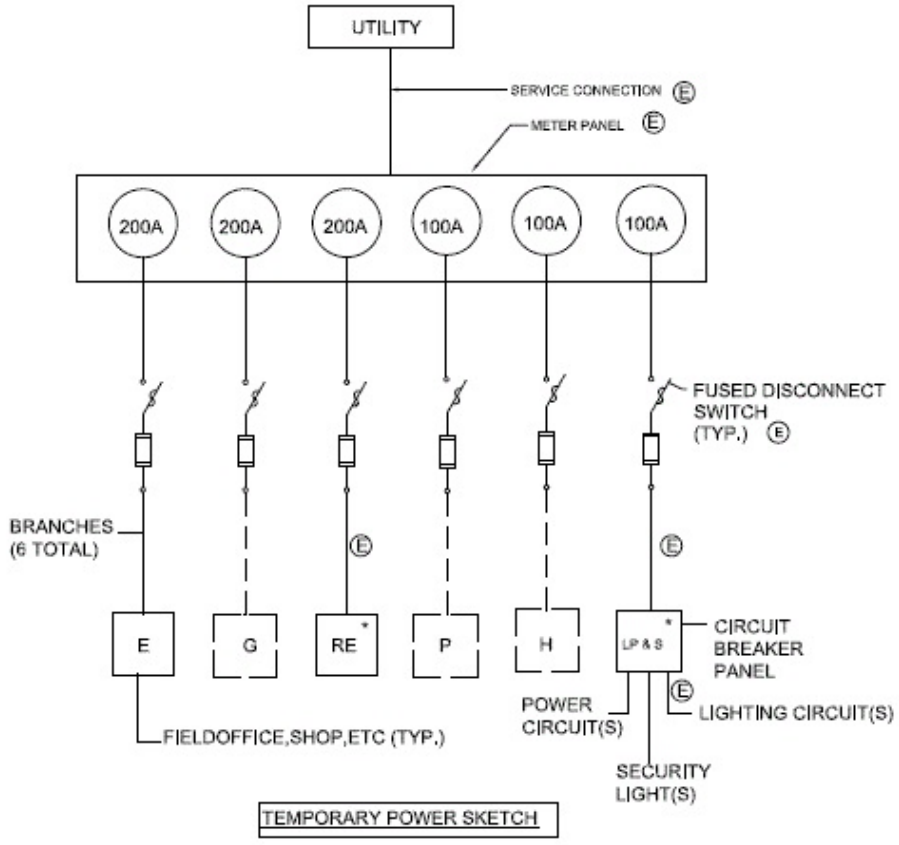
2. Lamps, fuses and other equipment shall be repaired and/or replaced, as required.

B. Removal

1. At the conclusion of the work, when directed by the Engineer, the temporary system shall be removed by the Electrical Contractor in its entirety. The ground surfaces and structures disturbed by the work shall be restored to their original condition.

END OF SECTION

TEMPORARY ELECTRICAL SYSTEM ARRANGEMENT



——— 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

SECTION 01 52 10 – TEMPORARY FIELD OFFICE TRAILERS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Office Furniture

B. Kitchen

C. Attachments

1. Table 1 – Office Furniture

2. Table 2 – Kitchen Items

D. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 51 11 – Temporary Water and Sanitary Services

B. Section 01 51 30 – Temporary Electrical System

C. Section 01 52 40 – Field Office Equipment and Supplies

D. Section 01 74 20 – 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. A space shall be identified for the Contractor's field office at the North River WRRF site (within the identified land for Contractor's use as shown on the Contract Drawings) which the Contractor shall furnish and maintain. If no space is available, the Contractor shall provide a field office close to the site at no additional cost to the City.

2. The Contractor's field office 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 shall be repaired or replaced at the Engineer's discretion, at no additional cost to the City.

C. Land for Contractor's Use During Construction

1. The Contractor shall confine its construction activities to the City-owned property and to the actual area where Work is performed within the limits of construction.

2. Approximately 10,000 square feet has been identified at the North River WRRD property, situated outside the WRRF's exterior walls for Contractor's use. Should the Contractor require additional space, the Contractor shall provide the space off-site at no additional cost to the City.

3. The City reserves the option to require the Contractor to vacate the assigned areas within sixty (60) days after notice by the City and at no additional cost to the City.

4. Following the completion of the Contract or as indicated on the Contract Drawings or as directed by the Engineer, the Contractor shall remove its plant, shanties, trailers, materials, equipment, etc., from the allocated site and restore the site to its original condition, satisfactory to the Engineer.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. 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.
5. Or approved equal.

B. Water Filter shall be manufactured by:

1. Aqua-Pure, Davisburg, MI;
2. Or Approved Equal.

2.02 MATERIALS / EQUIPMENT

A. Office Furniture

1. All furnishings and equipment shall be provided new and unused in accordance with Table 1. 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.

B. 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).

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 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 Contractor shall obtain and pay for all permits.
3. The 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.

B. The Contractor shall provide the following services for the field offices:

1. Resident Engineer's Field Offices at the North River WRRF:
   a. Telephone
   b. Internet Services, Digital Subscriber Line (DSL), Cable Modem or Equal
   c. Electrical Services
   d. Heating and Air Conditioning
   e. Daily janitorial services
      1) Janitorial services shall include daily mopping, vacuuming, dusting and garbage removal for the entire Engineer's Field Office Complex. The Contractor shall furnish, replace, and replenish electric light bulbs and fluorescent tubes, toilet paper, cloth and paper towels, and soap. Floors shall be waxed once a month at a

minimum. Windows and walls shall be washed once a month at a minimum. All maintenance Work shall be performed during normal working hours.

2. The Contractor shall maintain and perform all repairs to the field offices to the satisfaction of the Engineer during the performance of the Work under their Contract and for a period of 30 calendar days after the Contract is completed as evidence by the issuance of the Final Certificate.

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. 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.

2. 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.

3. Keep the access roads, parking areas, and walks about the field office buildings free and clear of snow and ice.

END OF SECTION

TABLE 1
OFFICE FURNITURE

Description		Quantity
Conference Room Monitor		One (1)
Book cases, 41 inches high by 36 inches wide by 13 inches deep		Two (2)
Dry chemical fire extinguishers, UL listed 1A-10BC		Four (4)
Office Chairs		Twelve (12)
Nightingale	6800MABA/6800BA	
Nightingale	2350	
Nightingale	LXO	
Nightingale	SXO	
Nightingale	CXO	
Nightingale	HD6800D	
Nightingale	247HD	
Herman Miller	Celle	
Herman Miller	Sayl	
Herman Miller	Mirra	
Herman Miller	Aeron	
Herman Miller	Embody	
Steelcase	Leap	
Steelcase	Think	
Steelcase	Amia	
Steelcase	Criterion	
Exemplis	Amplify	
Exemplis	Focus	
Exemplis	Novo	

TABLE 2
KITCHEN ITEMS

Description	Quantity
Electric bottle-less water filtration system with hot and cold outlets Model: Aqua-Pure AP - 200, with the Aqua-Pure AP 217 taste/odor cartridge	One (1)
Automatic drip coffee maker	One (1)

SECTION 01 52 40 – FIELD OFFICE EQUIPMENT AND SUPPLIES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to furnish and install field office equipment and supplies, complete and operational.

1. The Contractor shall also provide servicing of the resident engineer's field office.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:

1. Action 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) Network

2) Printers and Copying Machines

3) Telephones and Facsimile Machines

4) Internet Service.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Combination Copy, Printer, and Scanner Machine: Provide the latest model copy machine from the following brands that meets the requirements specified herein:

1. Work Center 7835 as manufactured by Xerox® Corp.

2. Or approved equal.

B. Facsimile Machine:

1. Laser Fax, Model KX-FL511 as manufactured by Panasonic Corp.

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Provide all furnishings and equipment specified herein new and unused.

B. All equipment furnished under this Section shall be provided with, at a minimum, the following consumable and ancillary supplies for duration of the Contract:

1. Toner cartridges.

2. Paper.

3. Maintenance / repair service contracts.

a. The Contractor shall provide a service and repair contract via the local representative of the equipment dealer or manufacturer.

b. The service contract shall be for on-call, on-site service during normal business hours.

c. The maintenance response time shall be not more than 24 hours from the time of notification.

C. Provide the following office equipment:

1. The Contractor shall install a LAN System:

a. All cable, conduit, and equipment (installed) necessary to provide a LAN interface from each computer station and the printer.

b. Cable and conduit routing shall be non-invasive and as approved by the Engineer.

c. Provide managed Ethernet switch with sufficient ports for the office equipment specified herein. Power over Ethernet is acceptable for wireless access points and other devices.

d. Provide a sufficient number of 802.3at Wi-Fi access points to provide the following minimum level of service to the entirety of the field office:

1) 1300Mbps at 5 GHz

2) 450Mbps at 2.4GHz

e. The Contractor shall be responsible for providing all appurtenances necessary to connect the managed Ethernet switch to the internet service provider, including underground installation of internet service.

f. Provide cable or fiber optic internet service of 100 MBps speed minimum. Satellite internet service providers are not acceptable.

2. Combination Copy, Scanner, and Printer Machines: The Contractor shall provide two (2) combination copy, scanner, and printer machines.

a. Machines shall be automatic feed type, compatible with the computers.

b. Machines shall operate off the LAN with 10/100 Ethernet Connectivity at a minimum.

c. Machines shall be capable of printing 8½-in. by 11-in., 8½-in. by 14, and 11-in. by 17-in. sheets.

d. Machines shall be capable of printing black and white and color at a resolution up to 1200 x 2400 dpi.

e. Machines shall also have color and black and white scanning capability.

f. Furnish all cable, conduit, and equipment necessary to provide a LAN interface from the managed Ethernet switch to the machines.

g. Cable and conduit routing shall be non-invasive and as approved by the Engineer.

h. The machine shall be designed to produce 110,000 copies per month and shall be dust resistant.

i. Copy function shall be capable of automatically feeding 8½-in. by 11-in., 8½-in. by 14-in., and 11-in. by 17-in. originals.

j. Machine shall be capable of and copying onto plain bond paper sheets at variable magnification from 50% to 200%.

k. The machine shall have an automatic feed tray, a staple function, and an automatic copy sorter.

l. The paper tray for each size paper shall hold at least 144 sheets.

m. Machine shall be capable of scanning to TIFF and text searchable PDF. Machine shall have scan to e-mail function.

n. 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.

o. The Contractor shall furnish powders, cartridges, chemicals, or other materials required for proper operation of the copy machine and paper supply.

3. Telephone Service:

a. Provide quantity 3 VoIP Telephones.

b. Each telephone shall be a full feature push button telephone set with multiple lines and all equipment necessary for its operation.

c. All telephones will be connected to a central switchboard having a minimum of ten independent touch-tone phone service lines.

d. The phones and phone service shall be furnished and installed by the Contractor.

e. Make arrangements and bear all costs for the installation of cables and for supplying telephone service during the Contract period.

f. The telephone lines shall be separate from the facsimile line specified herein.

4. Facsimile Machine:

a. Provide one (1) facsimile machine to be installed on an independent touch-tone VoIP service line.

b. Provide a service contract and all necessary supplies (toner, paper, etc.) for the system for the duration of the Contract.

D. Office Supplies:

1. The Contractor shall furnish all office supplies required by the Engineer and his staff during the course of construction.

2. 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 facsimile and copy machine.

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. 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) ccd 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 IMPLEMENTATION

A. Maintenance of Equipment and Services:

1. Maintain and repair all office equipment and furnishings in first class condition for continuous operation.

2. Telephone, Facsimile, and Internet service:

a. Provide telephone and fax service, including all calling charges for the Resident Engineer's field offices, for the duration of the Contract.

b. Provide internet service (cable or fiber optic – satellite is not acceptable) in order to adequately service the offices.

c. Provide separate lines for telephone service, alarm monitoring, and facsimile systems.

d. Install all telephone cables required for supplying telephone service.

e. The Contractor shall pay the costs for installation of the telephone cables and for supplying and maintaining telephone, alarm monitoring, facsimile, and internet service.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Removal of Equipment:

1. 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.

2. The Contractor shall have all services disconnected and capped to the satisfaction of the Engineer.

END OF SECTION

SECTION 01 55 00 – VEHICULAR ACCESS AND PARKING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. Maintenance of Traffic
2. Site access
3. Truck routes
4. Construction staff parking area
5. Contractor employees' parking area

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 55 26 – Traffic Control

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Maintenance of Traffic

1. The Contractor shall be responsible for maintenance and control of traffic in and out of the Site and at all points of vehicular ingress and egress affected by the Work.

2. All maintenance and protection of traffic shall be done in accordance with Section 01 55 26 – Traffic Control, this Contract and the latest traffic stipulations by New York City Department of Transportation (NYCDOT).

3. 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.

4. Construction-related vehicles and activities shall be understood as including vehicles operated and activities undertaken by the Contractor (including its employees, Subcontractors and visitors). Regular traffic shall be understood as referring to all vehicles other than construction- related vehicles.

5. The 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.

6. The Contractor shall perform the Work required in this Contract in accordance with applicable traffic and safety rules, regulations, ordinances, and permit conditions.

7. 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).

8. 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.

9. 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. 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.

B. Site Access

1. Access to the Site shall be at locations designated by the Engineer and is subject to change during the progress of the Project.

2. 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 Section 01 55 26 – Traffic Control.

3. Designated dock access shall be at the discretion of the Engineer.

C. Truck Routes

1. During the progress of construction, trucks entering or leaving the site shall utilize only NYCDOT-designated and DEP-directed or approved truck routes. The Contractor shall ensure that its crew members, and its Subcontractors and materialmen and their crew members are fully advised of the designated and directed or approved routes.

2. NYCDOT truck routes are identified on the New York City Truck Route map. Copies of this map can be obtained at the following website: http://www.nyc.gov/html/dot/html/motorist/trucks.shtml.

3. 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.

D. Construction Staff Parking Area

1. 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.

2. 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 the Site.

E. Contractor Employees' Parking Area

1. 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 the 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.

2. 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.

3. 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.

4. 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 Site.

5. 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.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Under this Section, the 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 ensure the safety of motorists, pedestrians and 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 having jurisdiction. 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 thereof 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 City 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 Department of Transportation (NYSDOT) 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 of Final Acceptance.

G. In addition to the Work shown in the Contract Documents, the Contractor shall comply with the New York City Department of Transportation Bureau of Highway Operations Standard Specifications, Section 1.06.44.

H. The contractor shall take necessary precautions to maintain and protect traffic as well as public transit routes along the Henry Hudson Parkway and within Riverbank State Park.

I. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 41 00 – Regulatory Requirements

B. Section 01 56 00 – Temporary Barriers and Enclosures

C. Section 31 25 10 – Dust, Soil Erosion and Sedimentation Control

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. New York City Department of Transportation (NYCDOT) Standard Highway Specifications

E. New York City Department of Transportation (NYCDOT) Standard Details of Construction

F. ASTM B589 - Standard Specification for Refined Palladium

1.05 DESCRIPTION

A. Maintenance of Traffic

1. During working hours, the Contractor shall be responsible for maintenance and control of traffic in and out of the Site at all points of vehicular ingress and egress and shall provide flagmen to warn vehicles on City streets of vehicles approaching from the Site. Flagmen shall be properly attired, equipped and trained according to the regulations of the City of New York and BEDC EHS Work Zone Traffic Control Standard. All roadway closures and minimum lanes of traffic shall be in conformance with the final NYCDOT-Office of Construction Mitigation and Coordination (OCMC) Traffic Stipulations.

2. Modifications to existing City streets and traffic patterns shall be approved by and in accordance with the requirements of the NYCDOT OCMC. The Contractor shall be responsible for obtaining and paying for this approval whenever the Contractor’s construction operations require modifications to the existing streets or traffic patterns. Traffic safety devices shall be placed as per the MUTCD and the NYSDOT Supplement to the MUTCD.

3. 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.

4. 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 the Contractor’s operations over said roadways. Any roadways damaged by the Contractor or 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.

5. The Contractor shall provide the minimum lane width at the various work zones as specified in the final NYCDOT OCMC Traffic Stipulations or as directed by the Engineer. Vehicular traffic at driveways to adjacent properties shall 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.

1.06 QUALITY ASSURANCE

A. Standards

1. The Contractor shall comply with the MUTCD, the NYSDOT Supplement to the MUTCD, the NYCDOT Standard Highway Specifications, BEDC EHS Standard for Work Zone Traffic Control, 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 Work, the Contractor shall submit an MPT Plan and a Schedule of Operations to the NYCDOT-OCMC, 7th Floor, 55 Water Street, New York, NY 10041, for review and approval, and for obtaining final written Traffic Stipulations. The Contractor shall adhere to any and all requirements identified in the NYCDOT-OCMC final Traffic Stipulations, 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 NYCDOT-OCMC and shall comply with all requirements issued by that agency. The Contractor shall notify both the City and the Engineer of the scheduled meeting.

b. The Contractor shall notify NYCDOT-OCMC 30 calendar 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 NYCDOT-OCMC. The Contractor shall notify both the City and the Engineer of the scheduled meeting.

d. Access must be provided for local and emergency vehicles at all times. A copy of the final NYCDOT-OCMC 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 NYCDOT. Such permits shall be maintained in effect for the entire duration of the Contract. 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 NYCDOT Sidewalk Roadway and Closure Application.

3. The Contractor shall also comply with the requirements specified in Section 01 41 00 – 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 is required by NYCDOT or deems it necessary to work outside the Normal Project Working Hours, he or she shall obtain all necessary permits and shall notify DEP in advance.

1.07 SUBMITTALS

A. General

1. The Contractor shall submit Shop Drawings as specified herein, including the MPT Plan and Schedule of Operations for the Maintenance and Protection of Traffic.

2. If not included within the MPT the Contractor shall submit a list of certified flaggers identifying the training for each as required by the BEDC EHS Standard.

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, an MPT Plan and Schedule of Operations for the Maintenance and Protection of Traffic, showing in complete detail the methods, sequences, procedures and facilities proposed for installation. Before the Contractor shall in any way or manner restrict or interfere with the normal flow of traffic, he or she shall first secure written approval from the agencies and departments having jurisdiction of its 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

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 having jurisdiction, 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 New York City Bureau of Traffic Operations and the NYSDOT Supplement to the MUTCD where applicable and approved by the Engineer.

2. All signs and barricades shall conform to the NYSDOT Supplement to the MUTCD.

3. All materials for the Temporary Traffic Signals shall conform to the latest specifications and drawings on file with the New York City Department of Transportation, Division of Traffic Operations, Signal Engineering and Street Lighting office. 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 Section 6.28B of the NYCDOT Standard Highway Specifications and NYCDOT Standard Details of Construction Drawing No. H-1038.

3. If the Contractor elects to substitute any material not listed in this Specification, he or she shall submit evidence acceptable to the NYCDOT that the proposed material is not frangible.

4. If the Contractor elects to use an alternate design, he or she shall submit Shop Drawings in accordance with Section 01 43 20 – Approval of Product Manufacturers.

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 NYCDOT Standard Details of Construction Drawing No. H-1012.

4. Reflective material shall conform to the requirements of ASTM Designation B589 "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 B589 "Standard Specification for Refined Palladium."

3. Flashing units for each barricade shall be solar powered with battery backup, or 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 NYCDOT Standard Details of Construction Drawing No. H-1049.

G. Temporary Construction Fencing:

1. All materials shall be in accordance with Section 01 56 00 – 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 NYCDOT Standard Highway Specifications, Volume II, Section 6.59.3.

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. 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 ERECTION

A. General Construction Details

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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 NYCDOT Bureau of Traffic Operations. 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.

8. 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 NYCDOT Bureau of Traffic Operations. Each barricade shall have at least one (1) solar powered flash-type warning device with battery backup affixed thereon, as approved by the Engineer.

9. 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.

10. 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.

11. 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.

12. 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 Section 31 25 10 – Dust, Soil Erosion and Sedimentation Control.

13. 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.

14. The Contractor shall also provide a sufficient number of competent flagmen in areas where traffic is congested, particularly where construction equipment is operating.

15. 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.

16. 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.

    a. 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 Section 01 56 00 – Temporary Barriers and Enclosures, and in no way reduces the Contractor's obligations as required by the Contract Documents.

b. 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.

c. The Contractor shall furnish, erect, relocate, maintain and remove all temporary fencing required under this Section.

d. 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.

e. 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.

17. Decking, in general, shall consist of heavy, adequately sized, steel plates completely covering excavations where pedestrians and vehicular traffic make this decking operation necessary.

18. 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.

19. Road plates shall be in accordance with the NYCDOT Standard Highway Specifications. 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. Road plates shall be secured and skid resistant. 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.

a. Where roadway pavement excavations have not been backfilled to grade within seven (7) calendar days of excavation and the roadway is required to be opened to traffic by covering the excavation with steel plates, the Contractor must recess the steel plates into the pavement surface by either stripping or grinding the asphalt pavement around the perimeter of excavations, as required, to embed the plates flush with the adjacent pavement surface at no additional cost to the City.

b. In order to accommodate the Five Borough Bike Tour, the New York City Marathon Race, or any other NYC special event, the Contractor shall be required to open the full width of streets along the event routes , as applicable, at least fifteen (15) days prior to the date of the scheduled event. As part of this requirement, The Contractor shall remove all stored materials within the project limits along the event route. Additionally, all road plates along the event route shall be recessed 2” and temporarily paved with Asphaltic Concrete Mixture [two (2”) inches thick] and made flush with the adjacent pavement surface at no additional cost to the City.

20. During all phases of construction, provisions shall be made for access for all emergency vehicles, such as firefighting equipment, police vehicles, ambulances, etc.

21. 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.

22. 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.

23. 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.

24. Signs or markers lost or damaged because the Contractor failed to properly install or maintain shall be replaced at the Contractor's expense.

25. 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.

B. Temporary Signs

1. 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.

C. Type III Breakaway Barricades

1. All methods shall comply with NYCDOT Standard Details of Construction Drawing No. H-1038.

D. Timber Curb

1. Construction of timber curb shall comply with the NYC Bureau of Highways' Standard Drawing 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.

2. 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.

E. Timber Barricades

1. 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, solar powered flashers with battery backup 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 NYCDOT Standard Details of Construction Drawing No. H-1013.

2. 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.

3. 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.

4. Lighting of barricades shall be by solar-powered flashing units with battery backup.

5. At the completion of the Work or when directed by the Engineer, barricades shall be removed and disposed of away from the work site.

F. Plastic Barrels

1. 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.

2. 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.

G. Temporary Construction Fencing

1. All methods shall be in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

H. Temporary Pavement Marking Type

1. Application shall be as recommended by the manufacture or as directed by the Engineer.

I. Precast Concrete Median Barrier (Jersey Barrier)

1. All methods shall be in accordance with the NYCDOT Standard Highway Specifications, Volume II, Section 6.59.4(F) and NYSDOT Standard Sheet 606-36 Precast Concrete Barrier.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 56 00 – TEMPORARY BARRIERS AND ENCLOSURES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Maintenance and Protection of Traffic (MPT) devices

B. Fencing

C. Protection of Work, personnel and materials

D. Tree and plant protection

E. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 55 26 – Traffic Control

1.04 REFERENCES

A. NYC Department of Transportation (NYCDOT) Standard Highway Specifications

B. NYC Department of Transportation (NYCDOT) Standard Details of Construction

C. OSHA Standards 29 CFR 1926

1.05 DESCRIPTION

A. MPT Devices

1. Roads, Parking Areas and Sidewalks

a. The Contractor shall provide, erect and maintain as necessary for the Work, all MPT devices as necessary and in accordance with Section 01 55 26 –Traffic Control. 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.

b. Sufficient barricades shall be erected to keep vehicles from being driven on or into Work under construction in accordance with NYCDOT requirements.

2. Excavations

a. 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.

b. 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.

c. 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.

d. 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 lit from sunset to sunrise.

3. 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.

B. Fencing

1. Temporary Construction Gates and Fencing

a. 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 NYCDOT Standard Details of Construction Drawing No. H-1021, with the following exception:

1) Fabric for fencing shall be aluminum-coated steel wire with a mesh size of 1-inch, complying with the requirements of AASHTO Designation M 181.

2. Safety Fencing

a. The Contractor shall provide and erect, when required or directed by the Engineer, temporary project safety fencing at the Work Site.

b. 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.

3. Fencing shall be maintained by the Contractor for the duration of the Contract. Upon Final acceptance of the Work, fencing shall become the property of the Contractor and shall be removed from the Site, unless otherwise directed by the Engineer.

4. 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.

C. Protection of Work, Personnel and Materials

1. 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.

2. 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.

3. In order to prevent damage, injury or loss, actions taken by the Contractor shall include, but not be limited to, the following:

   a. 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.

   b. Provide suitable storage facilities for all materials which are subject to injury by exposure to weather, theft or breakage.

   c. Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.

   d. Clean up frequently all refuse, rubbish, scrap materials, and debris caused by the Contractor's operations, to the end that at all times the Site shall present a safe, orderly and workmanlike appearance.

4. The Contractor shall protect the existing work and material from damage by its workers and shall be responsible for repairing any such damage at no additional cost to the City.

D. Tree and Plant Protection

1. 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.

2. Do not store materials or equipment or park construction equipment and vehicles within foliage drip lines.

3. In areas subject to traffic, provide temporary fencing or temporary barricades to protect trees and plants.

4. Open fires are not allowed onsite.

5. Within the limits of the Work, water trees and plants that are to remain to maintain their health during construction operations.

6. 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.

7. 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.

8. 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.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Temporary Construction Fencing

1. All materials shall comply with NYCDOT Standard Highway Specifications, Volume II, Section 6.34.2.

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 ERECTION

A. Temporary Construction Fencing

1. All methods shall comply with NYCDOT Standard Highway Specifications, Volume II, Section 6.34.3.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 57 00 – TEMPORARY CONTROLS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes:

1. General Requirements
2. Prohibited construction procedures
3. Noise Control
4. Dust Control
5. Pest and Rodent Control
6. Pollution Control
7. Care during Welding
8. Notification of Non-Compliance
9. Storm Water Runoff Control
10. Site Security

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 01 35 55 – Site Security Procedures

C. Section 01 57 16 – Temporary Pest Control

D. Section 31 25 10 – Dust, Soil Erosion and Sediment Control

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General Requirements

1. The Contractor shall furnish all labor, materials, equipment and incidentals required to ensure adequate environmental protection including implementation of all erosion and sediment control measures as directed by the Engineer and specified herein.

2. 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.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submit Shop Drawings as specified in Section 01 33 00 – Submittal Procedures.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Prohibited Construction Procedures

1. The following construction procedures are prohibited:

a. 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.

b. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridor or surface waters.

c. Dumping of silt-laden water directly into any stream corridor or surface waters without provision for treatment as noted herein.

d. 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.

e. Disposal of trees, bush and other debris into any stream corridor, any wetlands or at unspecified locations.

f. Open burning of materials.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Cover and Liner Fabric for Stockpiles

1. Cover and liner fabric for stockpiles shall be as specified under Section 31 25 10 – Dust, Soil Erosion and Sediment Control.

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 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Noise Control

1. All sound attenuation measures shall comply with the following City noise code regulations.

a. Exterior Mechanical Equipment: Section 27-770 of the New York City Administrative Code concerns windows of dwelling units facing mechanical equipment and the noise output limitation for exterior mechanical equipment as measured within the interior of the dwelling unit.

b. Ambient Noise Quality: Title 24, Chapter 2, Subchapter 5 (Prohibited Noise, Specific Noise Sources – Sound Level Standard) of the New York City Administrative Code concerns ambient noise quality criteria and standards which indicates the maximum outdoor sound levels in specific ambient noise quality zones for daytime and nighttime standards.

2. 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.

3. All construction equipment powered by an internal combustion engine shall be equipped with a properly maintained muffler.

4. Air powered equipment shall be fitted with pneumatic exhaust silencers.

B. Dust Control

1. 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.

2. 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.

3. Dust control for construction activities at all work areas shall be as follows:

4. 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.

5. Contractor shall regrade unpaved roadways and parking areas once a week to the satisfaction of the Resident Engineer.

6. 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

7. The Contractor shall erect runoff barriers or other means to ensure that runoff generated from dust control activities does not enter the Hudson River.

8. The Contractor shall comply with the requirements of Section 31 25 10 – Dust, Soil Erosion and Sediment Control.

C. Pest and Rodent Control

1. Provide rodent and pest control as necessary to prevent infestation of construction or storage area.
2. Employ methods and use materials which will not adversely affect conditions at the Site or on adjoining properties.
3. All chemicals shall be approved by the Engineer prior to their use and shall be safe for use in drinking water environment.
4. The Contractor shall comply with the requirements of Section 01 57 16 – Temporary Pest Control.

D. Pollution Control

1. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
2. Provide equipment and personnel to perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
3. 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.
4. The Contractor's equipment used during construction shall conform to all current Federal, State, and local laws and regulations.

E. Care during Welding

1. Provide protection of City's workers from welding arcs during the construction by providing adequate welding shields.

F. Notification of Non-Compliance

1. 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.
2. 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.
3. 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.

4. The Contractor shall be responsible for its Subcontractors' compliance with the provisions of this Section.

G. Stormwater Runoff Control

1. 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.

2. Prevent trash, demolition waste and construction debris from contaminating storm water runoff.

3. Provide berms, dikes, and other acceptable methods of directing storm water around work areas to drainage routes.

4. Storm water runoff controls shall be inspected daily. Problems and deficiencies shall be brought to the attention of the Engineer and corrected promptly.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Site Security

1. The Contractor shall comply with the requirements of Section 01 35 55 – Site Security Procedures.

B. Stockpiling of Materials

1. Stockpiling of excavated materials shall be handled in accordance with Section 31 25 10 – Dust, Soil Erosion and Sediment Control.

END OF SECTION

SECTION 01 57 16 – TEMPORARY PEST CONTROL
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pest Control Service
2. Regulatory Requirements
3. Material Requirements
4. Packaging
5. Safe Operation

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental, Health and Safety Requirements

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Pest Control Service:

1. The Contractor shall provide the services of a certified, licensed and insured pest control service for the purpose of exterminating and controlling pests at the Project Site whenever construction work is ongoing at the Site until the date demobilization is complete at the Site.

2. The Contractor shall provide rodent control as follows.

   a. 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. The Contractor shall provide mosquito control during the summer months as follows.

   a. 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.

   b. The Contractor shall identify and eliminate standing water 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 Contractor shall furnish all labor, equipment, and materials necessary to implement a Rodent and Insect Control Program.

   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 requirements of the New York City Department of Health and Mental Hygiene and New York State Department of Health for rodent and insect control. The exterminator shall only use products approved by the U.S. Environmental Protection Agency (EPA) for rodent and insect control.

6. The Contractor shall perform one 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 Contractor and the pest control service shall comply with all Federal, State, City and local ordinances, codes and regulations regarding the following:

a. Performing the pest control service.

b. Utilizing only the pesticides recommended by the manufacturer for the purpose intended and which will not create a hazard to health or property.

c. Cleaning up and disposing of all pesticides and pests.

2. The Contractor shall comply with all requirements of New York City Local Law 37 (LL 37) of 2005 for all City-owned or leased properties, upstate and in-city, including, but not limited to:

a. The prohibition of certain pesticide products for use on New York City property;

b. The requirement for notices at least 24 hours prior to pesticide applications; and

c. Reporting and recordkeeping requirements for upstate and in-city facilities

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. The Contractor shall provide a Rodent and Insect Control Plan

B. The Contractor shall provide, as required by LL 37, detailed information regarding each pesticide application.

1. The Contractor shall ensure that all records are provided to New York City using the NYC Department of Health and Mental Hygiene (DOHMH) Pesticide Use Reporting System (NYCPURS).

a. The Contractor shall confirm that the information regarding any prior month applications has been properly submitted through NYCPURS. A copy of such information shall be included in the monthly Contractor Environmental, Health and Safety (EHS) report in accordance with Section 01 35 27 – Environmental, Health and Safety Requirements.

2. The LL 37 required information, including any necessary prior notifications, shall be provided to DEP on the reporting forms established by the NYC DOHMH or approved equivalent.

a. This information shall be provided to DEP as part of the monthly Contractor EHS report in accordance with Section 01 35 27 – Environmental, Health and Safety Requirements.

b. By February 1 of each year, the Contractor shall provide a complete summary of all LL 37 required information for all pesticide applications at the project site (including upstate projects) for the entire prior year.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Pesticides shall be stored, handled, and used in accordance with the manufacturer's label and directions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

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.

1. Pesticides prohibited by LL 37 may not be utilized.

B. Pesticides shall be mixed and used in strict conformance with the instructions on the label or supplemental labels.

C. Packaging:

1. 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, City and local pesticides laws, rules and regulations in effect at the time of delivery.

2. 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.

3. The Resident Engineer shall reject any pesticides that have become wet, caked or otherwise unfit for use.

4. The basis of acceptance shall be original, sealed, and properly labeled pesticide containers.

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. 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.

3.02 IMPLEMENTATION

A. Safe Operation

1. 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.

2. 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.

3. Residual pesticides and containers shall be disposed off-site in accordance with the label instructions and applicable Federal, State, City and local regulations.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 58 13 – TEMPORARY PROJECT SIGNAGE
CONTRACT NR-107

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.

B. Attachments: The following figures are attached to this Section:

1. Figure 1 – Project Information Panel Layout (For Projects with Street Frontage of 60 Feet or Greater)
2. Figure 2 – Project Information Panel Layout (For Projects with Street Frontage of Less than 60 Feet)
3. Figure 3 – Environmental Facilities Corporation (EFC) Construction Sign Schematic: Drinking Water State Revolving Fund (DWSRF)

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. New York City Local Law 47/13

B. Rules of the City of New York 3301-01 (RCNY 3301-01)

1.05 DESCRIPTION

A. The 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.

B. Names of individuals on the Project information panel(s) shall be updated by the Contractor when these names change, at the direction of the Engineer,

1.06 QUALITY ASSURANCE

A. Not Used

1.07 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 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

2.02 MATERIALS / EQUIPMENT

A. Project Information Panel

1. The Project information panel shall be constructed in accordance with RCNY 3301-1, including the following requirements shown on Figure 1 or Figure 2 attached to this Section. The Engineer will provide project specific information.

   a. For construction sites with a street frontage of 60 feet or greater, the sign dimensions shall be in accordance with Figure 1. For construction sites with a street frontage less than 60 feet, the sign dimensions shall be in accordance with Figure 2.

   b. For projects that are not funded through the New York State Revolving Fund, the information and lettering shown below the sample rendering in Figures 1 and 2 should be removed and the rendering extended to fill that space.

2. Project information panels shall include the following information:

   a. A rendering, elevation drawing, site plan, or zoning diagram of the building exterior that does not contain logos or commercially recognizable symbols;

   b. A title line stating "Work in Progress:" and specifying the nature of the project;

   c. Anticipated project completion date as season YYYY;

   d. Website address to contact for project information;

   e. The corporate name and telephone number of the Contractor;

   f. The following statement, in both English and Spanish, "TO ANONYMOUSLY REPORT UNSAFE CONDITIONS AT THIS WORK SITE, CALL 311";

   g. 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.

   h. The name(s) of government official(s) shall be incorporated into the panel in accordance with Figures 1 and 2.

3. The project information panel shall be constructed of ¾-inch thick plywood panel of the following quality or equal as approved by the Engineer:

   a. High density overlaid exterior type fir plywood panels, 5 ply, B-B grade or better.

b. Each plywood panel shall be resin impregnated on both sides.

4. 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.

B. EFC Clean Water State Revolving Fund (CWSRF)/Drinking Water State Revolving Fund (DWSRF) Sign

1. The EFC construction sign shall be constructed of ¾" minimum thickness plywood identical to that specified in 2.02.A.3.

a. For a sample sign layout, refer to Figure 3 - EFC Construction Sign Schematic: DWSRF.

2. Project information panels shall include the following fasteners, sign supports, coating, lettering, and emblem:

a. Fasteners: All fasteners used in the fabrication of the sign shall be rust-proof

b. Sign Supports: The sign shall be adequately supported and braced to remain in the proper positioning and alignment, including resistance to wind loads and toppling of the sign.

c. Coating: All paint or exterior coverings used shall be exterior grade coating suitable for use on wood or the material of construction. The sign face background and sign back shall be white and consist of a minimum two coats of paint.

d. Lettering and Emblem: The sign shall include the following logos in an aspect ratio consistent with other lettering on the sign but not less than a height of 2".

1) The EFC logo available at https://efc.ny.gov/efc-logo-pdf

2) For DWSRF projects only: The New York State Department of Health (DOH) logo available at https://nysefc.app.box.com/v/EFC-DOH-black

3) The EPA logo consistent with the EPA Logo and Seal Specifications for Signage Produced by EPA Assistance Agreement Recipients as outlined in https://www.epa.gov/sites/default/files/2015-01/documents/epa_logo_seal_specifications_for_infrastructure_grants.pdf

e. For CWSRF and DWSRF projects, incorporate the following language: This project is jointly funded by the New York State [Clean Water/Drinking Water] State Revolving Fund and the U.S. Environmental Protection Agency. The [CWSRF/DWSRF] is

administered by the New York State Environmental Facilities Corporation [with its partner the New York State Department of Health (*for DWSRF projects only*)]. Other language as shown on Figure 3.

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. 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. The panel shall be replaced in its entirety for updates to information, names, or at the direction of the Engineer.

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.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

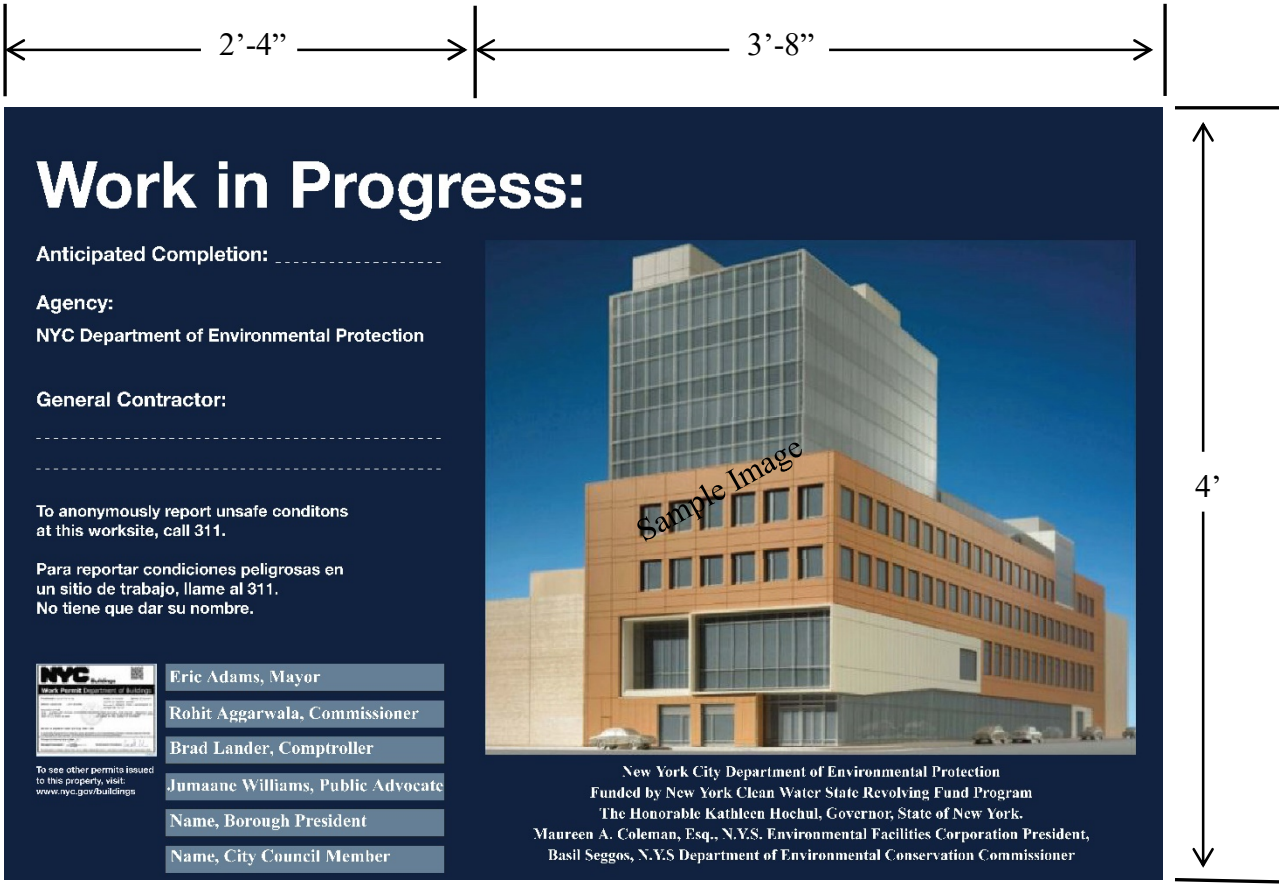
A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

FIGURE 1
PROJECT INFORMATION PANEL LAYOUT
(For Project Sites with Street Frontage of 60 Feet or Greater)



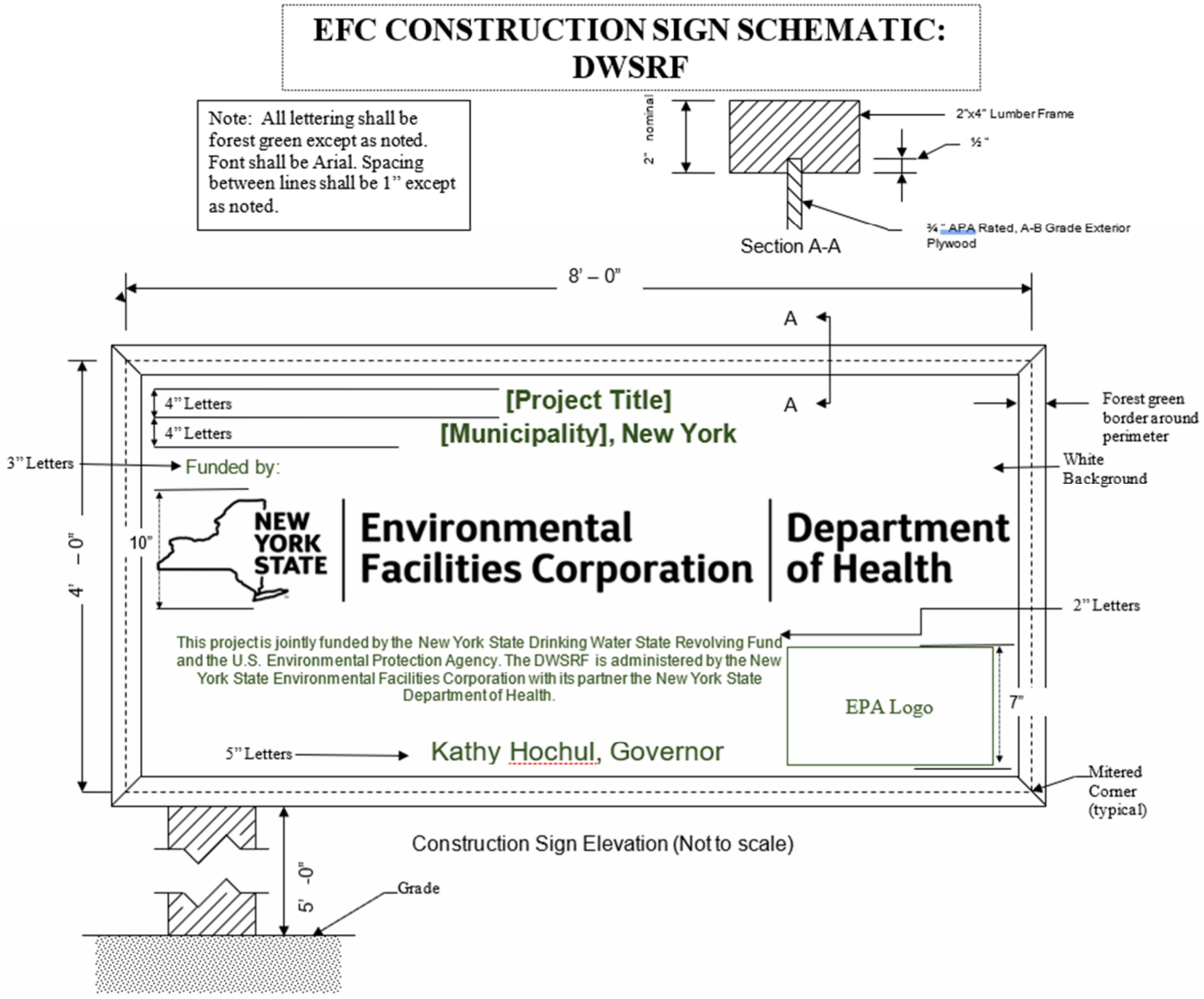
Note: As directed by the Engineer, the wording below the rendering shall be deleted if the project is not funded under the NYS Revolving Loan Fund and the rendering shall be extended to fill in that space.

FIGURE 2
PROJECT INFORMATION PANEL LAYOUT
(For Project Sites with Street Frontage of Less Than 60 Feet)



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 3


EFC CONSTRUCTION SIGN SCHEMATIC:
DWSRF
Note: All lettering shall be forest green except as noted. Font shall be Arial. Spacing between lines shall be 1" except as noted.
2" nominal
2"x4" Lumber Frame
½"
¾" APA Rated, A-B Grade Exterior Plywood
Section A-A
8' – 0"
A
A
4" Letters
4" Letters
[Project Title]
[Municipality], New York
3" Letters
Funded by:
Forest green border around perimeter
White Background
10"
NEW YORK STATE
Environmental Facilities Corporation
Department of Health
4' – 0"
2" Letters
This project is jointly funded by the New York State Drinking Water State Revolving Fund and the U.S. Environmental Protection Agency. The DWSRF is administered by the New York State Environmental Facilities Corporation with its partner the New York State Department of Health.
EPA Logo
7"
5" Letters
Kathy Hochul, Governor
Mitered Corner (typical)
Construction Sign Elevation (Not to scale)
5' -0"
Grade

PART 1 GGENERAL

1.01 SUMMARY

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

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Equipment and appurtenances. Equipment and appurtenances shall be designed in conformity with ASME, ASTM, and IEEE standards, as applicable, 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 Shop 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.

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 specified in 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 related New York State and New York City Codes.

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 New York City Fire Department and Departments of Buildings and of Small Business Services and all other Agencies Having Jurisdiction (AHJ). The Contractor, at its own expense, shall obtain a facility registration certificate and all permits required. In addition, the 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 Section 26 05 91 – Low Voltage Electric Motors and Section 26 05 92 – Medium Voltage Electric Motors. Characteristics of electrical energy and source of supply are given in these Sections. Electric energy supplies at the site of the work is subject to commercial loads and operating variations. The voltage given in the Contract Documents 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 the 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.

B. 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.

C. Accessories included. The 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. The 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 commercial grade cylinder locks and duplicate keys.

3. All spare parts shall be furnished as specified in the Contract. The Contractor shall furnish and install all specific equipment complete with all appurtenances, enclosures, means for connecting to power supply, and supporting structures necessary for standard operation of the equipment.

D. Contractor's working equipment. The 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.

E. Excessive loadings. Floor slabs shall not be subjected to excessive concentrated loads and in no case shall maximum safe loads be exceeded.

F. Welding. All structural welding and gas cutting shall conform to the requirements of the American Welding Society (AWS), American Society of Mechanical Engineers (ASME), NYC Department of Buildings (DOB) and the New York City Construction Code. All welding of pipe, fittings and pipeline equipment shall be performed by qualified welders as specified by the latest requirements of the ASME and AWS codes and their supplements, as applicable.

1. Welders shall be certified in compliance with Section IX Welding Qualifications of the ASME Boiler and Pressure Vessel Code or AWS D1.1 through D1.6, as applicable and as approved by the Engineer, and shall be qualified by an independent testing laboratory approved by the City.

G. 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.

H. Grouting. The 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.

I. Operating instructions. The Contractor, through qualified individuals, shall adequately instruct designated employees of the City in the operation, maintenance and care of all equipment installed hereunder.

J. Damage during tests and instruction periods. The 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.

K. 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 damage 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.

L. 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 NYC Department of Buildings (DOB) or the local AHJ.

1. The 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 City Electrical Code (NYCEC) or local AHJ.

2. For service equipment rated 1000 KVA and larger, drawings shall be submitted by the Contractor for approval to the DOB, as required by the NYCEC; or as otherwise required by the local AHJ. The Contractor shall pay the filing fees required for each submittal.

3. The Contractor shall submit for the approval of the Engineer and as required by the DOB or the AHJ, complete Shop Drawings covering electrical equipment furnished under this Contract.

   a. Where submissions are required to be made by a Professional Engineer the Contractor shall secure these services at no additional cost to the City.

   b. 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.

   c. Drawings shall be submitted to the Engineer for review before they are submitted to either the DOB or the AHJ.

   d. Upon receipt of approval or comments from DOB or the AHJ, the Contractor will return drawings to the Engineer with the disposition noted.

4. After full completion of its Work, the Contractor shall notify the local borough office of the DOB or the local AHJ, requesting a final inspection to be made.

M. 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.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 65 00 – PRODUCT DELIVERY REQUIREMENTS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Delivery of products
2. Handling of products
3. Inspection of items
4. Supporting heavy loads

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 66 00 – Protection of Materials & Equipment

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General Requirements

1. The Contractor shall make all arrangements for transportation, delivery and handling of materials and equipment required for installation and completion of the Work.

2. Storage space at the Site is limited; the Contract Documents indicate the staging and available storage areas. Coordinate with the Engineer as to whether on-site storage will be permitted. Any off-site storage locations or facilities are to be inspected and approved by the Engineer prior to storing items.

   a. 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 Section 01 66 00 – Protection of Materials & Equipment.

   b. If necessary to move stored materials and equipment during construction, the Contractor shall move materials and equipment at no additional cost to the City.

3. 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.

4. Transport and handle products in accordance with manufacturers' instructions and in compliance with all federal, State and local laws.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Products

1. The Contractor shall arrange deliveries of products in accordance with construction schedules and with ample time to facilitate inspection prior to installation.

2. The Contractor shall coordinate deliveries to avoid conflict with the Work and conditions at the Site and to accommodate the following:

   a. Limitations of storage space

   b. Availability of equipment and personnel for handling products

3. Materials and equipment shall not be delivered to the Site until related Shop Drawings, including the manufacturer's recommended storage instructions, have been approved by the Engineer.

4. Materials and equipment shall not be delivered to the Site until required storage facilities have been provided. Storage facilities and protection for products shall be as specified in Section 01 66 00 – Protection of Materials & Equipment.

5. Products shall be delivered to the Site in the manufacturer's original, unopened, labeled containers. The Engineer shall be informed of all deliveries of all materials and equipment.

6. 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.

7. Immediately on delivery, the Contractor shall inspect shipments to ensure:

   a. Product complies with requirements of Contract Documents and approved Submittals.

   b. Quantities are correct.

   c. Containers and packages are intact and labels are legible.

   d. Products are properly protected and undamaged.

B. Handling of Products

1. The Contractor shall provide equipment and personnel necessary to handle products in a manner that prevents soiling or damage to products or packaging.

2. The Contractor shall provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.

3. The Contractor shall handle products in a manner that prevents bending or overstressing.

4. Heavy components shall be lifted only at designated lifting points.

5. 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.

C. Inspection of Items

1. 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.

2. 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 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.

3. All materials and equipment that arrives at the Site during Normal Project Working Hours shall be unloaded as soon as practicable.

D. Supporting Heavy Loads

1. 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.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 66 00 – PROTECTION OF MATERIALS & EQUIPMENT
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Handling and storage of products

2. Protection of materials and equipment

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 65 00 – Product Delivery Requirements

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Storage of Products

1. Transport, store and handle products in accordance with manufacturer's methods and instructions and as required in Section 01 65 00 of the Contract.

2. Handle and lift products only at designated lift points and by methods to avoid soiling, disfigurement, bending, overstressing and damage.

3. 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.

4. 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.

5. Cover products subject to discoloration or deterioration with impervious sheet covering and protect products from soiling and staining.

6. 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.

7. Attach applicable manufacturer's storage service instructions labeled "STORAGE SERVICE INSTRUCTIONS ENCLOSED" to exterior of each stored product.

8. Inspect, maintain and service stored products on a regularly scheduled basis, consistent with manufacturer's instructions.

9. Record inspection, maintenance and services performed and keep log available for review by the City and Engineer.

B. Protection of Materials and Equipment

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. Materials may be stored out of doors if supported above ground surface on wood runners and protected with approved, effective and durable covers.

7. All storage and protection of materials and equipment at the Site shall be subject to the approval of the Engineer.

8. 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 guarantee 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.

9. 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.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 71 30 – PROTECTION AND RESTORATION OF STRUCTURES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified or otherwise required to complete the protection and restoration of all structures installed at or near the site of construction.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General Contractor Responsibilities

1. The 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.

2. The Contractor shall erect and maintain barriers, lights, fences, and other required protective devices in accordance with the Contract Documents and the NYC Building Code and the NYC Department of Transportation (NYCDOT) Bureau of Highway Operations Standards Specifications.

3. The 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.

4. In order to prevent damage, injury or loss, the Contractor's actions shall include, but not be limited to, the following:

   a. 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.

   b. Provide suitable storage facilities for all materials which are subject to injury by exposure to weather, theft, breakage, or otherwise.

   c. Place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work.

   d. 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.

   e. Provide barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, elevated walkways and other hazardous areas.

5. The 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. The 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.

6. 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.

7. All structures and appurtenances shall be adequately supported and safeguarded against all damage or injury in performance of work under this Contract. The 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.

8. The 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.

9. The 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.

10. 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.

B. Protection of Existing Structures and Utilities

1. 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, sewers and all appurtenant structures.

2. 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.

3. 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.

4. 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.

5. 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.

C. Underground Structures

1. 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.

2. 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.

3. 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.

4. Necessary changes in the location of the Work may be made by the Engineer, to avoid unanticipated underground structures.

5. 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.

D. Surface Structures:

1. 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.

2. 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.

E. Protection of Underground and Surface Structures

1. The 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.

2. 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.

3. 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.

4. 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.

F. Restoration of Pavements

1. Restoration of pavements shall be made in conformity with the requirements of the NYC Department of Transportation Standard Highway Specifications, latest edition. These specifications may be examined at the Office of the Department of Transportation, Bureau of Highway Operations, 55 Water Street, New York, New York. 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.

G. Coordination and Relocation of Street Utilities

1. Coordination and relocation of street utilities with utility companies shall be done in conformance with the Contract Documents and all applicable laws and regulations.

1.06 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.

1.07 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 71 50 – GENERAL CONSTRUCTION REQUIREMENTS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Seismic requirements
2. General mechanical requirements
3. Diagrammatic drawings
4. Ratings approximate
5. Schematic wiring diagrams
6. Electrical supply characteristics
7. Special electrical equipment requirements
8. Uniform finishes
9. Temporary support structures

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 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 City Construction Code in conjunction with the most current seismic provisions of the International Building Code (IBC) 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 City Construction 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 the date of Substantial Completion (or use and occupancy in accordance with Article 16 of the Standard Construction Contract), 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 in the Contract Documents.

G. Special Electrical Equipment Requirements

1. All electrical equipment and devices manufactured and furnished under this Contract 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 that it:
   a. recommends the use of the device or devices for the specific function to be performed; and
   b. 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 95% under rated load conditions. Electrical equipment with a power factor less than 95% shall be corrected to at least 95% 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 biphenyls (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 Documents include 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.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Contractor to submit process piping support drawing(s) and electrical conduit drawing(s) for EOR approval.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 73 12 – MAINTENANCE OF OPERATIONS AND CONSTRUCTION STAGING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Maintenance of Site operations

B. General criteria and restrictions

C. Construction staging

D. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 01 32 10 – Progress Scheduling

C. Section 01 35 55 – Site Security Procedures

D. Section 01 56 00 – Temporary Barriers and Enclosures

E. Section 01 57 00 – Temporary Controls

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Maintenance of Site Operations

1. The Contractor shall perform its work in a manner such that the DEP 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 DEP.

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 maintained by the Contractor under Section 01 32 10 – Progress Scheduling shall not serve as prior notice. No work shall proceed prior to the written approval of DEP.

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 the 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 in accordance with the requirements of the authorities having jurisdiction.

b. Existing fire suppression piping at / near Work Sites shall be operational at all times until replaced.

c. 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.

d. 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.

e. All site drainage flows shall not be interrupted.

f. 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.

g. 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.

h. 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.

i. 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.

j. 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, at a minimum, all requirements of the following:

      1) Section 01 14 00 – Work Restrictions,

      2) Section 01 32 10 – Progress Scheduling,

      3) Section 01 35 55 – Site Security Procedures,

      4) Section 01 56 00 – Temporary Barriers and Enclosures, and

      5) Section 01 57 00 – 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 the Contractor's 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 of roadway closed for roadwork. For temporary fall protection requirements, refer to Section 01 56 00 – Temporary Barriers and Enclosures. Maximum fence section removal shall be as determined by the Resident Engineer.

   e. Protect all open excavations per Section 01 56 00 – 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 DEP.

5. The Contractor shall not remove any items from service without written permission from DEP. 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 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 it shall rigidly adhere to these requirements.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Site Specific Criteria and Restrictions

1. Any required short term system shutdown affecting plant operation shall be coordinated and scheduled at a time suitable to the City. No system, equipment, item, or section of the system shall be removed from service by the Contractor, without written (hard copy or electronic) permission from the Engineer.

2. Throughout the entire construction duration, the Contractor shall maintain a 15-foot clear width on all facility roadways adjacent to work areas for emergency vehicles and evacuation. At any time, the Engineer can request relocation of any material or equipment stored on or near facility roadways.

3. The Contractor shall perform Work subject to the following constraints:

a. Process Mechanical

1) A minimum of two weeks' notice is required to coordinate work on the temporary sludge line and sludge nozzle assembly relocation.

2) A maximum of 24-hours is allowed to install each temporary sludge nozzle assembly.

3) A maximum of 24-hours is allowed to install the final sludge nozzle assembly.

B. Construction Staging

1. Phase 1 – Fender Replacement, Caisson Jacketing, Underdeck Repair, and Icebreaker Reconstruction

a. Phase 1A – Fender Replacement (Sludge Dock South End)

1) Relocate the existing sludge line and sludge nozzle assembly from its current position to the northern end of the sludge barge loading dock as per the Contract Documents.

2) Demolish the existing fender system as per the Contract Documents.

3) Install new FRP lumber edge protection system as per the Contract Documents.

4) Remove and replace damaged cleats. Refurbish existing bollards.

b. Phase 1B – Caisson Jacketing (126 Caissons)

1) Excavate riverbed as per the Contract Documents.

2) Clean and prep caisson surfaces.

3) Install new FRP jacket sleeve and grout annulus as per the Contract Documents.

c. Phase 1C – Underdeck Repair

1) Remove deteriorated existing membrane as per the Contract Documents.

2) Repair damaged concrete and steel, then reseal expansion joints as per the Contract Documents.

3) Replace removed membrane to underside of concrete.

d. Phase 1D – Icebreaker Reconstruction (3 Icebreakers)

1) Demolish existing ice breakers down to existing foundation.

2) Install new steel ice breaker structures over existing pile studs as per the Contract Documents.

3) Coat new steel ice breaker structures as per the Contract Documents.

2. Phase 2 – Fender Replacement, Caisson Jacketing, Underdeck Repair, and Icebreaker Reconstruction

a. Phase 2A – Fender Replacement (Sludge Dock North End)

1) Relocate the existing sludge line and sludge nozzle assembly from the northern end to the southern end of the sludge barge loading dock as per the Contract Documents.

2) Demolish the existing fender system as per the Contract Documents.

3) Install new marine rubber fenders and steel panels as per the Contract Documents.

4) Remove and replace damaged cleats. Refurbish existing bollards

b. Phase 2B – Caisson Jacketing (129 Caissons)

1) Excavate riverbed as per the Contract Documents.

2) Clean and prep caisson surfaces.

3) Install new FRP jacket sleeve and grout annulus as per the Contract Documents.

c. Phase 2C – Underdeck Repair

1) Remove deteriorated existing membrane as per the Contract Documents.

2) Repair damaged concrete and steel, then reseal expansion joints as per the Contract Documents.

3) Replace removed membrane to underside of concrete.

d. Phase 2D – Icebreaker Reconstruction (3 Icebreakers)

1) Demolish existing ice breakers down to existing foundation.

2) Install new steel ice breaker structures over existing pile studs as per the Contract Documents.

3) Coat new steel ice breaker structures as per the Contract Documents.

3. Phase 3 – Fender Replacement, Caisson Jacketing, Underdeck Repair, and Icebreaker Reconstruction

a. Phase 3A – Fender Replacement (South to Sludge Dock)

1) Demolish the existing fender system as per the Contract Documents.

2) Install new FRP lumber edge protection system as per the Contract Documents.

3) Relocate the existing sludge line and sludge nozzle assembly from the southern end to is original position on the sludge barge loading dock as per the Contract Documents.

b. Phase 3B – Caisson Jacketing (121 Caissons)

1) Excavate riverbed as per the Contract Documents.

2) Clean and prep caisson surfaces.

3) Install new FRP jacket sleeve and grout annulus as per the Contract Documents.

c. Phase 3C – Underdeck Repair

1) Remove deteriorated existing membrane as per the Contract Documents.

2) Repair damaged concrete and steel, then reseal expansion joints as per the Contract Documents.

3) Replace removed membrane to underside of concrete.

d. Phase 3D – Icebreaker Reconstruction (3 Icebreakers)

1) Demolish existing ice breakers down to existing foundation.

2) Install new steel ice breaker structures over existing pile studs as per the Contract Documents.

3) Coat new steel ice breaker structures as per the Contract Documents.

4. Phase 4 – Fender Replacement, Caisson Jacketing, Underdeck Repair, and Icebreaker Reconstruction

a. Phase 4A – Fender Replacement (North to Sludge Dock)

1) Demolish the existing fender system as per the Contract Documents.

2) Install new FRP lumber edge protection system as per the Contract Documents.

b. Phase 4B – Caisson Jacketing (131 Caissons)

1) Excavate riverbed as per the Contract Documents.

2) Clean and prep caisson surfaces.

3) Install new FRP jacket sleeve and grout annulus as per the Contract Documents.

c. Phase 4C – Underdeck Repair

1) Remove deteriorated existing membrane as per the Contract Documents.

2) Repair damaged concrete and steel, then reseal expansion joints as per the Contract Documents.

3) Replace removed membrane to underside of concrete.

d. Phase 4D – Icebreaker Reconstruction (3 Icebreakers)

1) Demolish existing ice breakers down to existing foundation.

2) Install new steel ice breaker structures over existing pile studs as per the Contract Documents.

3) Coat new steel ice breaker structures as per the Contract Documents.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 73 17 – INSTALLATION OF EQUIPMENT
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to install equipment.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General:

1. This Section includes the following:
   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.
2. The Contractor shall have adequate resources on site, including labor, materials, construction tools and equipment, to successfully perform the Work.
3. The Contractor shall be responsible for locating, aligning and leveling all equipment and shall employ a surveyor licensed in the State of New York to set all lines and levels of equipment to the accuracies specified in the Contract Documents.
4. Manufacturer's complete and official installation instructions, including permissible tolerances, shall be furnished in duplicate with each unit of equipment or set of identical units.
5. All equipment shall be installed in accordance with the approved shop drawings (including 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.
6. Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the approved shop drawings unless directed otherwise by the Engineer during installation.
7. As a condition precedent to the acceptance of equipment installed and operating, the Contractor shall provide the Engineer with written certification, obtained from each company manufacturing equipment for the Work that the equipment is installed and does operate in accordance with the Contract Documents 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, and/or otherwise required for sleeves, recesses, openings, chases, and related items, for installation of the equipment and materials

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.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Installation hardware:

1. Type 316L

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. 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 approved 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 shims about 2-in. wide and 4-in. long, and of a varying thickness from ⅛-in. to ½-in.. 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-in. 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 the 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 1½-in. thick grouting under the entire base plate supporting each pump, motor drive unit, and other equipment. Grouting shall be as specified in the respective equipment specification section(s) and as approved by the Engineer.

F. When motors are shipped separately from driven equipment, the motors shall be received, stored, have insulation resistance tested 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.

3.02 IMPLEMENTATION

A. Workmanship:

1. 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.

2. Only those workers qualified in the handling, setting, alignment, leveling and adjustment of the type of equipment supplied shall be employed in the Work.

3. 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.

4. Wedging shall 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.

5. Proper tools shall be used in the assembly of equipment and materials to prevent marring the surface of shafts, nuts, or other parts.

6. Connections requiring gaskets shall be tightened evenly all around to ensure uniform stress over the entire gasket area.

7. 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.

8. 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.

9. Only such equipment and materials that shall not damage the structure or equipment and materials shall be used on the Work.

10. The Contractor shall be responsible for the exact alignment of equipment with associated piping and, under no circumstances, will "pipe springing" be allowed.

11. Misaligned holes shall be reamed, as excessive driving of bolts or keys will not be permitted.

12. The Contractor shall furnish and install all necessary plugs in lubrication holes to prevent entry of foreign material.

The Contractor shall be required to use stainless steel Type 316L hardware and mounting parts, such as nuts and bolts, at the North River Wastewater Resource Recovery Facility, unless otherwise approved in writing by the Engineer.

B. Clearances and safeguards:

1. All devices, equipment, and systems furnished under this Contract shall be fabricated and installed so that the necessary and required clearances are provided for operation, maintenance, repair, and replacement. It is the Contractor's responsibility to review the Contract Drawings and ensure that the necessary and required clearances are available, and it is the Contractor's responsibility to notify the Engineer in the event that such clearances cannot be provided based on the Contract Documents.

2. 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 Contract Documents.

C. Alignment and leveling:

1. All couplings shall be aligned while the equipment is free from all external loads.

2. Both angular and parallel alignment shall be checked, and the degree of misalignment shall be recorded and submitted to the Engineer.

3. 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.

4. Misalignment shall not exceed the manufacturer's tolerances.

D. Cutting and patching:

1. 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 qualified workers.

E. Lubrication:

1. All lubrication shall be performed by the Contractor in accordance with the lubricant specifications and directions furnished by the manufacturer.

a. If required by the manufacturer's specifications and/or instructions, the Contractor shall provide lubrication of equipment while in storage, from delivery to installation.

2. The Contractor shall furnish required lubricants for the equipment until it is accepted.

3. 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.

3.03 FIELD TESTING / QUALITY CONTROL

A. Supervision by Manufacturer's Representative: The Contractor shall provide the services of qualified technical representatives of the equipment manufacturers who shall adequately supervise, in person and on site, 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, departure, and the purpose of their visit.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

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.

1. The Contractor shall also provide protection of installed equipment, as required, to prevent damage and remove protection devices/facilities, when no longer needed, prior to completion of work:

a. 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.

b. 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 (or use and occupancy in accordance with Article 16 of the Standard Construction Contract), wrappings and coverings shall be removed, equipment shall be cleaned and all scratches and abrasions shall be refinished.

END OF SECTION

SECTION 01 74 17 – CLEANING AND SITE MAINTENANCE
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

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

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 74 20 - Construction Waste Management

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General Requirements

1. The Contractor shall collect and dispose of all debris and rubbish resulting from its Work. Cleaning shall be performed daily and trash removal shall be performed weekly, or more frequently, as directed by the Engineer, whenever the debris or rubbish interferes with the Work under the Contract, plant operations or presents a fire hazard and as noted below.

2. Cleaning Work shall conform to the requirements of Section 01 74 20 - Construction Waste Management.

B. Requirements of Regulatory Agencies

1. In addition to the requirements specified herein, the 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.

2. The Contractor 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 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Cleaning Materials

1. The Contractor shall use only cleaning materials recommended by the manufacturer of surface to be cleaned.

2. Each type of cleaning material shall be used on only those surfaces recommended by the cleaning material manufacturer.

3. Use only cleaning materials which will not create hazards to health or damage property.

B. 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

A. Scheduling of Cleaning Operations

1. The Contractor shall schedule trash removal and cleaning operations as necessary and at intervals as directed by the Engineer.

a. So that dust, wash water or other contaminants generated during construction do not damage or mar painted or finished surfaces.

b. 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.

B. Site Maintenance Requirements

1. The Contractor shall keep the Work and surrounding premises within Work limits, including its staging and storage areas, free of accumulations of dirt, dust, waste materials, debris and rubbish.

2. The Contractor shall keep dust generating areas wetted down.

3. The Contractor shall provide suitable containers in sufficient quantity for storage of waste materials, debris and rubbish.

4. The Contractor shall dispose of waste materials and surplus materials off site at a regulatory-approved disposal site at intervals as needed.

3.02 IMPLEMENTATION

A. Snow and Ice Removal

1. The Contractor shall remove snow and ice from the following areas:

a. The sidewalks and parking areas associated with the Engineer's field office.

b. All construction access roads.

1) Any Plant walkways which cannot be accessed by the Plant's snow removal equipment due to construction activities.

2) Any additional areas designated by the Engineer.

c. 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.

d. When directed by the Engineer, the Contractor shall begin snow and/or ice removal immediately (within one (1) hour of the Engineer's directive to proceed).

e. The Contractor shall haul the removed snow and ice for disposal as per the applicable local rules.

f. Spreading of Salt and Sand

1) The Contractor shall furnish all labor, tools, equipment, and materials necessary to provide the following services specifically requested and authorized in writing by the Engineer:

a) Spread calcium chloride over all areas of the Engineer's parking lot and spread sand on the steps and platforms at the entrances to the Engineer's field office.

b) Salt and sand shall be spread prior to a snowstorm.

c) Upon termination of a snowstorm, the Contractor shall remove all sand from the steps and platforms at the entrances to the Engineer's field office.

2) Disposal of sand shall be the responsibility of the Contractor.

B. Disposal of Waste Materials

1. The Contractor shall not burn or bury rubbish and waste materials on the Site.

2. The Contractor 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.

3. The Contractor shall not discharge any wastes into waterways.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Final Cleaning

1. At the completion of the Work, the 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.

2. The Contractor shall thoroughly clean all materials, equipment and structures in it Work areas so as to leave the Work in a clean and new appearing condition.

   a. All marred surfaces shall be touched up to match adjacent surfaces;

   b. Dirty filters and burned-out lights shall be replaced as required;

   c. All glass surfaces shall be cleaned; and

   d. Floors shall be cleaned and polished.

3. The 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 Work areas.

4. The Contractor shall remove paint from and clean and restore all equipment and material nameplates, labels and other identification markings in its Work areas.

END OF SECTION

SECTION 01 74 20 – CONSTRUCTION WASTE MANAGEMENT
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

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.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental Health and Safety Requirements

B. Section 01 35 45 – Hazardous Materials Control

1.04 REFERENCES

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.

1.05 DESCRIPTION

A. Not Used

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 95% 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 07/18/2025 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:

1) Butyl Rubber
2) Cardboard
3) Cement
4) Concrete
5) EPDM rubber
6) Extruded polystyrene
7) Fencing
8) FRP
9) Grout
10) Land clearing debris
11) Metals from rebar, sheetrock studs, framing, etc.
12) Paints, solvents, and other hazardous fluids
13) Piping
14) Plywood
15) Recyclable office wastes such as paper and toner and ink cartridges
16) Steel
17) Stone
18) 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. 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

1.08 DELIVERY, STORAGE, AND HANDLING

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.

E. The Contractor shall store all construction waste using barges and the barges shall be emptied at the corresponding facilities. No construction waste shall be held at the North River Wastewater Resource Recovery Facility.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 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.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 75 10 – PRELIMINARY AND FINAL FIELD TESTS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Field Test Schedule and Updates
2. System Test Procedures
3. Contractor Responsibilities
4. Preliminary Field Tests of Equipment
5. Preliminary Field Tests of Systems
6. Final Field Tests of Equipment
7. Final Field Tests of Systems

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 32 10 - Progress Scheduling

B. Section 01 43 05 - Contractor's Work Quality

1.04 REFERENCES

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 this Section. The requirements contained herein shall apply, whether or not this Section is specifically referenced elsewhere in the Contract Documents.

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. Header 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. DEP 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.

1.06 QUALITY ASSURANCE

A. Nothing stated herein shall affect the requirements contained in Section 01 43 05 – Contractor's Work Quality; or the specific pressure testing requirements for piping systems specified in the Contract Documents. 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 Section 01 32 10 – Progress Scheduling, 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.

E. 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Preliminary Field Tests of Equipment:

1. 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 Contract Documents, 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.

2. A successful test shall consist of at least one continuous hour of trouble free operation unless a longer period is specified in the Contract Documents.

B. Preliminary Field Tests of Systems:

1. 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 Contract Documents.

2. The Systems shall be tested by operating the systems equipment together as a unit with all related piping, valves, electrical controls and mechanical operations.

3. 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.

4. Systems with automatic control systems shall be operated continuously by the automatic control system for four continuous hours, or longer if specified in the Contract Documents.

5. 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.

C. Final Field Tests of Equipment and Systems:

1. The following requirements shall be met prior to the final field testing of equipment and systems:

a. All required operating instructions, maintenance manuals, bulletins, and shop drawings shall be approved and distributed unless otherwise specifically allowed by the Engineer.

b. All spare parts shall be delivered unless otherwise specifically allowed by the Engineer

c. 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 DEP. 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.

d. After completion of Item c above and when leakage tests of pipelines are completed, the equipment or system shall then be given a final field test.

2. Equipment and systems shall be subject to final field tests in accordance with the procedures prescribed in the Contract Documents and approved test procedure for each test and as supplemented herein.

3. 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 procedures. 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.

4. The Contractor shall provide all labor and materials needed to supply all water or other media needed for final field testing.

5. 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 period 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 DEP. The Contractor shall warrant and guarantee that all equipment shall function satisfactorily for a period of one year from Substantial Completion.

D. Systems:

1. The following equipment groupings shall be tested together as Systems, in accordance with the Contract Documents:

a. Temporary and Final Sludge Nozzle Assembly including: Heat trace and associated valves.

b. Sludge Dock Lighting including: lighting controls and daylight dimming controls.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Items to be completed
2. Final record documents
3. Special tools and appliances
4. Spare parts and maintenance materials
5. Lubricants
6. Piping and equipment identification

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 78 24 – Spare Parts and Maintenance Materials

B. Section 01 78 39 – Final Record Documents

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

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 the Contract:

1. Scheduling equipment manufacturers' visits to the 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. The Contractor's attention is directed to the fact that required certificates and information listed herein must be submitted earlier in accordance with other Specifications.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. 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.

7. After the Engineer sends the contractor the latest editable blank BWT Asset Install and Preventative Maintenance fillable, electronic data entry form, compatible with BWT's existing computerized maintenance management system (CMMS), the Contractor's designee shall be responsible for entering all complete information associated with each asset shown thereon for review and acceptance by BWT's personnel. The Contractor's designee shall be required to respond to questions and update, as requested, all corrected data into these editable data entry forms to the satisfaction of BWT Digital Transformation personnel until final acceptance. Punch listing this task shall not be accepted by the DEP at the time of substantial completion.

B. Final Record Documents

1. 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 Section 01 78 39 – Final Record Documents.

C. Lubricant Survey

1. A lubrication survey, made by a lubricant supply firm, subject to the approval of the Engineer shall be provided by the Contractor.

2. 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.

D. Spare Parts List

1. A complete list of spare parts and maintenance materials to be furnished shall be submitted to the Engineer for approval as part of the Shop Drawing submittals.

2. The Contractor shall be required to furnish BWT Spare Parts fillable, electronic data entry forms (e.g., excel spreadsheets), for review and updated, as needed, for approval by BWT Digital Transformation personnel and provide to BWT, at the designated location as directed, all spare part packages with BWT-approved bar code sticker labels affixed thereon. Punch listing this task shall not be accepted by the DEP at the time of substantial completion.

E. Special Tools List

1. 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery

1. Spare Parts

a. Upon acceptance of the spare parts by the Engineer, the Contractor shall deliver the spare parts for storage to the location within the City limits designated by DEP upon request by the Engineer.

2. Lubricants

a. 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 specified herein.

B. Storage

1. Spare Parts

a. 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.

b. Complete information shall also be provided for use and reordering of spare parts.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Spare Parts

1. Spare parts and maintenance materials shall be furnished in accordance with all applicable Specifications.

2. 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 Contract.

B. Special Tools

1. 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 Contract.

2. Special tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with heavy duty cylinder locks and duplicate keys.

1.10 WARRANTY

A. All spare parts shall be protected and packaged for a shelf life of at least ten (10) years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Lubricants

1. The Contractor shall furnish and deliver 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 Shop 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 Standard Construction Contract. The grade of lubricants furnished shall be in accordance with the recommendations of the equipment manufacturers made on the approved equipment shop drawings.

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. Piping and Equipment Identification

1. The Contractor shall furnish and install identification signs for all equipment, control panels, valves and piping identification in accordance with specific requirements of the Contract for piping and equipment identification.

B. Asset ID Identification Signs

1. Contractor submittal and Engineer approval of Asset ID signs are subject to confirmation by BWT Asset Management during the construction phase.

2. The Contractor shall furnish and install identification signs for all new Asset ID specified in Section 01 78 24, Spare Parts and Maintenance Materials. Asset ID signs are to be permanent affixed to the new equipment, before declaration of substantial completion of the associated new equipment system can be made by the DEP.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. In addition to any requirements of the New York City Standard Construction Contract, before the determination of Substantial Completion is issued, the Contractor shall clean and perform 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.

END OF SECTION

SECTION 01 78 24 – SPARE PARTS AND MAINTENANCE MATERIALS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall inventory, store, and deliver all spare parts and maintenance materials as shown, specified, and/or required.

B. The following index of this Section is presented for convenience:

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C. The following schedule, attached after the "End of Section" designation, is a part of this Section:

1. Schedule 01 78 24-1, Spare Parts and Maintenance Materials Schedule.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Furnish all spare parts and maintenance materials shown, specified, and/or required by the Contract Documents.

B. Contractor shall provide data for each distinct spare part or maintenance material, in paper and electronic format, as specified herein.

C. Contractor shall attach bar-code tag stickers, furnished by the Engineer, to each distinct spare part or maintenance material.

D. Schedule delivery of all spare parts and maintenance materials for the Work over a reasonable period of time and in coordination with DEP personnel and the Engineer.

E. All spare parts and maintenance materials shall be turned over to DEP in 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 indicated by the part manufacturer.

F. The Contractor shall turn over spare parts and maintenance materials to DEP upon completion of the Work or when DEP assumes beneficial occupancy or as directed by DEP or Engineer. Contractor shall then place them in permanent storage rooms or areas designated by the DEP or Engineer.

G. Contractor shall be fully responsible for loss or damage to all spare parts and maintenance materials until such time they are handed over and accepted by DEP.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

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

1. Action Submittals:

a. List of all spare parts and maintenance materials and data:

1) The spare parts and maintenance materials list and data shall be submitted in paper and electronic format:

a) The electronic format shall be a spreadsheet that allows data to be uploaded into a commercial database system owned by DEP.

b) Schedule 01 78 24-1, Spare Parts and Maintenance Materials Schedule, located after the "End of Section" designation, is a typical form and is included for reference only. The actual form is to be

obtained from BWT Digital Transformation via the Engineer.

2) The spare parts and maintenance materials list and data shall be submitted to the Engineer at least 120 Days prior to delivery.

2. Information Submittals:

a. Schedule of the intended dates for spare parts and maintenance materials deliveries.

b. Submit a letter of transmittal for each part or maintenance material shipment, including the following information, at a minimum:

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 DEP to sign and confirm receipt of the parts and materials.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver spare parts and maintenance materials in accordance with the requirements of the Contract Documents. In addition:

1. Spare parts and maintenance material delivery shall require a minimum written notice to Engineer of 7 Days.

2. The Contractor shall attach bar-code stickers to each approved spare part or maintenance material, upon receipt.

a. The Engineer shall furnish bar code stickers and transmit the bar code stickers to the Contractor.

b. The sticker for any spare part shall be affixed to shipment packaging for that part.

c. If additional stickers are required for split deliveries or re-delivery of previously rejected parts, they will be furnished by the Engineer and transmitted to the Contractor.

B. The Contractor shall store and handle spare parts and maintenance materials in accordance with the requirements of the Contract Documents. In addition:

1. Store and handle spare parts and maintenance materials in accordance with manufacturer recommendations.

2. During construction and prior to acceptance by DEP, the Contractor shall store spare parts or maintenance materials in the Contractor's buildings or

construction trailers. Storage locations shall have floor, roof, and closed sides, and be in accordance with the part manufacturers' recommendations.

a. Contractor shall protect spare parts and maintenance materials from weather, condensation, and humidity.

b. If the Contractor's assigned location is inappropriate, an alternate storage location shall be used, as designated by DEP, and at no additional cost to DEP.

c. Upon placement of each item in the storage location, the item bar-code sticker or tag shall be scanned into DEP Database along with the shelf bar-code sticker using hand held Radio Frequency Computers.

3. DEP personnel reserve the right to inspect each spare part or maintenance material upon delivery for adherence to approved submittals and reject any part or parts in accordance with said inspection.

a. Packaging shall be opened by the Contractor to allow such inspection.

b. DEP personnel reserve the right to reject any spare parts or maintenance materials during such inspection.

c. Any spare parts or maintenance materials rejected shall be taken back by Contractor and the Contractor shall resubmit a new spare part or maintenance material at no additional cost to DEP.

d. The Contractor shall provide DEP personnel with access, and transport if required, to the Contractor's storage facilities.

4. After acceptance of delivered spare parts and maintenance materials, the Contractor shall place accepted spare parts and maintenance materials in a storeroom directed by DEP personnel.

a. All spare parts and maintenance materials shall be identified, assigned a storeroom and location as directed by DEP personnel, delivered, shelved, and logged into the shelf or bin via scanning the barcode to the database referenced herein.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Data for each distinct spare part or maintenance material, per approved submittals, shall be recorded and entered into the existing computer database, provided by DEP and as directed by the Engineer.

1. Reference Schedule 01 78 24-1, Spare Parts and Maintenance Materials Schedule, located after the End of Section designation.
2. Data shall include, but not necessarily be limited to:
    a. Contract number.
    b. Specification Section number.
    c. Description of equipment for which part is being provided.
    d. Equipment number (per DEP numbering system).
    e. Manufacturer of part, manufacturer's part number.
    f. Supplier / vendor for part, with name and contact information.
    g. Unit price of part.
    h. Quantity required to be delivered.
3. No spare parts or maintenance materials shall be accepted by DEP unless all data listed above has been entered into the database and barcodes have been applied as specified.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SCHEDULE 01 78 24-1
SPARE PARTS AND MAINTENANCE MATERIALS SCHEDULE

CONTRACT _____EQUIPMENT DESCRIPTION AND NUMBER _____

EQUIPMENT SPEC. SECTION _____SUBMITTAL # _____REVIEW CYCLE # _____

PART DESCRIPTION	MANUFACTURER NAME	MANUFACTURER PART NO.	VENDOR NAME	VENDOR PART NO.	COMPONENT Y/N?	COMPONENT SERIAL #	QUANTITY ON ORDER (PER SPEC)

SCHEDULE 01 78 24-1
ASSET TAGS SCHEDULE

ASSET ID	ASSET DESCRIPTION	ASSET TYPE	EXISTING BUILDING/AREA	MANUFACTURER	MODEL #	SERIAL #	SIZE	SPEED	INITIAL COST	INSTALLATION DATE
NR2.18.46.184.AI01.01	Caissons, Below Final Tanks, Hudson River	E	Final Settling Area							
NR2.18.46.184.AA01.01	Caissons, Below Main Building, Hudson River	E	Administration Building							
NR2.18.46.184.AT01.01	Caissons, Below Primary Tanks, Hudson River	E	Primary Settling Area							
NR2.18.46.184.BC01.01	Caissons, Below Thickener and Digester Building, Hudson River	E	Thickener Area							
NR2.18.48.999.ZZ01.01	Ice Breaker 01, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.02	Ice Breaker 02, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.03	Ice Breaker 03, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.04	Ice Breaker 04, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.05	Ice Breaker 05, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.06	Ice Breaker 06, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.07	Ice Breaker 07, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.08	Ice Breaker 08, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.09	Ice Breaker 09, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.10	Ice Breaker 10, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.11	Ice Breaker 11, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.999.ZZ01.12	Ice Breaker 12, Located in Hudson River, Northeast of Plant	E	Hudson River							
NR2.18.48.198.BE01.01	Area, Dock	E	Sludge Transfer Area							
NR2.18.48.198.BE02.01	Fender System	E	Sludge Transfer Area							
NR1.06.27.105.AZ01.01	Sludge Nozzle Assembly, Sludge Loading Dock, #1, West	E	Sludge Transfer Area							
NR1.06.27.105.AZ01.02	Sludge Nozzle Assembly, Sludge Loading Dock, #2, West	E	Sludge Transfer Area							
NR2.18.46.184.AI02.01	Underdeck, Below Final Tanks, Hudson River	E	Final Settling Area							
NR2.18.46.184.AA02.01	Underdeck, Below Main Building, Hudson River	E	Administration Building							
NR2.18.46.184.AT02.01	Underdeck, Below Primary Tanks, Hudson River	E	Primary Settling Area							
NR2.18.46.184.BC02.01	Underdeck, Below Thickener and Digester Building, Hudson River	E	Thickener Area							
NR2.18.48.193.AZ01.01	Outdoor Lighting, West Sludge Barge Loading Dock	E	Sludge Transfer Area							

SECTION 01 78 25 – OPERATIONS AND MAINTENANCE MANUALS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. General requirements.
2. Operation and maintenance Manual requirements.
3. Binding and format requirements.
4. Submittals.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 78 39 – Final Record Documents

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

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.

C. Operation and Maintenance Manual Requirements:

1. The Manuals shall include, but not be limited to, the following:

a. 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.

b. 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:

1) A written explanation with illustrations for each preventive maintenance task.

2) Recommended schedule for execution of preventive maintenance tasks.

3) Lubrication charts.

4) Table of alternative lubricants.

5) Troubleshooting instructions.

6) List of required maintenance tools and equipment.

7) Nameplate data of each component, year of installation, Contract number and Specification number.

8) Name, address and telephone number of the manufacturer and the manufacturer's local representative(s).

9) Installation instructions.

10) Emergency operating instructions and capabilities.

11) Troubleshooting and corrective maintenance (repair) procedures.

12) 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".

13) Parts list with current prices and ordering information.

14) List of recommended spare parts and the recommended number of each.

15) Name, address and telephone number of nearest parts supply house and nearest repair service center.

16) Warranties, guarantees, bonds and service contracts.

17) Long-term and short-term manufacturer's recommended equipment storage procedures.

18) Written explanations of all safety considerations relating to operation and maintenance procedures.

19) Name, address and telephone number of manufacturer, manufacturer's local service representative, and subcontractor or installer.

20) Copy of all approved shop drawings.

21) 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.

22) Complete electrical schematics and wiring diagrams. Complete wiring between terminal points must be shown. Computerized diagrams are not acceptable.

2. 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.

3. 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.

4. 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.

D. Binding and Format Requirements:

1. 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.

2. Intermediate submittals of the Manual for approval by the Engineer need not be hard bound.

3. 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 fly-leaf for each product.

4. All text must be legible typewritten or machine printed originals or high quality copies of same.

5. 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:

a. Title "OPERATING AND MAINTENANCE MANUAL"

b. Project title and number.

c. Contract title and number.

d. Identity of building or structure as applicable.

e. Identity of general subject matter covered.

6. 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.

7. 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.

E. Submittals:

1. 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.

2. 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.

3. 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.

4. 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.

5. Final Approved Copies of the Manuals:

   a. 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 Section 01 78 39 – Final Record Documents.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 78 39 – FINAL RECORD DOCUMENTS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for all Final Record Documents.

B. The following index of this Section is presented for convenience:

C.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 29 10 – Schedule of Values

B. Section 01 32 30 – Job Photographs and Videos

C. Section 01 33 00 – Submittal Procedures

D. Section 01 78 40 – Records in Paper Formats

E. Section 01 78 42 – Records in Electronic Formats

F. Section 01 78 25 – Operation and Maintenance Manuals

1.04 REFERENCES

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

B. As-Built Drawings. The "As-Built Drawings" reflect the "as constructed" final product. These drawings shall use the same title blocks and sheet numbers as the original "Bid Set Drawings", with the exception that an "AB" is prefixed onto the original drawing number.

C. Final Copy Shop Drawing (FCSD): Final Copy Shop Drawing means the approved copy (Furnish as Submitted (FAS), Furnish as Noted (FAN), or Furnish as Corrected (FAC)) of the Shop Drawing as described in Section 01 33 00 - Submittal Procedures, corrected to reflect any deviations made for the installed condition showing the actual construction.

D. 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.

E. 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.

F. Bid Set Drawings (or Design Drawings): The Bid Set Drawings consist of the original Contract Drawings issued by DEP with the Invitation for Bids.

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

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

I. Operations and Maintenance Manuals: When specified, Operations and Maintenance Manuals ("O&M Manuals") shall be prepared by the Contractor in conformance with Section 01 78 25 - Operation and Maintenance Manuals. Final copies of the O&M Manuals shall be submitted in accordance with the requirements of this Section.

J. EPMIS: DEP's web-based Enterprise Project Management Information System ("EPMIS" or "the System") used to manage all Project communications, workflows and document submittals.

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

1. Signed copy of the 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 Schedule of Values as described in Section 01 29 10 – Schedule of Values;
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 Approved Punch List
10. Final evaluation;
11. Final extension of time (if applicable);
12. Claim settlements (if applicable);
13. Certificate of Occupancy;
14. Warranties;
15. Structure Survey (per Article 9 of the General Conditions);
16. Regulatory Transition Plan (where applicable).

L. Job Photographs and Videos: The photographs and videos furnished in accordance with Section 01 32 30 – Job Photographs and Videos.

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

1.05 DESCRIPTION

A. Not Used.

1.06 QUALITY ASSURANCE

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

1. All records in electronic format shall be produced in conformity with Section 01 78 42 – Records in Electronic Formats.
2. All records in paper formats shall be produced in conformity with Section 01 78 40 – Records in Paper Formats.

1.07 SUBMITTALS

A. Format

1. The Contractor shall submit the final record documents in electronic and paper formats, according to the requirements of Table 1 – Summary of Final Record Documents to be Furnished, attached at the end of this Section.

B. Quantities

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

1.08 DELIVERY, STORAGE, AND HANDLING

A. Final Record Documents shall be delivered to the Engineer.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. As-Built Drawings

1. The Contractor shall create an As-Built Drawing Set by revising the Conformed Drawings in .DWG or .RVT or in some cases a combination of both formats conforming to ISO 13567 and the NYCDEP BIM/CAD Standard Manual. If no Conformed Drawings were created, then the Contractor shall use the original Bid Set Drawings. When using the Conformed Drawings, the Contractor shall independently confirm that the changes made by the Addenda to the original Bid Set Drawings were correctly reflected in the Conformed Drawings. Files submitted in .DWG or .RVT format will be bound to include all related matter (e.g., base files, font files and shapes). If submitting in .RVT format, the file must contain the 3D

discipline models, discipline links, and all associated drawing sheets. Each file shall be viewable and printable in its entirety without recourse to external files. In addition to .DWG or .RVT or a combination of both formats of deliverables, the Contractor shall also submit a point cloud deliverable, supplied in industry-standard formats such as .RCP/.RCS, and shall accurately capture the completed conditions of the project and be aligned to the established project coordinate system. These drawings shall use the same title block and sheet numbers as the original "Bid Set Drawings", with the exception that an "AB" is prefixed onto the original drawing number. When using the Conformed Drawings, the Contractor shall independently confirm that the changes made by the Addenda to the original "Bid Set Drawings" were correctly reflected in the Conformed Drawings.

2. The Contractor shall use the information compiled during construction to create an As-Built Drawing Set. 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 including Change Orders, Design During Construction (DSDC) memoranda and Requests for Information (RFIs). These deviations and/or changes shall generally relate 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. All deviations and/or changes shown shall be field verified.

3. The Contractor should have the electronic files of the Contract Drawings. However, should the Contractor require an additional copy, the Engineer will supply the Contract Drawings in .DWG or .RVT files upon written request, if such copies are available. The .DWG or .RVT files will consist of a bound set of drawings.

4. Drawing Size – The As-Built Drawings are to be the same size as the full size Contract Drawings (22-inches by 34-inches).

5. The new As-Built Drawing number shall be generated as per the following steps:

    a. The As-Built Drawing number is the original Bid Set Drawing number prefixed by an "AB" for As-Built.

        1) Example: If the drawing number for a Contract Drawing is 36G-02S-14, the As-Built Drawing number will be "AB-36G-02S-14".

    b. If a new drawing is produced, its number can be added to the end of the series (i.e., if 14 is the last drawing in the series, then the first new drawing becomes 15; the second new one becomes 16, etc.).

    c. If a new drawing is inserted into the middle of a series, it is assigned a letter suffix starting with A (i.e., 02A, 02B, etc.).

1) Example: If the drawing number for a Contract Drawing is 36G-02S-02, the new, additional As-Built drawing will be numbered “AB-36G-02S-02A”.

6. Designation – The designation “As-Built Drawing” is to be added to the drawing. Insert the words “As-Built Drawing” above the title box in the right hand corner of the drawing. (Do not include the quotation marks in “As-Built Drawing” when marking the drawing.)

7. Modifying the Contract Drawings – Prior to submitting an As-Built Drawing made from a Contract Drawing for review and acceptance, the Contractor is to create a “clean” finished copy of the drawing by undertaking the following:

   a. Remove all signatures and certifications from the Contract Drawing

   b. Remove all previous revisions and references from the revision boxes

   c. Remove the Professional Engineers seal, Engineer’s company names, and any initials from the drawing title block

   d. Modify all of the original title boxes to show the Contractor information including the name of the Contractor and the date.

   e. Remove all previous markings (notes, revision indicators, balloons, submittal stamps, etc.) from the drawing.

8. Contractor’s Information – The Contractor’s name, address, contact information and date (month and year) the Project is completed is to be added to the drawing. Place this information in the title block in the space previously utilized for the Engineer’s name.

9. Adding Revisions – Items/areas changed are to be enclosed within a cloud line. The revision cloud layer is to be a 0.024-inch line thickness.

10. The Contractor shall submit copies of the As-Built Drawings for review and approval by the Engineer. These submittals shall show the deviations and changes from the original design drawings by using red-line mark-ups. The Contractor shall make modifications to the submitted As-Built Drawings as required by the Engineer. In the final, approved set of As-Built Drawings, the red lines shall be converted to black.

11. The final approved set of As-Built Drawings shall have the following statement on the cover sheet:

   a. "These As-Built Drawings for Contract ###, as prepared by XYZ Company, have been prepared as Record Copy Drawings.” The above statement shall be signed by the representative of the Contractor. The signer shall be identified along with the Contractor.

B. Final Copy Shop Drawings (FCSDs)

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 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 26 05 91-002, the FCSD will be numbered "FCSD-26 05 91-002",

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. FCSD Submittal for Approval

a. Two (2) 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 (1) approved set of the FCSDs for use in submitting the entire set in paper and electronic copies.

C. Bid Set Contract

1. If the Contractor does not have a complete set of the original Bid Set Contract (including 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 Contract Drawings, as discussed below. This set shall include all the sequential pages of the Contract Documents and shall include:

a. Front and back covers
b. Invitation for Bids
c. Information for Bidders
d. Table of Contents
e. Notice to Bidders
f. Standard Construction Contract
g. General Conditions
h. Schedule of Wage Rates
i. Specification Sections
j. 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 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.

D. 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 .DWG or .RVT format, the Contractor may request a set from the Engineer. If possible, the Bid Set Drawings will be provided to the Contractor in .DWG or .RVT format, bound with their respective data sets.

E. Conformed Set Contract

1. The Conformed Set Contract shall be Archived.

F. Conformed Drawings

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

G. Change Orders

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

H. Operations and Maintenance (O&M) Manuals

1. The O&M Manuals shall be Archived.

2. O&M Manuals should have been submitted and reviewed as part of the shop drawings submission and review process in accordance with Section 01 78 25 - Operations and Maintenance Manuals.

3. Final, approved copies of the O&M Manuals shall be furnished during the progress of the work in accordance with Section 01 78 25 - Operations and Maintenance Manuals. Additional electronic copies of each manual shall be submitted as part of the Final Record Documents.

I. Key Documents

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

J. Additional Documents

1. Any Additional Documents such as Soil Classification Reports, Environmental Impact Statements, Site Assessments, Geotechnical Reports, permits and RFIs 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.

K. Job Photographs and Videos

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

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

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 & .DWG or .RVT)	4 sets (PDF/A & .DWG or .RVT)	2 sets
Final Copy Shop Drawings	1 set (PDF/A & .DWG or .RVT)	4 sets (PDF/A & .DWG or .RVT)	1 set
Conformed Drawings	1 set (PDF/A & .DWG or .RVT	4 sets (PDF/A & .DWG or .RVT)	NA
Bid Set Drawings	1 set (PDF/A & .DWG or .RVT)	4 sets (PDF/A & .DWG or .RVT)	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 an eletronic copy of the Manual in a fitted sleeve attached on the inside of the front cover of the binder for the Manual. These shall be furnished to the Operating Bureau in accordance with the requirements Section 01 78 25 - Operation and Maintenance during the progress of the work. Two extra eletronic sets of each manual or two compilation sets be furnished as part of the Final Record Documents. At a minimum, four (4) sets of paper-bound O&M Manuals are to be distributed to BWT facility staff , one (1) to the chief, one (1) for use by a deputy chief, one (1) to the Marine Section, and one (1) to the BWT Trade.

SECTION 01 78 40 – RECORDS IN PAPER FORMATS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for all Final Record Documents to be produced in paper formats.

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.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 78 39 - Final Record Documents

B. Section 01 78 25 - Operation and Maintenance Manuals

1.04 REFERENCES

A. Definitions:

1. Small-Format Documents: 11 inches by 17 inches or smaller
2. Large-Format Documents: larger than 11 inches by 17 inches

B. Reference Standards:

1. ANSI/NISO Z39.48 - Permanence of Paper for Publications and Documents in Libraries and Archives

1.05 DESCRIPTION

A. Final Record Documents

For the Final Record Documents specified in Section 01 78 39 - Final Record Documents, the following directions shall apply.

1. Drawings
   a. As specified in Section 01 78 39 - Final Record Documents, provide full size, paper copies of the Final Copy Shop Drawings and As-Built Drawings (if required).
      1) Bid Set and Conformed Drawings are not required to be furnished as paper copies but shall be furnished as part of the electronic archives.
   b. Paper copies are to be produced from the electronic copies.
2. Bid Set - Contract
   a. 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.
   b. 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 inches x 17 inches).
3. O&M Manuals
   a. As required in Section 01 78 25 - Operation and Maintenance Manuals, submit hard bound copies and electronic copies of each O&M Manual during the progress of the Work.
   b. No additional paper copies are required to be submitted as part of the Final Record Documents.
4. Key Documents
   a. Key Documents, as defined in Section 01 78 39 - Final Record Documents, are not required to be produced in paper format.

5. Change Orders
    a. Change orders are not required to be produced in paper format.
6. Job Photographs
    a. The job photographs are not required to be produced in paper format for purposes of the Final Record Documents.
7. Additional Documents
    a. Additional Documents are not required to be produced in paper format.

1.06 QUALITY ASSURANCE

A. 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 work day, and once at the end of the work day.

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

1.07 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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

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 electro-photographic printing shall be used. When color electro-photographic 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 electro-photographic 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 electro-photographic 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 specified below.

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

a. Either electro-photographic 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.

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 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 01 78 42 – RECORDS IN ELECTRONIC FORMATS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This Specification describes the requirements for the electronic records for the items specified in Section 01 78 39 - 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, analog 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. The following index of this Section is presented for convenience:

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3.01	Examination / Preparation	3
3.02	Implementation	6
3.03	Field Testing / Quality Control	6
3.04	Startup / Demonstration	6
3.05	Adjusting / Protection / Cleanup	6

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 32 30 - Job Photographs and Videos

B. Section 01 78 39 - Final Record Documents

C. Section 01 78 40 - Records in Paper Formats

1.04 REFERENCES

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

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

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

D. ISO 19005-1 - Document Management -- Electronic document file format for long-term preservation - Part 1: Use of PDF 1.4 (PDF/A-1).

1.05 DESCRIPTION

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 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. File Transfer Media

1. The current file transfer medium is a waterproof USB solid state drive (SSD) also known as a flash drive. Alternative file transfer media may be used, at the discretion of DEP.

2. The USB SSD used for producing the electronic Archives shall be:

a. Corsair Flash Survivor USB 3.0 with 256 gigabytes storage

b. Or approved equal.

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. 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 USB SSD.

2. 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.

3. The Metadata Excel Table shall be included in the USB SSD of each Final Record Document type and shall serve as an index for the files of the record in the USB SSD. 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 USB SSD to which they are hyperlinked.

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

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 19005-1 Portable Document Format-Archival (PDF/A); Tagged Image File Format (TIFF), version 6.0 ("II" format); AutoCAD and Revit. 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 Computer-Assisted Design (CAD) system shall be delivered to DEP in two different file formats: Native AutoCAD or Revit; and 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.

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 Section 01 32 30 - Job Photographs and Videos.

3.02 IMPLEMENTATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

EXHIBIT A

USB SSD Folder Structure

The USB SSD shall have a folder structure similar to the ones shown below.

For a USB SSD with one set of Final Record Documents

"Contract # – Bid Drawings (PDF Files)
Metadata Table- Contract # – As-Built Drawings - PDF.xls"

For a USB SSD with more than one set of Final Record Documents:

"Contract # – Bid Drawings (PDF)
Contract # – Bid Drawings (PDF Files)
Metadata Table- Contract ### – As-Built Drawings - PDF.xls"
"Contract # – Bid Drawings (AutoCAD or Revit)
Contract # – Bid Drawings (AutoCAD or Revit Files)
Metadata Table- Contract # – As-Built Drawings - AutoCAD.xls or Revit.xls"

SECTION 01 79 05 – EQUIPMENT START-UP AND TRAINING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Representatives of Equipment Manufacturers
2. Start-up Services
3. Training of plant personnel
4. Lesson plans
5. Training aids
6. Qualifications of training specialists

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 75 10 – Preliminary and Final Field Tests

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Representatives of Equipment Manufacturers:

1. The Contractor shall provide the services of qualified factory trained representatives of the equipment manufacturers, who shall provide the following services:

a. Supervise and assist in the installation of the equipment to ensure a proper installation of the equipment.

b. Check the installation of the equipment and make all necessary adjustments prior to placing the equipment in service.

c. Supervise the preliminary and final equipment and system field test work specified in Section 01 75 10 - Preliminary and Final Field Tests.

1) Additional acceptance testing supervision resulting from the failure to meet the specified performance requirements shall be at the Contractor's expense.

d. 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.

2. The manufacturers' representatives shall devote, at a minimum, the amount of full time specified under the Contract Documents.

3. The Contractor shall coordinate all equipment start-up services and training with the City, the Engineer and the manufacturers.

B. Start-Up Services:

1. 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.

2. 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.

C. Training:

1. As part of these services, the City will provide the necessary personnel to be trained in the operation and maintenance of the equipment. Training shall occur after the initial operational period is complete.

2. 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.

3. All training shall take place at the Work Site at a place specified by the City and shall be conducted by qualified training specialists.

4. Separate training sessions shall be conducted for City mechanical operations and maintenance personnel and for City electronic and electrical maintenance personnel.

5. 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.

6. 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 Contract Documents.

7. Training shall be limited to no more than three days per week. No training shall be conducted on Mondays and Fridays.

8. The Contractor shall deliver all training material to the Engineer and the City a minimum of 14 days prior to the scheduled training.

D. Lesson Plans:

1. 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:

a. 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.

b. 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.

c. The lesson plan shall indicate when training aids are used or referred to during the course of instruction.

d. An outline of required lesson plan contents is included below:

2. Equipment Description:

a. Purpose and function of equipment and auxiliary equipment and systems.

b. Physical arrangement of equipment components and electrical supply.

c. General function of controls, including automatic and manual operation, interlocks, and shutdowns.

3. Equipment Operation:

a. Operating requirement for equipment to perform satisfactorily.

b. Typical operating characteristics.

c. Start-up and shutdown procedures.

d. Use of controls.

4. Equipment Monitoring:

a. Recommended routine instrument readings and operational checking.

b. Early warning signs of developing operational or equipment problems.

c. Procedures for handling non-routine problems such as alarms, power failures, component failures, etc.

5. Equipment operational trouble-shooting procedures.

6. Safety and Housekeeping:

a. Safety features of the equipment.

b. Safe practices.

c. Housekeeping practices.

7. Description of the use of the equipment manufacturer's O&M Manual as regards operation.

8. Preventive Maintenance Requirements:

a. Maintenance needs for equipment.

b. Identification of procedure to satisfy maintenance need (relate to equipment manufacturer's O&M Manual, which should have detailed descriptions of maintenance procedures).

c. Outline or summarize procedures.

d. Recommended schedule for performing preventive maintenance.

e. Provide preventive maintenance record forms (if available).

9. Maintenance Inspection Program:

a. Parts, components and areas of equipment to inspect for routine preventive maintenance.

b. Recommended frequency of inspection.

c. Inspection procedures.

d. Problem identification.

10. Maintenance Trouble-shooting:

a. Sections in O&M Manual detailing trouble-shooting procedures.

b. Summarize trouble-shooting procedures.

c. Testing equipment used in trouble-shooting.

1) Demonstration of use of specialized testing equipment if supplied with equipment.

2) Other testing equipment.

d. Tests used to verify trouble-shootings findings.

11. Disassembly and Assembly:

a. Summarize disassembly and assembly procedures.

b. O&M Manual coverage of subject.

c. Testing to verify success of corrective maintenance.

12. Equipment Calibration:

a. Calibration needs and tolerances.

b. Calibration equipment.

c. O&M Manual listing of calibration ranges, tolerances and settings.

13. Name, address and telephone number of nearest parts supply house and nearest repair service center.

14. Warranty information and service contract description, if applicable.

E. Training Aids:

1. 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.

2. Additional training aids shall be used for maximum training effectiveness and shall include the following as appropriate:

   a. Audio-visual aids, for example, videos, PowerPoint presentations, flow charts, posters, diagrams, and catalogue cuts.

   b. Models and samples, for example, cutaways, spare parts, tools, miniature models, equipment assemblies, and damaged parts.

3. The use of additional training aids shall be identified in the lesson plan, and a description of the additional training aids shall be given.

1.06 QUALITY ASSURANCE

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.

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 91 00 – COMMISSIONING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the Commissioning requirements of this Project. This Section includes requirements for commissioning of facilities and facility systems to verify compliance with design, including optimum energy efficient operations. This Section includes requirements for commissioning activities and documentation in compliance with the sustainability certification system used.

B. Commissioning does not take away from, or reduce, the Contractor's responsibility to provide a finished and fully functioning product and installation as per the Contract Documents.

C. This section will in no way diminish the responsibility of the Contractor in performing all aspects of work and testing as outlined in the Contract Documents. Any requirements outlined in this Section are in addition to requirements required in the Contract Documents,

D. Section Includes

1. Building commissioning of the following systems:

a. Marine Fender System

b. FRP Lumber System

c. Lighting

1) Outdoor Lighting Control System

d. Steel Debris Fence

E. Attachments

1. Attachment A: Equipment and System Schedule

F. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 31 15 – Project Coordination

B. Section 01 32 10 - Progress Scheduling

C. Section 01 78 24 – Spare Parts and Maintenance Materials

D. Section 01 78 25 – Operation and Maintenance Manuals

E. Section 01 79 05 – Equipment Start-up and Training

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Commissioning Plan

1. The Commissioning Plan provides guidance in the execution of the commissioning process. After the initial construction phase Commissioning kickoff meeting, the Contractor will update the plan. This plan is a living document that must evolve and expand as the Project progresses.

2. The Commissioning Plan shall include:

a. Description of the facility and Project.

b. Description of the commissioning process and associated deliverable documents.

c. Description of equipment and systems to be commissioned.

d. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.

e. Sampling frequency for equipment to be tested.

f. Identification of prerequisites/tasks that must be completed before the next operation can proceed.

g. Organization Chart and Contact List.

h. Description of roles and responsibilities of Commissioning team members.

i. Description of observations to be made and reported on during testing and witnessing of testing by all parties involved in the Project.

B. Commissioning Schedule: Contractor shall provide construction schedules to DEP, in accordance with Section 01 32 10 - Progress Scheduling.

1. The Contractor shall develop and submit a schedule identifying the commissioning process and provide commissioning scheduling information to the Engineer for review and planning activities.

2. The Contractor shall incorporate the commissioning activities into the Project CPM schedule.

1.06 QUALITY ASSURANCE

A. The Contractor shall have a Commissioning Agent (CxA) on staff who shall be responsible for Commissioning issues compliance and coordination.

1. The CxA shall be a Professional Engineer with 5-years of Commissioning experience on projects of similar complexity.

2. The CxA shall be a ASHRAE Building Commissioning Professional (BCxP).

1.07 SUBMITTALS

A. Commissioning Kick-off Meeting Minutes.

B. Commissioning Plan

1. Submit within 90 consecutive calendar days of Notice to Proceed.

2. Update as necessary during the work to reflect the progress on the components and systems.

C. Commissioning Schedule

1. Submit concurrent with Commissioning Plan.

2. Update as necessary during the Work to reflect the progress on the components and systems.

D. Functional performance test procedures and forms: Submit minimum 30 calendar days prior to testing.

E. Deficiency Report and Resolution Record

1. Document items of non-compliance in materials, installation or operation. Document the results from start-up/pre-functional checklists, functional performance testing, and short-term diagnostic monitoring. Include details of the components or systems found to be non-compliant with the drawings and specifications. Identify adjustments and alterations required to correct the system operation and identify who is responsible for making the corrective changes.
2. Update as necessary during the work to reflect the progress on the components and systems.

F. Final Commissioning Report

1. Compile a Final Commissioning Report. Summarize all of the tasks, findings, conclusions, and recommendations of the commissioning process. Indicate the actual performance of the facility systems in reference to the DEP's Project requirements and Contract documents. Include completed pre-functional inspection checklists, functional performance testing records, diagnostic monitoring results, identified deficiencies, recommendations, and a summary of commissioning activities.

G. Operation and Maintenance (O&M) Manual Submittals

1. Contractor shall provide O&M manuals to DEP, in accordance with Section 01 78 25 – Operation and Maintenance Manuals.

H. Training

1. Contractor shall provide training in accordance with Section 01 79 05 – Equipment Start-up and Training.

I. Spare Parts

1. Contractor shall provide spare parts to DEP, in accordance with Section 01 78 24 – Spare Parts and Maintenance Materials.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. Commissioning Process

1. The following provides an overview of the Commissioning tasks during Project construction and the general order in which they occur.

   a. Construction-phase Commissioning begins with a Commissioning Kickoff Meeting, conducted by the CxA in accordance with Section 01 31 15 – Project Coordination, where the Commissioning process is reviewed with all the Commissioning Team Members.

   b. Additional meetings may be required throughout construction, scheduled by the CxA in accordance with Section 01 31 15 – Project Coordination, with necessary parties attending to plan, scope, coordinate and schedule future activities and resolve open Issues.

   c. The Engineer will review the Contractor submittals and provide comments to the Contractor for inclusion in their review. The reviewed submittals will include all commissioned equipment information, including detailed startup procedures, and coordination drawings that include commissioned equipment and systems, control drawings and sequences, and interfaces and interlocks between systems.

   d. The CxA works with the CM and the Engineer in developing Pre-functional and Functional Test documentation formats.

   e. Periodically throughout the construction process, the CxA will perform site visits to observe component and system installations.

   f. The checkout and performance verification generally proceeds from component level to equipment to systems and intersystem

levels. Pre-functional (Installation) Checklists are to be completed before Functional Performance Checklists.

g. The Contractor shall, with guidance from the CxA, execute and document the Pre-Functional (Installation) Checklists and perform startup and initial checkout of equipment and systems. The CxA documents that the checklists and startup are completed according to the approved plans. This will include the CxA witnessing selected assembly markups, portions of the startup of selected equipment, and spot checking the Pre-Functional (Installation) Checklists.

h. The CxA develops specific equipment and system Functional Checklists. The Contractor receives a copy of the procedure through the Commissioner. The CxA may request additional design narrative from the Commissioner and Controls Contractor, depending on the completeness of the Basis of Design and sequences provided within the design documents.

i. The Functional Checklists are executed by the Contractor and witnessed and documented by the CxA.

j. Items of non-compliance in material, installation startup, and operation are corrected and the equipment or system is rechecked. The CxA will maintain an Issues Log to track Issues and Issue resolution.

k. The CxA will review the Operation & Maintenance documentation for completeness.

l. Completion of Commissioning is required for Substantial Completion.

m. The Final Commissioning Report shall be submitted to the Engineer within 30 consecutive calendar days after substantial completion.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

Attachment A – Equipment and System Schedule

The following equipment and systems shall be commissioned in this Project.

System	Equipment	Check
Marine Fender System	Rubber fenders	
	Steel panels	
	Mounting brackets and frames	
	Lifting hoist	
FRP Lumber System	FRP Lumber	
	Fasteners and connectors	
	Support structures	
	Protective coatings	
Temporary Sludge Line and Sludge Nozzle Assembly	Heat tracing	
Lighting Controls	Sweep or scheduled lighting controls	
	Daylight dimming controls	
Steel Debris Fence	Fence panels	
	Posts and supports	
	Gates and access points	

SECTION 02 41 10 – DEMOLITION AND REMOVALS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to complete the demolition, removal, disposal and relocation Work.

B. Included, but not limited to, are demolition and removals of existing materials, structures, equipment, or work necessary to install the new Work, as shown and specified and to connect same with existing work in an approved manner. Demolition includes structural concrete, foundations, walls, doors, windows, structural steel, metals, roofs, masonry, attachments, appurtenances, piping, electrical and mechanical equipment, paving, curbs, walks, fencing, and similar existing facilities.

C. Demolitions and removals which may be specified under other Sections shall conform to requirements of this Section.

D. The Contractor shall obtain all required permits from the City and other agencies having jurisdiction.

E. The following index of this Section is presented for convenience:

F.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 31 25 10 - Dust, Soil Erosion and Sediment Control

1.04 REFERENCES

A. 29 CFR 1926 - Safety and Health Regulations for Construction (Subpart T - Demolition)

B. 29 CFR 1910 - Occupational Safety and Health Standards

C. ANSI/ASSE A10 - Construction and Demolition Safety Standards

D. AWS D12.1 - Reinforcing Steel Welding Code

E. NYCDEP - Environmental Health and Safety Policies and Procedures – Vol. III. Control of Hazardous Energy Lock-Out/Tag-Out, or latest version

1.05 DESCRIPTION

A. Protection:

1. Demolition and removal Work shall be performed by competent workers experienced in the various types of demolition and removal Work required. The Work shall be carried through to completion with the prevention of damage to structures and the adjacent property and with due regard to the safety of City employees, work persons on the site, and the public. The Work will be performed so as not to interfere with the use of, and free and safe passage to and from, adjacent structures.

2. The Contractor shall provide, erect and maintain catch platforms, lights, barriers, weather protection, warning signs and other items as required for proper protection of the public, occupants of the building, work persons engaged in demolition operations, and adjacent construction.

3. The Contractor shall provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.

4. The Contractor shall provide and maintain temporary protection of the existing structure designated to remain where demolition, removal and construction work is being done, connections made, materials handled or equipment moved. The Contractor shall be responsible for any damage to the existing structure or contents by reason of providing insufficient protection.

5. The Contractor shall take necessary precautions to control dust as required by Section 31 25 10 – Dust, Soil Erosion and Sediment Control. Dust

shall be prevented from rising by wetting demolished masonry, concrete, plaster and similar debris. All portions of the existing facility affected by the operations under this Section shall be protected by dustproof partitions and other adequate means.

6. The Contractor shall provide adequate fire protection in accordance with local Fire Department requirements.

7. The Contractor shall carry out all operations so as to avoid interference with operations and work in the existing facilities and the work under other contracts.

8. The Contractor shall be solely responsible for making all necessary arrangements and for performing all necessary work involving the discontinuance or interruption of all utilities or services.

9. Any equipment, piping and appurtenances removed without proper authorization, and that are necessary for the operations of the existing or expanded facilities, shall immediately be replaced to the satisfaction of the Engineer at no cost to the City.

10. Closing or obstructing of roadways, sidewalks, and passageways adjacent to the work by the placement or storage of materials will not be permitted, and all operations shall be conducted with minimum interference to traffic.

11. The Contractor shall repair damage caused by its operations to existing structures and equipment to remain, or to any property belonging to the City or its employees.

12. The Work shall comply with 29 CFR Part 1926 -- Safety and Health Regulations for Construction, applicable provisions and recommendations of ANSI/ASSE A10 -- Construction and Demolition Safety Standards, New York City Construction Code, New York City Electrical Code, all other governing codes and rules, and as specified herein or shown in the Contract Documents.

13. The Contractor shall make such investigations, explorations and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal.

14. Demolition and removal of hazardous materials shall be in accordance with applicable federal, State and Local regulations.

B. Permits: The Contractor shall obtain all permits from all appropriate regulatory agencies required for closing or obstructing streets and sidewalks. Obtain all air permits as required for demolition of any building or structure located in New York City including a Demolition Permit from the Department of Buildings and a DEP Registration for Demolition from the Department of Environmental Protection, Bureau of Environmental Compliance.

C. Condition of Structures and Equipment:

1. The City does not assume responsibility for the actual condition of structures and equipment to be demolished and removed.

2. Conditions existing at the time of inspection for bidding purposes will be maintained by the City so far as practicable. However, there is no guarantee by the City that the number of fixtures, amount of equipment or any other material of value existing at bidding time in the buildings and structures to be demolished will be present in the structures when they are demolished. The Contractor shall have no claim against the City because of the absence of such fixtures and materials.

3. The conditions of existing structures and equipment shown on the Contract Documents is based on visual inspection and a walk-through survey only. Neither the Engineer nor the City will be responsible for interpretations or conclusions drawn therefrom by Contractor.

D. Scheduling: The Contractor shall carry out operations so as to avoid interference with City's operations and work in the existing facilities.

E. Notification: At least 48 hours prior to commencement of a demolition or removal, Contractor shall notify the Engineer in writing of his proposed schedule. City will inspect the existing equipment or facilities and review with the Contractor those items which are to remain the property of the City. No removals shall be started without the permission of the Engineer.

F. Coordination: The Contractor shall coordinate all electrical shutdowns with the Engineer and the Plant's Responsible Individual as defined in the DEP Policies and Procedures. The Contractor shall confirm all equipment is de-energized, and install required lock-out and tag-out devices on electrical equipment to prevent accidental re-energizing of the equipment.

G. Pre-Demolition Meeting:

1. The Contractor shall have a pre-demolition meeting with the Engineer and representatives of other related construction contracts, if any, in the presence of the Resident Engineer, to review all of the work areas that will be affected by the removal of materials from demolition.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to proposed methods, equipment and operating sequences to be used in performance of the demolition and removals work and handling of hazardous materials.

B. The Contractor shall demonstrate how coordination of operations and sequence for shut-off, capping, temporary services, continuation of utility services, and other applicable items will be provided to ensure no interruption of City's operations.

C. Sequence and Schedule: The Contractor shall submit a detailed schedule showing the sequence and duration of demolition activities.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 IMPLEMENTATION

A. General:

1. The Work required shall be done with care, and shall include all necessary shoring, bracing, and support to prevent movement, settlement, or collapse of existing structures or facilities. The Contractor shall be responsible for any damage caused by demolition and removal Work to any part or parts of existing structures or equipment designated for reuse or to remain. The Contractor shall perform patching, restoration and new work in accordance with applicable technical sections and details of the Contract Documents.

2. Surfaces of walls, floors, ceilings, or other areas which are exposed by any of the removals specified herein, and which will remain as architecturally finished surfaces, which have holes, scars, chipped or other damaged

surfaces revealed by the removal, shall be repaired by the Contractor with the same or matching materials as the existing surface or as may be otherwise approved by the Engineer.

3. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with Section 31 25 10 – Dust, Soil Erosion and Sediment Control and all governing regulations pertaining to environmental protection.

   a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

   b. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing prior to the start of the work.

   c. The use of calcium chloride for dust control will not be allowed.

4. All supports, pedestals and anchors shall be removed with the equipment and piping unless otherwise specified or required. Concrete bases, anchor bolts and other supports shall be removed to approximately one inch below the surrounding finished area, and the recesses shall be patched to match the adjacent areas. Superstructure wall and roof openings shall be closed, and damaged surfaces shall be patched to match the adjacent areas, as specified under applicable sections of the Specifications, as shown on the Contract Drawings, or as directed by the Engineer. Wall sleeves and castings shall be plugged or blanked off, all openings in concrete shall be closed in a manner meeting the requirements of the appropriate sections of the Specifications, as shown on the Contract Drawings and as directed and approved by the Engineer.

5. Any materials or items designated to remain the property of the City shall be removed with care and stored at locations designated by the City.

6. Where equipment is shown or specified to be removed and relocated, the Contractor shall not proceed with removal of this equipment without the prior approval of the Engineer. Upon approval, and prior to commencing removal operations, the equipment shall be operated in the presence of representatives of the Contractor, the City and the Engineer. Such items shall be removed with care, under the supervision of the trade responsible for reinstallation, and shall be protected and stored until required. Material or equipment damaged during removal shall be replaced with similar new material or equipment. Any equipment that is removed without proper authorization and is required for plant operation shall be replaced at no cost to the City.

7. Wherever piping is to be removed for disposal, the Contractor shall drain the piping and adjacent pipe and headers that are to remain in service shall be blanked off or plugged and then anchored in an approved manner.

8. Where alterations occur, or new and old work join, the Contractor shall cut, remove, patch, repair or refinish the adjacent surfaces to the extent required by the construction conditions, so as to leave the altered work in as good a condition as existed prior to the start of the work. The materials and workmanship employed in the alterations shall be of the same quality as required for new work of the same type.

9. The Contractor shall remove enclosures, signs, guards, and the like when no longer required or when directed by the Engineer at the completion of the Work.

10. The Contractor shall dispose of all demolition materials, equipment debris, and all other items not marked or specified by the City or the Engineer to remain as property of the City, off site and in conformance with the requirements of the Contract and all existing applicable laws and regulations.

11. The Contractor shall de-energize and disconnect electrical service to all structures and equipment prior to demolition or relocation. No demolition activity shall commence prior to electrical disconnection.

12. All construction and demolition debris that has come in contact with regulated solid waste shall be cleaned to the satisfaction of the Engineer before leaving the site.

13. The use of explosives is not permitted.

B. Structural Removals

1. The Contractor shall remove concrete, structures and sub-structures to the lines and grades shown unless otherwise directed by the Engineer.

2. The Contract Drawings show approximate available information on thickness of existing concrete to be removed and the extent of reinforcement. It is the Contractor's responsibility, before commencing the demolition work, to verify the thickness of existing concrete to be removed and the extent to which it is reinforced by suitable means as deemed necessary by the Contractor in the field. The City does not guarantee the accuracy of existing concrete thickness to be removed or the extent of reinforcement shown on the Contract Drawings, as actual concrete thickness or reinforcement may vary. No additional compensation will be made because of variations from the thickness of concrete or for variations in the extent of reinforcement shown on the Contract Drawings.

3. All concrete, stone, reinforcement, structural or miscellaneous metals, wire mesh and other items contained in or upon the structure shall be removed and taken from the site and disposed of at a permitted facility. Demolished items shall not be used in backfill.

4. After removal of parts or all of slabs and like work which tie into new work or existing work, the point of junction shall be neatly repaired so as to leave only finished edges and finished surfaces exposed.

C. Mechanical Removals

1. Mechanical removals shall consist of dismantling and removing existing pipes and other facilities as specified, shown, or required for the completion of the work. It shall include cutting, capping, draining, and plugging as required, except that the cutting of existing piping for the purpose of making connections thereto will be included under Division 40 of the Specifications.

2. Existing process, water, chemical, and other piping shall be removed where shown on the Contract Drawings. All removed piping shall be removed to the nearest solid support, capped and left in place. Piping shall be purged and made safe by the Contractor prior to removal or capping. Disposal of any chemicals or other purged material in accordance with the requirements of Section 01 35 45 - Hazardous Materials Control and other applicable environmental, health, and safety (EHS) requirements of the Contract shall be the responsibility of the Contractor. Where piping that is to be removed passes through existing walls, it shall be cut off and properly capped on each side of the wall.

3. When underground piping is to be altered or removed, the remaining piping shall be properly capped. Abandoned underground piping may be left in place unless it interferes with new work or is shown or specified to be removed.

4. Any required demolition or changes to potable water piping and other plumbing system work shall be made in conformance with all applicable codes. Other plumbing piping and heating piping shall be pressure tested only.

5. Provide all caps, plugs, blind flanges, shut-off valves and other work and materials required to remove from service existing piping and necessary to keep existing piping in service where shown or required.

D. Pavement, Curb and Sidewalk Removals:

1. Remove existing pavement, including base and surface courses, stabilized sub-bases, curbs, and gutters as required to construct new facilities or as shown. Before removing, saw a straight joint at least 1-1/2-inches deep between sidewalk and pavement designated for removal and that left in place. Curbs and gutters shall be removed to the nearest construction joint beyond the limit of demolition shown on the Contract Drawings.

2. Provide for satisfactory transition between replaced pavement and sidewalks and the portions remaining in place.

E. Electrical Removals:

1. Electrical removals shall consist of the removal of existing distribution switchboards, control panels, conduits and wires, and miscellaneous electrical equipment all as shown, specified, or required to perform the work.

2. All existing electrical equipment and fixtures to be removed shall be removed with such care as may be required to prevent unnecessary damage to keep existing systems in operation and maintain the integrity of the grounding systems.

3. Distribution switchboards shall be removed or modified as shown in the Contract Documents. Switchboards to be removed shall be disconnected and dismantled, and all components shall be disposed of off the site. Circuit breakers and other control equipment on modified switchboards that will no longer be used shall be removed unless otherwise shown or specified. All new openings cut into the modified switchboard panels shall be cut square and dressed smooth to the dimensions required for the installation of the new equipment.

4. Conduits and wires shall be abandoned or removed where shown. All wires in abandoned conduits shall be removed, salvaged, turned over to the City and stored where directed by the Engineer. Abandoned conduits concealed in floor or ceiling slabs, or in walls, shall be cut flush with the slab or wall at the point of entrance. The conduits shall be suitably plugged and the area repaired in a flush, smooth, approved manner. Exposed conduits and their supports shall be disassembled and removed from the site. Repair all areas of work to prevent rust spots on exposed surfaces.

5. The Contractor shall coordinate all electrical shutdowns with the Engineer and the facility's Responsible Individual as defined in the DEP Policies and Procedures. The Contractor shall confirm all equipment is de-energized, and install required lock-out and tag-out devices on electrical equipment to prevent accidental re-energizing of the equipment.

F. Miscellaneous Removals:

1. Contractor shall remove miscellaneous items where shown on the Contract Documents or where necessary for the construction of new structures or modification of existing structures. Anchor bolts shall be cut back minimum three inch below the concrete surface and the hole patched.

G. Modifications and Closures:

1. Modifications shall conform to all applicable requirements of the Contract Documents, and the directions and approvals of the Engineer.

2. Where alterations require cutting or drilling into existing floors and walls the holes shall be repaired in an approved manner. Contractor shall repair such openings with the same or matching materials as the existing floor,

wall, or as otherwise approved by the Engineer. All repairs shall be smoothly finished unless otherwise approved by the Engineer.

3. Where parts of existing structures are to remain in service, demolish the portions to be removed, repair damage, and leave the structure in proper condition for the intended use. Remove concrete to the lines designated by drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp straight corners that will result in neat joints with new construction or be satisfactory for the purpose intended. Where existing reinforcing rods are to extend into new construction, remove the concrete so that the reinforcing is clean and undamaged. Cut off other reinforcing flush with the surface.

4. New work shall be keyed into the existing in an acceptable manner. New reinforcing steel shall be welded to the existing reinforcing. Welding shall conform to AWS D12.1, Reinforcing Steel Welding Code. In general, the same or matching materials as the existing adjacent surface shall be used. The finished closure shall be a smooth, tight, sealed, permanent closure with all exposed surfaces smooth finished and acceptable to the Engineer.

H. Maintenance and Clean Up:

1. Contractor shall maintain the facility, structures, and other City properties free from accumulations of waste, debris, and rubbish caused by the demolition and removal operations.

2. Contractor shall provide on-barge dump containers for collection of waste materials, debris and rubbish, and shall wet down dry materials to prevent blowing dust. Demolition materials and debris shall not be stored on facility premises unless permitted by the Engineer.

3. At reasonable intervals during the progress of the demolition and removal work or as directed by the Engineer, the Contractor shall clean the Site and properties and dispose of all waste materials in accordance with the applicable regulations and requirements of this Contract.

4. All recyclable items shall be recycled.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This Section details the requirements for construction and demolition activities affecting Asbestos-Containing Materials (ACM), trace asbestos materials (i.e., Building Materials containing 1% or less of asbestos), and Asbestos-Containing Waste Materials, if discovered during the Work. As shown in Attachment A – Table 1 from the Limited Asbestos, Lead Paint, and PCB Survey Report for the North River WRRF Underdeck Structural and Marine Improvements Project, Contract NR-107, May 2025 attached to Section 01 35 45 – Hazardous Materials Control, specified herein, or required to complete the Work, no ACM was identified to be impacted by the Work. However, if suspect ACM, trace asbestos materials (i.e., Building Materials containing 1% or less of asbestos), and/or Asbestos-Containing Waste Materials are discovered, the suspect ACM must be sampled and analyzed in accordance with these Specifications and applicable regulations.

B. All Work under this Section shall be performed to minimize the creation of airborne emissions; minimize the quantity of waste generated; protect the health and safety of all personnel and welfare of the public; and avoid adverse environmental impacts.

C. It should be noted that DEP Asbestos Projects being conducted on New York City property that is physically located outside of the five boroughs, would be subject to the requirements of 12 NYCRR 56, and not the requirements of RCNY Title 15, Chapter 1.

D. In the absence of analytical testing results for certain materials, the material shall be classified as suspect ACM pending the analytical results. Abatement of unforeseen or suspect/confirmed asbestos during the Work performed under this Section shall be in accordance with Section 01 35 45 – Hazardous Materials Control.

E. All Independent Third-Party air monitoring shall be outside this Contract and performed by others.

F. The Contractor shall label all known ACM in the field to prevent accidental disturbance by workers.

G. The following index of this Section is presented for convenience:

H.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurements and Payments.

B. At the completion of abatement activities, the Contractor is responsible for submitting all of the documentation required herein. Payment to abate and dispose of ACM and resulting Asbestos-Containing Waste Materials produced by this Work will not be made until all required documentation, including the following is provided to the City:

1. Copies of all NYSDOL and DEP 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 DEP 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 Worker 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 (10 NYCRR 55-2).

5. All data related to bulk sampling, including the results of any asbestos surveys performed by a DEP-certified Asbestos Investigator and NYSDOL-certified Asbestos Inspector, where applicable.

6. The Asbestos Work Plan submitted and implemented 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(s) 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.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental Health and Safety Requirements
B. Section 01 35 45 – Hazardous Materials Control
C. Section 01 41 00 - Regulatory Requirements
D. Section 01 51 11 – Temporary Water and Sanitary Services
E. Section 01 51 12 – Temporary Heat and Ventilation
F. Section 01 51 30 – Temporary Electrical System

1.04 REFERENCES

A. Definitions

1. Abatement: Any and all procedures physically taken to control fiber releases from ACM. This includes Removal, Encapsulation, enclosure, cleanup, and Repair.
2. Adequately Wet: Defined by the EPA (40 CFR 61.141) as a material sufficiently mixed or penetrated with amended water to prevent the release of Visible Emissions. If Visible Emissions are observed coming from an ACM or asbestos waste, then the material has not been "Adequately Wetted." However, the absence of Visible Emissions is not evidence of being Adequately Wet. ACM must be fully penetrated with the wetting agent to be Adequately Wet. If the ACM being abated is resistant to amended water penetration, the wetting agent shall be applied to the material prior to and during Abatement as necessary to minimize the potential for fiber releases.
3. Aggressive Air Sampling: A method of sampling within a Negative Pressurized Enclosure (NPE) in which mechanical equipment is used before and during the sampling period to stir up settled dust/asbestos fibers. Mechanical equipment includes 20-inch fans and forced air equipment (e.g., a one-horsepower leaf blower).
4. Air Sampling Technician: A person who performs Asbestos Project air sampling and possesses a valid Air Sampling Technician certificate issued by the NYSDOL.

5. Ambient Air Monitoring: The measurement or determination of airborne asbestos fiber concentrations outside but in the general vicinity of the Work site, performed in accordance with NIOSH or EPA sampling methodologies.

6. Asbestos Abatement Contractor: A Subcontractor licensed by the NYSDOL who performs Abatement during an Asbestos Project, or employs persons performing such Abatement.

7. Asbestos Abatement Permit: A permit issued by the DEP ACP in accordance with RCNY Title 15, Chapter 1, authorizing the performance of construction Work for Asbestos Projects involving any of the activities defined in RCNY Title 15, Chapter 1-26(a) (1)-(13).

8. Asbestos Assessment Report (Form ACP-5): A form submitted to the DEP ACP by which a DEP-certified Asbestos Investigator certifies that a building or structure (or portion thereof) is free of ACM or the amount of ACM to be abated constitutes a Minor Asbestos Project.

9. ACM: Any material containing greater than one percent asbestos.

10. Asbestos Handler: An individual certified by the DEP and/or NYSDOL who disturbs, removes, encapsulates, repairs, or encloses ACM. Asbestos Handlers working on projects within the five boroughs shall possess both DEP and NYSDOL certifications. Asbestos Handlers working on projects outside of the five boroughs shall possess NYSDOL certifications.

11. Asbestos Handler Supervisor: An individual certified by the DEP and/or NYSDOL who supervises the asbestos handlers during an Asbestos Project, and ensures that proper asbestos Abatement procedures as well as individual safety procedures are being adhered to. Asbestos Handler Supervisors working on projects within the five boroughs shall possess both DEP and NYSDOL certifications. Asbestos Handler Supervisors working on projects outside of the five boroughs shall possess NYSDOL certifications.

12. Asbestos Project: Any Work performed in connection with the alteration, renovation, modification, or demolition of a building or structure, or in connection with the replacement or repair of equipment, pipes, or electrical equipment not located in a building or structure, which will involve the Abatement, Disturbance, or cleanup of friable or Non-Friable Asbestos. Asbestos Projects are classified as either Large Asbestos Projects, Small Asbestos Projects, or Minor Asbestos Projects in New York State and New York City, and each type of project involves several phases, which can include: background air monitoring, mobilization, pre-abatement/Containment construction, Abatement, cleaning/re-cleaning, final Clearance Air Monitoring, Containment breakdown, and demobilization.

13. Asbestos Project Notification (Form ACP-7): A form submitted to the DEP ACP for all Large Asbestos Projects and Small Asbestos Projects. Minor Asbestos Projects do not require an ACP-7 form.

14. Asbestos-Containing Waste Material: ACM or asbestos-contaminated objects requiring disposal.

15. Building Materials: Any and all materials listed in 12 NYCRR 56-5.1(f)(1), including but not limited to interior and exterior finished, equipment, plaster, roofing, flooring, caulking, sealants, tiles, insulation, and mortar and refractory bricks used in the construction of boilers.

16. Clean Room: An uncontaminated area or room that is part of the Personal Decontamination Enclosure System, with provisions for the storage and changing of "street clothes" into clean Personal Protective Equipment (PPE).

17. Clearance Air Monitoring: Area air monitoring performed inside the Restricted Area and Regulated Abatement Work Area after the completion of the final cleaning, final waiting period, and Final Visual Inspection by the Asbestos Handler Supervisor and Project Monitor. Aggressive Air Sampling shall be performed as part of the Clearance Air Monitoring activities inside of the Containment.

18. Containment: The NPE within the Restricted Area, which establishes the Regulated Abatement Work Area, and surrounds the location where the asbestos Abatement is actually taking place.

19. Critical Barrier: A term used by the NYSDOL to define barriers that seal-off all openings to or within the defined Regulated Abatement Work Area, including but not limited to operable windows, skylights, doorways, ducts, grills, diffusers, and any other penetrations to surfaces adjacent to or within the Regulated Abatement Work Area.

20. Disturbance: Any activities that disrupt the matrix of ACM, or Asbestos-Containing Waste Materials. This includes activities that generate dust, debris, Visible Emissions, or airborne asbestos fibers, including moving friable ACM or Asbestos-Containing Waste Materials from one place to another.

21. Encapsulation: The coating or spraying of ACM, or the bare substrate surface that is exposed after an Abatement, with a pigmented (i.e., non-transparent) liquid sealant that creates a membrane over the surface of the material (bridging encapsulant) or penetrates into the material and binds its components together (penetrating encapsulant).

22. Excursion Limit: Defined in the OSHA Asbestos Standard for the Construction Industry (29 CFR 1926.1101) as individual exposure, without regard to the use of respirators, to an airborne concentration of asbestos fibers of 1.0 fiber per cubic centimeter of air (1.0 f/cc) averaged over a 30-minute sampling period. No employee of the Contractor shall at any time be exposed to concentrations of asbestos fibers above the Excursion Limit.

23. Worker Exposure Monitoring: Personal air sampling performed outside the respirator within the breathing zone of individuals that are representative of

the 8-hour TWA and 30-minute short-term exposures of each employee, for the purpose of determining compliance with OSHA's Asbestos Standard for the Construction Industry (29 CFR 1926.1101). Analytical results from Worker Exposure Monitoring will be used to select appropriate respiratory protection and PPE for individuals within a Restricted Area and Regulated Asbestos Work Area. For the purpose of this Section, Worker Exposure Monitoring samples shall be collected from individuals who are representative of each task being conducted by the Contractor, and all Worker Exposure Monitoring shall follow pertinent NIOSH or EPA sampling methodologies.

24. Final Visual Inspection: An inspection performed by the Project Monitor and Asbestos Handler Supervisor at the completion of the final waiting period on an Asbestos Project (but prior to Clearance Air Monitoring). The inspection is performed in accordance with ASTM E1368 to determine the completeness of Abatement and cleanup.

25. Friable Asbestos: A term used by the NYSDOL to define any ACM or asbestos waste that can be crumbled, pulverized or reduced to powder when dry, by hand pressure.

26. Glovebag: A manufactured, impervious, bag-like enclosure with two (2) inward-projecting long sleeve gloves, one (2) inward-projecting waterwand sleeve, an internal tool pouch, and an attached, labeled receptacle for asbestos waste. The Glovebag is constructed and installed to surround an object or area to be abated, and contain all asbestos fibers released during the Abatement process.

27. High-Efficiency Particulate Air (HEPA) Filter: A filter designed to remove 99.97% of all particles greater than 0.3 micrometers (μm) in diameter. For the purpose of this Section, HEPA vacuum and Negative Air Pressure Equipment (i.e., Microtraps) used by the Contractor shall meet the Standard for Safety High-Efficiency, Particulate, Air Filter Units (UL 586) developed by Underwriters Laboratories.

28. Holding Area: A room or area in the Waste Decontamination Enclosure System utilized for the temporary (i.e., no longer than the current work shift) storage of containerized asbestos waste, prior to its transfer to a final on-site storage container (i.e., dumpster, trailer, or roll-off) or a licensed asbestos waste transport vehicle. The Holding Area is located between the washroom and an uncontaminated area.

29. Independent Third-Party Monitor: A NYSDOL-licensed asbestos contractor who will be contracted by the Engineer or the City, and is completely independent of the Asbestos Abatement Contractor involved with the Asbestos Project. The Independent Third-Party who conducts ambient and clearance air monitoring or Project Monitoring on an Asbestos Project shall not have any business, personal, or other relationship with the Asbestos Abatement Contractor.

30. Isolation Barrier: A term used to define the construction of partitions, the placement of solid materials, and the plasticizing of apertures to seal off the Regulated Abatement Work Area from surrounding areas and contain asbestos fibers.

31. Large Asbestos Project: An Asbestos Project involving the Removal, enclosure, Encapsulation, Repair, Disturbance, cleanup, or handling of 260 linear feet or more of ACM, or 160 square feet or more of ACM.

32. Log: An official record, maintained by the Asbestos Abatement Contractor, of all activities that occurred during the Asbestos Project. The Log shall be in the form of a bound notebook, and at a minimum, identify the following information: (a) the building owner, agent, contractor, and workers; (b) daily activities, cleanings, and waste transfers; (c) the names and certificate numbers of all Asbestos Handlers and Asbestos Handler Supervisors; (d) the results of inspections of decontamination systems, barriers, and negative pressure ventilation equipment; (e) summaries of all corrective actions and Repairs; (f) work stoppages with reasons for stoppages; (g) manometer readings at least twice per work shift; (h) daily checks of emergency and fire exits; (i) any unusual events.

33. Microtrap: (See definition of "Negative Air Pressure Equipment").

34. Minor Asbestos Project: An Asbestos Project involving the Removal, enclosure, Encapsulation, Repair, Disturbance, cleanup, or handling of 25 linear feet or less of ACM, or 10 square feet or less of ACM.

35. Negative Air Pressure Equipment: A local exhaust system capable of maintaining air pressure within the Containment at a lower pressure than the air outside of the Containment. The Negative Air Pressure Equipment also provides for the HEPA filtration of all air exhausted from the Containment.

36. Non-Friable Asbestos: A term used by the NYSDOL to define any ACM or asbestos waste that cannot be crumbled, pulverized or reduced to powder when dry, by hand pressure.

37. Obstruction: The blocking of a means of egress with any temporary structure or barrier. Polyethylene sheeting shall not be considered an Obstruction when it is prominently marked with exit signage or paint, and cutting tools (i.e., a knife or razor blade) are attached to the work area side of the sheeting for use in the event that the sheeting must be cut to permit egress. A corridor shall not be considered obstructed when there is a clear path measuring at least three feet wide.

38. OSHA Monitoring: (See definition of "Worker Exposure Monitoring").

39. P-100 Filter: (See definition of: "HEPA").

40. Perimeter Monitoring: (See definition of "Area Monitoring").

41. Permissible Exposure Limit (PEL): Defined in the OSHA Asbestos Standard for the Construction Industry (29 CFR 1926.1101) as individual exposure, without regard to the use of respirators, to an airborne concentration of asbestos fibers of 0.1 fibers per cubic centimeter of air (f/cc) calculated as an 8-hour Time-Weighted Average (TWA). No employee of the Contractor shall at any time be exposed to concentrations of asbestos fibers above the PEL. See also Excursion Limit.

42. Personal Decontamination Enclosure System: A series of connected rooms designed to control the passage of Asbestos Handlers, and other authorized individuals into the Regulated Abatement Work Area from uncontaminated areas. The system consists of a Clean Room, a Shower Room, and an equipment room separated from each other and the Regulated Abatement Work Area by airlocks and curtained doorways.

43. Personal Monitoring: (See definition of "Worker Exposure Monitoring").

44. Phase Contrast Microscopy (PCM): An analytical method (e.g., NIOSH 7400 and 7401) used for determining the asbestos fiber concentration in an air sample.

45. Polarized Light Microscopy (PLM): An analytical method (e.g., 40 CFR 763, Subpart F, Appendix A or ELAP Item 198.1 or 198.6) used for determining the asbestos content in a bulk material.

46. Post Abatement Air Monitoring: (See definition of "Clearance Air Monitoring").

47. 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.

48. Project Designer: A person who performs Asbestos Project design functions and possesses a valid Project Designer certificate issued by the NYSDOL.

49. Project Monitor: A person who performs Asbestos Project Monitoring functions and possesses a valid Project Monitor certificate issued by the NYSDOL

50. Regulated Abatement Work Area: The portion of the Restricted Area where Abatement Work actually occurs. This includes the interior of the Restricted Area Containment enclosure. For Glovebag operations, the areas contiguous to where the operation takes place are Regulated Abatement Work Areas. For tents, the interior of each tent is a Regulated Abatement Work Area. For exterior, Non-Friable Asbestos Abatement conducted without the establishment of negative air ventilation systems or Containment enclosures, the entire Restricted Area surrounding the Abatement location is considered to be the Regulated Abatement Work Area.

51. Removal: The stripping of any ACM from surfaces or components of a building or structure.

52. Repair: A term used by the DEP to define a corrective action using specified work practices (e.g., Glovebags or tents) to minimize potential asbestos fiber releases from minimally damaged ACM.

53. Restricted Area: An area established and marked for the Abatement portion of an Asbestos Project. The area shall include, but not be limited to, Regulated Abatement Work Areas and any contiguous decontamination enclosure systems, adjoining staging areas where work materials, debris, or waste materials from such Work may accumulate, and waste storage areas (e.g., dumpsters, trailers, or roll-offs).

54. Shower Room: A room between the Clean Room and the equipment room in the Personal Decontamination Enclosure System set up to prevent cross-contamination by ensuring the removal of potential asbestos contamination from the body that may have accumulated during Abatement operations. The Shower Room shall have hot and cold running water controllable at the tap, shall be arranged for complete showering during decontamination, and shall include clean, dry towels, soap, and shampoo in quantities sufficient to accommodate the personnel working on the Asbestos Project.

55. Small Asbestos Project: An Asbestos Project involving the Removal, enclosure, Encapsulation, Repair, Disturbance, cleanup, or handling of more than 25 linear feet but less than 260 linear feet of ACM, or more than 10 square feet but less than 160 square feet of ACM.

56. Suspect ACM: All friable and non-friable materials suspected of containing asbestos as determined by a certified NYSDOL Asbestos Inspector and/or certified DEP Asbestos Investigator, which have not been sampled and analyzed for asbestos content. Suspect ACM includes PACM.

57. Tent: (See definition of “Containment”).

58. Transmission Electron Microscopy (TEM): An analytical method (e.g., 40 CFR 763, Subpart F, Appendix A or ELAP Item 198.4) used for determining the asbestos fiber concentration in an air sample, or for determining the asbestos content in a bulk material.

59. Trace Asbestos-Containing Material: A building material that contains less than or equal to 1% of asbestos.

60. Variance: Relief from specific requirements set forth in state or local asbestos regulations, which is granted in writing by the agency that enforces the regulations.

61. Visible Emission: Any emission containing particulate material that can be seen without the aid of instruments.

62. Waste Decontamination Enclosure System: A series of connected rooms designed to control the transfer of materials and equipment from the

Regulated Abatement Work Area. The system consists of a washroom and a Holding Area separated from each other and the Regulated Abatement Work Area by airlocks and curtained doorways.

63. Wet Cleaning: The process of eliminating asbestos contamination from surfaces, equipment, or other objects by using cloths, mops, or other cleaning tools that have been saturated with amended water.

64. Worker Decontamination Enclosure System: (See definition of "Personal Decontamination Enclosure System").

65. Work Place Safety Plan: Construction documents prepared by a registered design professional and submitted for review to the DEP ACP in order to obtain an Asbestos Abatement Permit. The plan shall include, but not be limited to, plans, sections, and details of the Regulated Abatement Work Area clearly showing the extent, sequence, and means and methods by which the Work is to be performed.

B. Reference Standards:

1. The Contractor shall comply with all applicable regulations, standards, and guidelines of federal, state, and local environmental and occupational safety and health agencies regarding ACM, trace asbestos materials, and Asbestos-Containing Waste Materials. These regulations, standards, and guidelines include, but are not limited to the following:

a. ASTM International:

1) D2898 – Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing;

2) E84 – Standard Test Method for Surface Burning Characteristics of Building Materials;

3) E1368 – Standard Practice for Visual Inspection of Asbestos Abatement Projects.

b. United States (U.S.) Department of Transportation (DOT):

1) 49 CFR 171 - General Information, Regulations, and Definitions;

2) 49 CFR 172 – Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response information, and Training Requirements;

3) 49 CFR 173 – Shippers: General Requirements for Shipments and Packagings;

4) 49 CFR 178 – Specifications for Packagings.

2. United States Environmental Protection Agency (EPA):

a. 40 CFR 61 - National Emission Standards for Hazardous Air Pollutants (NESHAP);

b. 40 CFR 262 - Standards Applicable to Generators of Hazardous Waste;

c. 40 CFR 268 – Land Disposal Restrictions;

d. 40 CFR 302 – Designation, Reportable Quantities, and Notification;

e. 40 CFR 763 - Asbestos Hazard Emergency Response Act (AHERA).

3. National Institute for Occupational Safety and Health (NIOSH):

a. Method 7400 – Asbestos and Other Fibers by PCM;

b. Method 7401 – Asbestos by TEM.

4. National Fire Protection Association (NFPA):

a. NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials;

b. NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

5. New York City Department of Environmental Protection (DEP):

a. Environmental Health and Safety Policies and Procedures – Vol. II, Spill Prevention, Environmental Release Reporting and Investigation;

b. Environmental Health and Safety Policies and Procedures – Vol. III, Asbestos Management;

c. RCNY Title 15 Chapter 1 - Asbestos Control Program Rules and Regulations; RCNY Title 15 Chapter 19 – Discharges of Wastewater and Other Materials to Public Sewers.

6. New York City Department of Sanitation (DSNY):

a. RCNY Title 16 Chapter 8 – Asbestos Rules and Regulations.

7. New York State Department of Environmental Conservation (NYSDEC):

a. 6 NYCRR 360 - Solid Waste Management Facilities;

b. 6 NYCRR 364 - Waste Transporter Permits;

c. 6 NYCRR 376 – Land Disposal Restrictions.

8. New York State Department of Health (NYSDOH):

a. 10 NYCRR 55-2 – Approval of Laboratories Performing Environmental Analysis.

9. New York State Department of Labor (NYSDOL):

a. 12 NYCRR 56 - Asbestos Rules and Regulations.

10. Occupational Safety and Health Administration (OSHA):
    a. 29 CFR 1910 – Occupational Safety and Health Standards;
    b. 29 CFR 1910.28 – Safety Requirements for Scaffolding;
    c. 29 CFR 1926.65 – Hazardous Waste Operations and Emergency Response;
    d. 29 CFR 1910.134 - Respiratory Protection Standard;
    e. 29 CFR 1910.1001 - Asbestos Standard for General Industry;
    f. 29 CFR 1910.1200 - Hazard Communication Standard;
    g. 29 CFR 1926 - Safety and Health Regulations for Construction;
    h. 29 CFR 1926.1101 - Asbestos Standard for the Construction Industry.
11. Underwriters Laboratories, Inc. (UL):
    a. UL 586 – Standard for Safety High Efficiency, Particulate, Air Filter Units;
    b. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.

1.05 DESCRIPTION

A. Commencement of Work: Ten (10) business days prior to the proposed start of Work at each separate location, the Contractor shall notify the Engineer, the onsite safety staff, and building occupants. No Work may proceed at any location until authorized by the Engineer.

B. The Contractor shall coordinate any required equipment shutdowns with the Engineer prior to starting the work.

C. Access Restrictions: The Contractor shall inform the Engineer of proposed access restrictions (i.e., areas or items of equipment which will not be accessible during the proposed Asbestos Project), and provide them estimated time frames (including specific dates) of such proposed access restrictions. The Contractor shall notify Other Contractors in advance of the abatement Work included herein, to provide them with sufficient time for coordination of interrelated items that are included in their contracts and that must be performed before, after, or in conjunction with the Work included under this Section.

D. The Contractor shall ensure that Personal and Waste Decontamination Enclosure Systems along with the Regulated Abatement Work Area are constructed of solid materials with lockable doors to prevent unauthorized entry during non-working hours.

E. Meetings: In addition to the pre-construction meeting and site walk-through, other meetings may be required or may be requested by the Engineer, including briefings with Site Operations personnel. Written documentation (i.e., “minutes”) of all

meetings shall be generated by the Contractor, and copies shall be provided to DEP within three (3) business days following each meeting.

1.06 QUALITY ASSURANCE

A. Permits and Notifications: The Contractor shall make all necessary notifications, secure any necessary permits and Variances, complete agency-required forms, and pay all fees in conjunction with asbestos Abatement activities, waste transportation, and waste disposal in accordance with federal, state, and local asbestos regulations (as per 01 41 00 - Regulatory Requirements). Prior to the submittal of any notifications, permit/Variance applications, or forms to regulatory agencies, the Contractor shall provide them to the Engineer for review.

B. Scheduling: The Contractor shall coordinate and schedule all phases of the Work to be performed under this Section with the DEP, subcontractors, material suppliers, and other parties as necessary to ensure the proper execution of the Work.

C. Compliance: In addition to the requirements of this Section, DEP EHS Policies and Procedures and Section 01 35 27 – Environmental Health and Safety Requirements, the Contractor shall comply with all applicable regulations of federal, state, and local authorities pertaining to the Abatement, disturbance, cleanup, handling, transportation, storage, and disposal of ACM, trace asbestos materials, and Asbestos-Containing Waste Materials. All matters regarding the interpretation of any regulations, standards, or policies shall be submitted to the Engineer for resolution before starting the Work. Where the requirements of this Section, DEP EHS Policies and Procedures, and federal, state, or local regulations conflict or vary, the most stringent requirements or regulations shall apply.

D. Rejection of Non-Complying Items: DEP reserves the right to reject Contractor submittal items, including proposed disposal facility, vendors, subcontractors or personnel with regulatory citations/violations, that it deems inappropriate or unacceptable by the Engineer or DEP. The DEP further reserves the right, and without prejudice to other recourse, to accept non-complying items subject to an adjustment in the Contract amount, as approved by the DEP.

E. Suspect Material Characterization: All caulking and bitumastic coatings are considered suspect ACM. Therefore, if a confirmatory sample will be collected, the sampling shall be performed by a certified DEP Asbestos Investigator or NYSDOL Asbestos Inspector.

F. Qualifications:

1. Asbestos Abatement Contractor: The Contractor shall possess a current NYSDOL asbestos license and shall have successfully completed at least two (2) Asbestos Projects of comparable scope and methodologies within the past three (3) years. This experience shall be documented and provided as follows: (a) the name, address, and phone number of each facility where the work was performed; (b) the volume and type of each material that was abated; (c) the specific methods of Abatement (including the tools, technologies, and engineering controls employed);

2. Asbestos Handler Supervisor:

   a. Shall be currently certified by the DEP (if working on Asbestos Projects in the five boroughs) and NYSDOL (for all Asbestos Projects).

   b. Shall have a minimum of two (2) years of experience on Asbestos Projects, and shall have served as the Asbestos Handler Supervisor on at least three (3) Asbestos Projects of comparable scope and methodologies to the work being performed under this Section.

3. Asbestos Handler:

   a. Shall be currently certified by the DEP (if working on Asbestos Projects in the five boroughs) and NYSDOL (for all Asbestos Projects), and

   b. Shall have a minimum of one (1) year of experience on Asbestos Projects, and shall have worked on at least three (3) Asbestos Projects of comparable scope and methodologies to the Work being performed under this Section.

1.07 SUBMITTALS

A. Thirty (30) business days prior to commencement of the Work of this Section or as directed by the Engineer, the Contractor shall submit the following to the Engineer:

1. Asbestos Inspection and Sampling Plan: The Contractor shall provide an Asbestos Inspection and Sampling Plan to identify suspect asbestos-containing materials and collect confirmatory samples, as appropriate during the inspection.

2. The Asbestos Inspection and Sampling Plan shall include at a minimum:

   a. At a minimum, the inspection shall be performed by a certified NYSDOL Asbestos Inspector or a certified NYCDEP Asbestos Investigator (if performed within the City), who shall have OSHA 10-hour 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 RCNY Title 15 Chapter 1 or 12 NYCRR Part 56, as applicable to the Work location.

   d. Health and safety protocol (Job Hazard Analysis) for all investigation activities.

3. Asbestos Inspection Report: The Contractor shall provide an Asbestos Inspection Report summarizing the results of all inspection activities, and

as applicable, a sampling narrative, laboratory data packages and an inventory, including photographs, of all identified suspect and confirmed asbestos-containing materials. All reporting shall be in accordance with RCNY Title 15, Chapter 1 or 12 NYCRR Part 56, as applicable to the Work location.

4. Asbestos Work Plan: The Asbestos Work Plan shall be prepared in accordance with RCNY Title 15, Chapter 1 or 12 NYCRR 56, all applicable DEP EHS Policies and Procedures, and all other pertinent federal, state, and local regulations. In addition, the Asbestos Work Plan shall be coordinated with the Engineer. The Asbestos Work Plan shall also be signed and dated by a NYSDOL-certified Project Designer, with a copy of the Project Designer's current NYSDOL certification, attached to the Work Plan. The Asbestos Work Plan shall include the following elements:

   a. Asbestos Control:

      1) Drawings showing the location and details of the following: (a) each Regulated Asbestos Work Area; (b) the type, location, and number of negative air pressure machines that will be used, as well as all exhaust locations; (c) proposed electrical hookups and temporary electrical panels; (d) proposed water hookups; (e) each Restricted Area; (f) each Personal Decontamination Enclosure System; (g) each Waste Decontamination Enclosure System; (h) each waste storage area (e.g., dumpster, trailer, or roll-off); (i) restroom areas; (j) areas designated for eating and drinking.

      2) A section on the interfacing of trades (i.e., other contractors) and the sequencing of asbestos-related Work.

      3) A section on the collection, handling procedures, cleanup, and disposal of Asbestos-Containing Waste Materials (including the collection, filtering, and disposal of wastewater).

      4) A section on the procedures and methodologies that will be used to conduct Worker Exposure Monitoring, including the name and qualifications (i.e., training and experience documentation) of the individual who will be responsible for conducting the Worker Exposure Monitoring.

      5) A section on housekeeping procedures to be used for maintaining clean Regulated Abatement Work Areas, clean Restricted Areas, and clean decontamination enclosure systems.

      6) A section on the specific methods and procedures that will be used to control fiber releases, and ensure that as per 40 CFR Part 763, Subpart E, of the EPA Asbestos in Schools Rule measured by Phase Contrast Microscopy (PCM), fiber

concentrations less than or equal to the clearance and action criteria of 0.01 f/cc of air, or background levels (whichever are greater), are not exceeded outside of each Regulated Abatement Work Area. For projects conducted outside of the five boroughs of New York City, the clearance and action criteria is less than 0.01 f/cc; of air, or background levels (whichever is greater).

7) Task Analysis: Each task analysis shall include, but is not limited to, the following information: (a) the type of Work activity; (b) the tools/equipment that will be used and their respective decontamination procedures; (c) the types of ACM that will be disturbed, or Asbestos-Containing Waste Materials that may be generated when performing the activity; (d) the engineering controls that will be used to control the spread of asbestos fibers during the activity; (e) the proposed crew size for the activity and individual employee responsibilities during the activity; (f) housekeeping procedures that will be used during the activity; (g) PPE and proposed respiratory protection that will be used for the activity.

8) Equipment and Supplies: Identify the materials and equipment that will be used to perform the Work, including materials and equipment designed to be non-combustible or fire retardant in accordance with NFPA 701 and 255. Materials and equipment utilized for Abatement activities that take place within the five boroughs, shall conform to RCNY Title 15 Chapter 1-61.

9) Rental Equipment Notification: If rental equipment is to be used during the Work, the Contractor shall notify the rental agency in writing concerning the intended use of the equipment, and shall develop and submit an equipment decontamination plan to the Engineer for review and approval prior to the start of Work.

10) Safety Data Sheets (SDSs): Provide SDSs for all chemical products (including wetting agents and encapsulants) to be used for the Work.

b. Waste Management:

1) A description of the types of ACM and Asbestos-Containing Waste Materials associated with the Work (include details regarding whether the materials are friable or non-friable) as per 49 CFR 171 and 172.

2) The estimated quantity of each waste stream that will be generated as per 40 CFR 302.

3) Name, address, telephone number and current permit documentation for the disposal facility indicating that the facility is approved by federal, state, and local regulatory agencies to receive Asbestos-Containing Waste Materials.

4) Current 6 NYCRR 364 and 49 CFR 173 permit documentation for the waste transporter that will transport Asbestos-Containing Waste Materials from the Work Site to the disposal facility.

5) Spill prevention, Containment, and cleanup contingency measures to be implemented during a suspected fiber release or emergency situation.

6) A detailed discussion of the on-site handling, storage, removal, cleanup, and disposal of waste materials, including the following: (a) description of the waste storage areas; (b) the methods and procedures that will be used to collect and containerize wastes on a daily basis; (c) the types of bags/containers; (d) the submittal of weekly waste inspection records.

7) The name and qualifications of the Asbestos Handler Supervisor. At a minimum, the Asbestos Handler Supervisor shall be onsite during all activities affecting ACM.

c. Asbestos Abatement Project Notifications and Permits: Submit completed permits and notifications to the Engineer for review and approval prior to submittal to the applicable agencies. All Large Asbestos Projects and Small Asbestos Projects that take place within the five boroughs are required to follow notification and permitting procedures per RCNY Title 15, Chapter 1. All Large Asbestos Projects require notification procedures per 12 NYCRR 56. Documents that may be required based upon the scope and location of the project include, but are not limited to, the following:

1) EPA Large Asbestos Project Notification;

2) DEP Asbestos Assessment Report (Form ACP-5);

3) DEP Asbestos Project Notification (Form ACP-7);

4) DEP Asbestos Project Amendment (Form ACP-8);

5) DEP Asbestos Variance Application (Form ACP-9);

6) DEP Asbestos Technical Review Unit Permit (A-TRU Permit);

7) DEP Work Place Safety Plan;

8) NYSDOL Asbestos Project Notification;

9) NYSDOL Asbestos Variance Application.

d. A detailed schedule for the implementation of the Asbestos Work Plan elements, including the different phases of the Asbestos Project, the projected start and completion dates for Restricted Area preparation, gross Removal and Abatement, cleanings, Clearance Air Monitoring, and demobilization activities.

e. Medical Surveillance: The Contractor shall provide a sufficient number of properly trained, experienced, and certified workers, each of whom shall: (a) have received a medical exam that included a Pulmonary Function Test (PFT) within the past year; (b) have received written medical clearance within the past year, by a licensed physician, to wear a respirator; (c) have received a qualitative or quantitative respirator fit-test within the past year for the specific respirator the employee will be using for this Work.

f. Employee Documentation: The Contractor shall provide a sufficient number of properly trained, experienced, and certified workers, each of whom shall: (a) have current NYSDOL-issued and DEP-issued asbestos certificates; (b) documentation for Asbestos Handlers and Asbestos Handler Supervisors, including required work experience; and (c) dates and written proof of respiratory clearance, including fit-test and medical examinations by the Contractor or other employer within the past year.

g. A current (i.e., within the last month) signed and notarized statement disclosing all of the Abatement Contractor's OSHA, EPA, NYSDOL, DEP, DSNY, and DOT citations/violations on Asbestos Projects within the past three (3) years.

h. A current (i.e., within the last month) signed and notarized statement disclosing all of the Asbestos Handler Supervisor's NYSDOL and DEP citations/violations within the past three (3) years.

i. Analytical Laboratory Qualifications for Analyzing Air Samples: Submit the name, address, and telephone number of each analytical laboratory, including copies of current AIHA and ELAP certificates along with dates of accreditation/reaccreditation. ELAP certificates should show evidence of certification for the specific analytical methods that will be used.

5. The Contractor shall submit all Worker Exposure Monitoring results to the DEP no later than 24-hours after the collection of the air samples.

B. Field Reports and Recordkeeping: The Contractor shall maintain and provide the following documentation:

1. Worker Exposure Monitoring Documentation: Worker Exposure Monitoring Documentation shall be made available to the DEP immediately upon request. All laboratory analytical results shall be accompanied by complete COC documentation.

a. The signed Worker Exposure Monitoring documentation shall include, but not be limited to, the following information: (a) sample "start" and "stop" times; (b) flow rates (initial and final) for each sample; (c) the total volume of air collected for each sample; (d) names of individuals being sampled along with the specific Work task each individual is performing; (e) specific respiratory protection and PPE worn by each individual; (f) types (i.e., makes and models) of sampling equipment used; (g) types of sample media (i.e., filters and cassettes) used; (h) the most recent calibration dates, along with the calibration results, for the sampling equipment used; (i) name of the individual who conducted the Worker Exposure Monitoring; (j) dates that the Worker Exposure Monitoring was conducted; (k) Work tasks being performed adjacent to the Restricted Area during the Worker Exposure Monitoring; (l) unique sample numbers used to identify each sample; (m) the phase of the Asbestos Project being performed (i.e., background, pre-abatement, Abatement, cleaning, or clearance).

2. Waste Manifest Documentation: A Waste Profile for all asbestos waste shall be completed and submitted to the Engineer for review and approval prior to DEP signature. The Contractor shall submit a Facility Letter of Acceptance form the selected asbestos-permitted landfill stating that the facility will accept the asbestos wastes generated during abatement. The Contractor shall also submit advance copies of the completed manifest for the Engineer's review and approval, prior to NYCDEP signature on the date of disposal. Following disposal, completed and signed waste manifests from the approved, asbestos-permitted landfill, shall be provided to the DEP within 10 business days of disposal. In addition, on-site waste storage areas shall be inspected weekly by the Asbestos Handler Supervisor.

3. Waste Storage Area Inspection Documentation: Each weekly waste storage area inspection shall be documented in the Asbestos Abatement Contractor's bound Log. The Log shall be signed by the Asbestos Handler Supervisor, and shall be made available to the DEP immediately upon request. The content of this documentation shall include, but not be limited to, the following information: (a) the name of the inspector; (b) descriptions of waste streams; (c) waste container type and quantity; (d) the current disposal status (i.e., when the waste container is scheduled to be removed from the Work Site) and physical condition of each waste container; (e) the present condition of each waste storage area; (f) proper label type; (g) storage area security method to prevent unauthorized entry.

4. Asbestos Project Inspection Documentation: Project Monitors and Restricted Areas shall be inspected daily by the Asbestos Handler Supervisor.

   a. Each daily Asbestos Project inspection shall be documented in the Asbestos Abatement Contractor's bound Log. The Log shall be

signed by the Asbestos Handler Supervisor, and shall be made available to the DEP immediately upon request. The content of the Log shall include, but is not limited to, the following information: (a) the type of Asbestos Project (i.e., Large Asbestos Project, Small Asbestos Project, or Minor Asbestos Project) being conducted; (b) the current phase of the Asbestos Project (i.e., mobilization, background pre-Abatement, abatement, cleaning, Clearance Air Monitoring, or Containment breakdown); (c) the names of the Asbestos Handlers, Asbestos Handler Supervisors, Project Monitors, and Air Sampling Technicians on site, as well as the name of the company each individual is representing; (d) the types of air monitoring (i.e., Worker Exposure Monitoring or area monitoring) being conducted, and the number of samples being collected for each type of air monitoring activity; (e) the results of decontamination enclosure system, Critical Barrier, Isolation Barrier, and Negative Air Pressure Equipment inspections; (f) a summary of corrective actions and Repairs; (g) reasons for Work stoppages, if any; (h) manometer readings (at least twice per work shift); (i) emergency and fire exit checks; (j) verification that functional fire extinguishers are present in the Restricted Areas; (k) any unusual events that occurred during the Work; (l) non-compliance issues observed, including their corrective actions.

5. Contractor Project Record: The Asbestos Handler Supervisor shall maintain a project record in the Regulated Abatement Work Area. The Contractor Project Record shall be made available to the Engineer or DEP for review at any time during the Asbestos Project, and shall be submitted to the DEP within 24- hours after the completion of the Asbestos Project.

   a. At a minimum, the Contractor Project Record shall contain the following information: (a) copies of DEP and NYSDOL asbestos certificates/licenses for all individuals/companies working on the Asbestos Project; (b) copies of all notifications, amendments, permits, work safety plans, and Variances related to the Asbestos Project; (c) copies of all exposure and Ambient Air Monitoring results generated during the Asbestos Project; (d) documentation of all pressure differential readings for Regulated Abatement Work Areas; (e) copies of all available bulk sample analytical data as well as asbestos survey reports relating to the Asbestos Project; (f) copies of all daily sign-in sheets as defined in this Article; (g) a list of emergency phone numbers, including the local fire department, local police department, nearest hospital, as well as phone numbers for the Engineer and DEP personnel responsible for administering the Asbestos Project; (h) a copy of New York City's Asbestos Control Program Rules and Regulations (Title 15, Chapter 1); (i) a copy of New York State's Asbestos Rules and Regulations (12 NYCRR 56); (j) a copy of EPA's asbestos regulations (40 CFR 61,

Subparts A and M); (k) copies of all SDSs pertaining to all chemicals being used during the Asbestos Project; (l) a copy of the Contractor's Asbestos Work Plan; (m) copies of all daily air monitoring reports as defined in this Article; (n) copies of all daily Asbestos Project inspection reports as defined in this Article; (o) copies of all weekly waste storage area inspection reports as defined in this Article.

6. Daily Sign-In Documentation: The Contractor shall generate daily sign-in documentation for all individuals entering and exiting each Regulated Abatement Work Area and Restricted Area, for the duration of the Asbestos Project. The daily sign-in documentation shall be maintained in the Asbestos Abatement Contractor's bound Log. The daily sign-in documentation shall be made available to the Engineer or DEP for review at any time during the Asbestos Project.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Respirators: The Contractor shall select respirators approved by NIOSH for use in Regulated Abatement Work Areas where the Abatement or Disturbance of ACM or Asbestos-Containing Waste Materials will occur. If not included within the EHASP the Contractor shall submit their Respiratory Protection Program to DEP for review prior to abatement activities. At a minimum, the Contractor shall provide each individual within a Regulated Abatement Work Area with a half-face, negative pressure, air purifying respirator equipped with HEPA filter cartridges. The Contractor's Asbestos Handler Supervisor shall make all determinations regarding respiratory protection modifications that will be implemented for the Work. All modifications shall be in accordance with the OSHA Asbestos Standard for the Construction Industry (29 CFR 1926.1101) and the Contractor's Asbestos Work Plan. At no time during the Asbestos Project shall respiratory protection within a Regulated Abatement Work Area be downgraded to below the minimum requirement of a half-face, negative pressure, air purifying respirator equipped with HEPA filter cartridges.

B. PPE: The Contractor shall provide personnel who have a potential to be exposed to asbestos with appropriate PPE.

C. HEPA Filters: HEPA filters used in vacuuming equipment and Negative Air Pressure Equipment must meet or exceed any manufacturer's specifications and recommendations, as well as specifications presented in the Standard for Safety High Efficiency, Particulate, Air Filter Units (UL 586).

D. Containment Materials: Plastic sheeting used in the construction of temporary enclosures shall be fire retardant in accordance with NFPA 701. Wood or other materials used in the construction of temporary enclosures shall be non-combustible or fire-retardant in accordance with NFPA 255, ASTM D2898, ASTM E84 and UL 723.

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. Safe Work Practices for Trace Asbestos materials

1. An exposure assessment shall be performed in accordance with 29 CFR 1926.1101(f) (2) (i) to determine if workers disturbing, handling, or performing cleanup activities involving trace asbestos materials, must wear PPE or respiratory protection.

2. Wetting agents or special work methods shall be utilized to control potential employee exposures to asbestos during the handling, mixing, removing, cutting, application, or cleanup, of trace asbestos materials, except if the use of these wetting agents/work methods is not feasible (e.g., using them may create electrical hazards or equipment malfunctions).

3. Asbestos-contaminated wastes and debris shall be cleaned-up promptly and disposed of in leak-tight containers. The handling, disposal, and transport of Trace Asbestos-Containing Material wastes is not regulated since the wastes are not ACM (i.e., they do not contain greater than 1% asbestos).

4. The use of high-speed abrasive saws that are not equipped with "point-of-cut" ventilators or enclosures with HEPA-filtered exhaust air shall be prohibited.

5. The use of compressed air to cleanup or remove trace asbestos materials is prohibited.

B. Preparation

1. Utilities: The temporary use of any on-site utilities shall be subject to the approval of the DEP. The Contractor shall furnish all water, hoses and water filtration devices needed for the Work as per 01 51 11 - Temporary Water and Sanitary Services; as well as any temporary electrical hookups and temporary lighting to the Asbestos Control Area as per 01 51 30 - Temporary Electrical System. All temporary lighting and temporary electrical service to an Asbestos Control Area shall be provided by the Contractor and shall be in weather-proof enclosures and be ground fault protected. Also, the Contractor shall supply all heating and ventilation equipment needed for the Work as per 01 51 12 Temporary Heat and Ventilation.

2. Signs: The Contractor shall post conspicuous warning signs at all approaches to Regulated Abatement Work Areas, Restricted Areas, and waste storage areas. The signs shall be located at such a distance so that personnel may read the sign and take necessary precautions before entering a Regulated Abatement Work Area, Restricted Area, or waste storage area. Signs shall comply with the requirements of federal, state, and local regulations. Once Clearance Air Monitoring results indicate that a Regulated Abatement Work Area is in compliance with the provisions for re-occupancy set forth in RCNY Title 15, Chapter 1 or 12 NYCRR 56, the signs shall be removed. At a minimum, each sign shall bear the following information in English and the predominant language that is spoken by the Contractor's employees if English is not spoken:

DANGER
ASBESTOS CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA
NO SMOKING

C. Fire Extinguishers: The Contractor shall maintain at least two functional fire extinguishers in each Restricted Area. The fire extinguishers shall have a minimum rating of 2-A:10-B:C, and each fire extinguisher shall be checked daily by the Asbestos Handler Supervisor to ensure that it remains functional throughout the duration of the Asbestos Project.

3.02 IMPLEMENTATION

A. Bulk Removal

1. Protection of Existing Work to Remain: All Work involving the Abatement or Disturbance of ACM or Asbestos-Containing Waste Materials, must be conducted without damage to, or contamination of equipment or surfaces within the Regulated Abatement Work Areas, Restricted Areas, or other areas adjacent to these areas. All such damage or contamination shall be

immediately corrected and cleaned up by the Contractor at the Contractor's expense.

2. Containments and Negative Air Pressure Equipment: Pressure differential readings for each workday shall be obtained, documented in the Contractor's Project Record, and reviewed by the Asbestos Handler Supervisor on a daily basis. The Asbestos Handler Supervisor shall notify the Engineer and the DEP immediately, if any variations in the pressure differential readings may have led to the migration of asbestos fibers outside of a Regulated Abatement Work Area. Corrective actions shall be implemented immediately to ensure that negative pressure is restored.

3. Personal Decontamination Enclosure System: The Contractor shall ensure that employees do not leave a Regulated Abatement Work Area wearing any potentially contaminated protective work clothing or PPE. Employees are required to shower prior to leaving the Regulated Abatement Work Area.

3.03 FIELD TESTING / QUALITY CONTROL

A. Air Monitoring

1. Air monitoring for airborne concentrations of asbestos fibers shall be conducted by the Asbestos Handler Supervisor (or by a qualified air monitoring firm) in accordance with OSHA.

a. Worker Exposure Monitoring: Worker Exposure Monitoring shall be conducted during each phase of the Asbestos Project (e.g., pre-abatement, Abatement, and cleanup) for one (1) Work shift from at least one (1) employee that is representative of each type of Work task that is being performed. Each personal air sample will "run" for the employee's entire Work shift in order to ensure that enough volume (of air) is collected and an accurate 8-hour TWA can be calculated. Representative 30-minute short-term employee exposures shall also be conducted and shall be determined on the basis of one or more samples representing 30-minute exposures associated with operations that are most likely to produce exposures above the excursion limit for employees in each Regulated Abatement Work Area as per OSHA 1926.1101(f)(1)(iii). Documentation regarding the sample numbers, specific shift when the sampling was conducted, the Work tasks that were sampled, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

b. Complete documentation of all Worker Exposure Monitoring activities shall be in accordance with this Article.

c. The Contractor shall submit all Worker Exposure Monitoring results to the DEP within 24- hours from when the air samples were collected.

d. If at any time, PCM analysis of any air sample (i.e., from Worker Exposure Monitoring performed by the Contractor) in any phase of the Asbestos Project (i.e., pre-abatement, Abatement, cleanup, or clearance) indicates that the filter was "overloaded" and a fiber count cannot be obtained, the sample shall immediately undergo TEM analysis. All costs of the additional TEM analysis will be at the Contractor's expense.

2. Area Monitoring: Air monitoring for airborne concentrations of asbestos fibers shall be conducted by the DEP.

a. All Clearance Air Monitoring results shall meet or be below background ambient air levels or 0.01 f/cc of air (whichever is greater), prior to the breakdown of the Containment. If Clearance Air Monitoring results indicate a fiber count greater than background ambient air levels or 0.01 f/cc of air in any area, the Contractor will be required to re-clean that area. For projects conducted outside of the five boroughs, the clearance and action criteria is less than 0.01 f/cc; of air, or background levels (whichever is greater). Repeated cycles of cleaning and Clearance Air Monitoring will be performed until a fiber count is achieved that meets or is below background ambient air levels or 0.01 f/cc of air within the area. All costs of re-cleaning and additional Clearance Air Monitoring will be at the Contractor's expense.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleanup: All cleaning Work shall progress from the point most remote from the intakes of the Negative Air Pressure Equipment, towards the intakes of the equipment, as well as from the highest point of the surfaces to be cleaned towards the lowest point of the surfaces. Dry sweeping and using compressed air to cleanup a Regulated Abatement Work Area or a Restricted Area is strictly prohibited. HEPA-filtered vacuums and Wet Cleaning methods shall be used to ensure that these areas remain free of visible dust and debris on a daily basis. In addition, only cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the materials or as approved by the DEP, shall be used.

B. Collection, Filtration and Containerization of Wastes: The Contractor shall collect and containerize asbestos waste (solid and liquid), debris, PPE, and Containment materials on a daily basis in accordance with the Asbestos Work Plan. Using chutes to move construction debris or waste (bagged or not bagged) will not be permitted at any time.

1. Prior to containerizing Asbestos-Containing Waste Materials, the wastes shall be "Adequately Wetted," and wrapped in 6-mil (0.006") polyethylene sheeting, or double-bagged in 6-mil polyethylene bags. The bags shall be

"goose necked" and sealed air tight with duct tape, and each bag (or wrapped item) shall be labeled before being placed in an appropriate container (i.e., dumpster, trailer, or roll-off) for disposal.

2. Corrugated cartons or drums may be used in conjunction with polyethylene bags and sheeting for the disposal of Asbestos-Containing Waste Materials that have sharp-edged components (e.g., nails, screws, or tin sheeting) which may tear the bags or sheeting. The waste within these drums or cartons must be wrapped or double-bagged, and the cartons/drums must be labeled.

3. Wastewater derived from the Asbestos Project shall be collected and filtered through a system with at least a 5.0-micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid the rapid clogging of the filtration system by large particles. Contaminated filters shall be disposed of as asbestos waste. Filtered wastewater shall be discharged in accordance with all applicable federal, state, and local regulations.

   a. Discharging filtered asbestos decontamination water to a DEP Wastewater Treatment Plant (WWTP) will require written permission from the DEP Bureau of Wastewater Treatment (BWT) and the submission of analytical testing results for asbestos to the BWT for review and approval prior to discharge. The disposal requirements for filtered asbestos decontamination water generated on other DEP properties (e.g., drinking water shafts) may be more stringent or prohibited.

C. Storage of Wastes: The Contractor shall store all bagged Asbestos-Containing Waste Materials in DOT-approved container systems (e.g., a roll-off or trailer), as per 49 CFR 178. No container shall be filled in excess of the capacity marked on the container, and all containers shall be lined with 6-mil (0.006") polyethylene sheeting, have a hard top, and shall be lockable. In addition, all containers shall have an intact and legible label affixed to it. No bagged asbestos waste shall be stored in a Regulated Abatement Work Area or decontamination enclosure system for longer than the current Work shift that generated the waste.

   1. Non-Asbestos Waste: The Contractor shall store non-Asbestos-Containing Waste Materials separately from Asbestos-Containing Waste Materials, shall provide all non-asbestos waste containers, and shall make all transportation and disposal arrangements for non-Asbestos-Containing Waste Materials in accordance with federal, state, and local regulations.

D. Labeling: The Contractor shall affix warning labels to all asbestos waste disposal bags, wrapped items, and containers (i.e., drums, dumpsters, trailers, or roll-offs). Labels shall comply with the requirements of federal, state, and local regulations. At a minimum, each label on disposal containers/bags/items shall bear the following information in English:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
[Generator Name, Address, and Telephone Number]

E. Final Visual Inspection and Clearance Air Monitoring: The Independent Third-Party Monitor shall not conduct Clearance Air Monitoring until the Regulated Abatement Work Area has been inspected by the Asbestos Handler Supervisor and the Project Monitor has performed the Final Visual Inspection. During this inspection, the Asbestos Handler Supervisor and the Project Monitor shall determine if the following has been achieved: (a) all ACM and Asbestos-Containing Waste Materials have been abated and removed from the area; (b) the area is clean and dry; (c) Critical Barriers and Isolation Barriers are intact; (d) Negative Air Pressure Equipment is turned on and functioning. If any of these items have not been achieved, the Contractor shall perform the necessary corrective actions to achieve compliance before conducting the Clearance Air Monitoring.

F. Breakdown of the Regulated Abatement Work Area: Critical Barriers shall not be removed and Negative Air Pressure Equipment shall not be turned off until Clearance Air Monitoring results meet the criteria specified in this Section and RCNY Title 15, Chapter 1 or 12 NYCRR 56.

G. Asbestos Project Completion Form/Asbestos Project Conditional Completion: Upon successful completion of an Asbestos Project performed in the five boroughs, a copy of the Asbestos Project Completion Form (ACP-21) or Asbestos Project Conditional Completion Form (ACP-20) issued by the DEP shall be submitted to the Engineer.

H. Disposal of Wastes: Asbestos-Containing Waste Materials shall be disposed of to ensure that containers do not remain on the job site for longer than necessary. Containers that have reached their storage capacity shall not remain on site and transportation arrangements shall be made for their removal.

I. Disposal Documentation: Once all waste profiles have been completed and signed by DEP, the Contractor shall provide DEP with a “Letter of Acceptance” issued by the TSDF indicating that the wastes will be accepted, and a copy of the advance manifest. On the date of disposal, the Contractor shall submit one (1) copy of the completed manifest that has been signed and dated by the initial transporter in accordance with 6 NYCRR 372, 40 CFR 262 and 40 CFR 302, to the DEP for signature as Generator. All manifests and Land Disposal Restrictions (LDRs) must be signed by a DEP employee as per 6 NYCRR 376 and 40 CFR 268, and as described in Section 01 35 45 - Hazardous Materials Control.

END OF SECTION

SECTION 02 83 05 – LEAD MANAGEMENT
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This Section details the requirements for construction and demolition activities affecting materials and structures coated with or containing Lead, if discovered during the Work, as shown on Table 2, attached to Section 01 35 45 – Hazardous Materials Control, specified herein, or required to complete the Work, including all affected coatings identified and impacted by the Work. No lead materials or coatings were identified to be impacted by the Work. However, if suspect lead is identified, it must be sampled and analyzed in accordance with these Specifications and applicable regulations.

B. All Work under this Section shall be performed to minimize the creation of airborne emissions (40 CFR 50); minimize 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.

C. In the absence of analytical testing results for a specific painted/coated material, air monitoring and worker Personal Protective Equipment (PPE) requirements, including respiratory protection, shall address the potential presence of Lead.

D. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment will be made for performing any work required under this Section. All costs 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 01 27 00 – Measurements and Payments.

B. Payment for the disposal of Lead Wastes (with the exception of painted/coated scrap metal) will not be made until a signed copy of the manifest from the Treatment, Storage, and Disposal Facility (TSDF), certifying the amount of Lead Waste delivered is returned with complete chain-of-custody (COC) documentation to the NYCDEP.

1.03 RELATED SECTIONS

A. Section 01 35 27 -- Environmental Health and Safety Requirements

B. Section 01 35 45 – Hazardous Materials Control

C. Section 01 41 00 – Regulatory Requirements

D. Section 01 51 11 – Temporary Water and Sanitary Services

E. Section 01 51 12 – Temporary Heat and Ventilation

F. Section 01 51 30 – Temporary Electrical System

G. Section 01 74 20 – Construction Waste Management

H. Section 02 41 10 – Demolition and Removals

I. Section 02 84 05 -- PCB Management

1.04 REFERENCES

A. Definitions

1. Abatement: Any measure or set of measures designed to permanently eliminate Lead Paint hazards (refer to 40 CFR 745.223 for description of what is included). Abatement does not include renovation, remodeling, landscaping, or other activities, when such activities are not designed to permanently eliminate Lead Paint hazards, but instead, are designed to repair, restore, or remodel a given structure or dwelling, even though these activities may incidentally result in a reduction or elimination of Lead Paint hazards. Furthermore, Abatement does not include interim controls, (e.g., the spot removal of a Lead paint/bitumastic coating on a surface in order to perform torch cutting at that location), Operation and Maintenance (O&M) activities, or other measures and activities designed to temporarily reduce Lead Paint hazards.

2. Action Level: Defined by OSHA as individual exposure, without regard to the use of respirators, to a specific airborne concentration of a contaminant expressed in micrograms per cubic meter of air ($\mu g/m^3$) calculated as an 8-hour Time-Weighted Average (TWA). Once an Action Level is met or exceeded, the Contractor is responsible for meeting specific requirements

outlined in the applicable OSHA standard, which may include additional worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. The following Action Levels are pertinent to the disturbance, removal, construction/demolition, and disposal activities associated with painted/coated materials and structures (as per 01 74 20 - Construction Waste Management, 02 41 10 - Demolition and Removals):

a. Lead - 30 µg/m^3 per 29 CFR 1926.62.

3. Area Monitoring: Stationary air sampling outside of a Lead Control Area for the purpose of determining compliance with OSHA's Lead in Construction Standard (29 CFR 1926.62), and for the purpose of ensuring that airborne Lead concentrations remain below 30 ug/m^3 outside of the Lead Control Area during all work activities that have the potential to disturb Lead-Containing Materials or Lead Wastes. All Area Monitoring shall follow pertinent NIOSH (Methods 5503, 7048, 7082, 7105, 7300, 7600, 7604, 7900) or ASTM sampling methodologies.

4. Certified Industrial Hygienist (CIH): Refers to an individual employed by the Contractor who is currently certified by the American Board of Industrial Hygiene (ABIH).

5. Competent Person: Defined in the OSHA Lead in Construction Standard (29 CFR 1926.62) as one who is capable of identifying existing and predictable hazards in the surroundings or working conditions, and who has authorization to take prompt corrective measures to eliminate them. Duties of the Competent Person include the following: (a) determining prior to the performance of the Work, whether Lead is present in the workplace; (b) establishing Lead Control Areas and assuring that access to and from those areas is limited to authorized personnel; (c) assuring the adequacy of any employee Exposure Monitoring required by OSHA; (d) assuring that all employees exposed to airborne contaminant levels above Action Levels, Permissible Exposure Limits, or Recommended Exposure Limits wear appropriate PPE, respiratory protection, and are trained in the use of appropriate methods of exposure control for all of the contaminants present; (e) assuring that proper Hygiene Facilities are provided and that workers are trained to use those facilities; (f) assuring that engineering controls specific to the contaminants present are implemented, maintained in proper operating condition, and functioning properly.

6. Decontamination Area: Designated area within the Hygiene Facilities for removing gross contamination from PPE (using a HEPA vacuum), washing away contamination that has accumulated on the skin and hair (using soap and water), removing and disposing/washing of contaminated PPE, and donning clean clothing that will not potentially contaminate areas outside of a Lead Control Area's Physical Boundary.

7. DOT Hazardous Materials Transportation Training: Training that meets the criteria outlined in 49 CFR 172.704. This training shall include discussions from 49 CFR 171 of the following: (a) hazardous materials tables within 49 CFR 172; (b) material packaging and labeling within 49 CFR 178; (c) shipping papers and placards within 49 CFR 173; (d) material loading and segregation within 49 CFR 173.

8. EPA Lead-Based Paint Supervisor Training: A training course administered by the EPA or approved company - which includes discussions of the following: (a) worker protection and safety; (b) occupant protection; (c) clan-up and clearance; (d) waste disposal; (e) residence and community relations; (f) regulatory aspects; (g) use of X-Ray Fluorescence (XRF) paint analyzers; (h) legal and insurance issues.

9. Exclusion Zone: (See definition of "Lead Control Area").

10. Exposure Monitoring: Personal air sampling performed outside the respirator within the breathing zone of individuals, for the purpose of determining compliance with OSHA's Limits for Air Contaminants Table (29 CFR 1910.1000, Table Z-1) and Lead in Construction Standard (29 CFR 1926.62). Analytical results obtained from Exposure Monitoring will be used to select appropriate respiratory protection and PPE for individuals within a work area. For the purpose of this Section, Exposure Monitoring samples shall be collected from individuals who are representative of each type work task being conducted by the Contractor, and all Exposure Monitoring shall follow pertinent NIOSH or ASTM sampling methodologies.

11. Hazardous Waste Operations (HAZWOPER) Training: Training that meets the criteria outlined in the OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). A minimum of 24-hour HAZWOPER Training will be required for Abatement work being performed under this Section. However, certain types of work may require 40-hour HAZWOPER Training.

12. High-Efficiency Particulate Air (HEPA) Filter: A filter designed to remove 99.97% of all particles greater than 0.3 micrometers (μm) in diameter. For the purpose of this Section, HEPA vacuum and local exhaust filtration equipment used by the Contractor shall meet the Standard for Safety High-Efficiency, Particulate, Air Filter Units (UL 586) developed by Underwriters Laboratories.

13. Homogenous Materials: Lead-Containing Materials which are similar in appearance, color, texture, and substrate type.

14. Hygiene Facilities: Facilities within the Physical Boundary of a Work area that are set up to prevent cross contamination and are equipped with change areas and separate storage facilities for PPE and clean clothing. Hygiene Facilities shall include adequately supplied hand washing station(s) (i.e.,

running water, soap, and clean towels) or shower(s) (hot and cold water that is controllable at the tap, soap, shampoo, and clean towels).

15. Lead: Defined in the OSHA Lead in Construction Standard (29 CFR 1926.62) as metallic Lead, all inorganic Lead compounds, and organic Lead soaps. Excluded from this definition are all other organic Lead compounds.

16. Lead-Based Paint (LBP): A term used by Department of Housing and Urban Development (HUD) and the EPA to define paint or other surface coatings (e.g., glazes) with Lead levels equal to or exceeding 1.0 milligram per square centimeter (1.0 mg/cm^2) in a paint XRF reading, or 0.5% by dry weight (5,000 mg/kg (ppm)) in a paint chip sample. LBP is subject to the requirements set forth in the OSHA Lead in Construction Standard (29 CFR 1926.62).

17. Lead-Containing Material: Any material that contains, or is coated with, a detectable concentration of Lead.

18. Lead-Containing Paint (LCP): A term used to define paint or other surface coatings (e.g., glazes) with any detectable amount of Lead less than 1.0 milligram per square centimeter (1.0 mg/cm^2) in a paint XRF reading, or 0.5% by dry weight (5,000 mg/kg (ppm)) in a paint chip sample. LCP is subject to the requirements set forth in the OSHA Lead in Construction Standard (29 CFR 1926.62).

19. Lead Control Area: The area within the Physical Boundary where worker Hygiene Facilities are located and where all Work activities take place that involve the disturbance of Lead-Containing Materials and Lead Wastes.

20. Lead Paint: A generic term that refers to both LBP and LCP.

21. Lead Waste: Non-specific liquid or solid waste generated during the Abatement, removal, construction/demolition, handling, or cleanup of a Lead-Containing Material.

22. Organic Vapor Cartridge: A NIOSH approved respirator filter typically containing 25 to 40 grams of sorption media such as activated charcoal.

23. OSHA Lead Awareness Training: Annual training that meets the criteria outlined in the OSHA Lead in Construction Standard (29 CFR 1926.62) for individuals that have the potential to be exposed to Lead-Containing Materials or Lead Wastes. This training shall include discussions of the following: (a) current federal, state, and local regulations pertaining to Lead (including 29 CFR 1926.62) and other heavy metals that may be disturbed during the Work; (b) the health effects of Lead and other heavy metal exposure; (c) state-of-the-art work practices, engineering controls, and procedures for Abatement, removal, construction/demolition, materials handling, waste management, and housekeeping activities that involve Lead-Containing Materials and Lead Wastes; (d) the use and maintenance of PPE and the use and maintenance of respirators in accordance with 29 CFR 1910.134; (e) medical surveillance programs and the medical removal

protection program; (f) requirements regarding warning signs, labeling, and Safety Data Sheets (SDSs) in accordance with 29 CFR 1910.1200; (g) responsibilities of the Competent Person.

24. OSHA Lead in Construction Standard (29 CFR 1926.62): A federal standard that applies to all construction work where an employee may be occupationally exposed to Lead. In this standard, "construction work" is defined as work for construction, alteration, or repair, including painting and decorating. It also includes, but is not limited to, the following: (a) the demolition or salvage of structures where Lead or materials containing Lead are present; (b) the removal or encapsulation of materials containing Lead; (c) new construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain Lead, or materials containing Lead; (d) the installation of products containing Lead; (e) Lead contamination/emergency cleanup; (f) the transportation, disposal, storage, or containment of Lead or materials containing Lead on the site or location at which construction activities are performed; (g) maintenance operations associated with any of the construction activities described in this definition.

25. OSHA Monitoring: (See definition of "Exposure Monitoring").

26. P-100 Filter: (See definition of: "High-Efficiency Particulate Air (HEPA) Filter").

27. Perimeter Monitoring: (See definition of "Area Monitoring").

28. Permissible Exposure Limit (PEL): Defined by OSHA as employee exposure, without regard to the use of respirators, to a specific airborne concentration of a contaminant expressed in micrograms per cubic meter of air ($\mu g/m^3$) calculated as an 8-hour TWA. Once a PEL is met or exceeded for a particular contaminant, the Contractor is responsible for meeting specific requirements outlined in the applicable OSHA standard, which may include worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. The following PELs are pertinent to removal, demolition, and disposal activities associated with Lead-Containing Materials and Lead Wastes:

    a. Lead - 50 $\mu g/m^3$ per 29 CFR 1926.62.

29. Personal Monitoring: (See definition of "Exposure Monitoring").

30. Physical Boundary: A physical barrier designated with ropes, "caution tape," or a partition that surrounds a work area in order to limit the entry of unauthorized personnel and delineate "clean areas" from areas that may meet or exceed an Action Level, PEL, or REL.

31. Recommended Exposure Limit (REL): An exposure limit recommended by the NIOSH that can be expressed as a TWA, Ceiling Limit, or Short-Term Exposure Limit (STEL). Once an REL is met or exceeded for a particular

contaminant, the Contractor is responsible for ensuring that workers receive appropriate Exposure Monitoring, PPE, including respiratory protection, Hygiene Facilities, medical surveillance, and training.

32. Regulated Area: (See definition of "Lead Control Area").

33. Resource Conservation and Recovery Act (RCRA) Training: Training that meets the criteria outlined in 40 CFR 265.16. This training shall include Site-specific discussions of the following: (a) hazardous waste identification; (b) waste storage container use and labeling; (c) waste storage area management; (d) personal health and safety, including fire safety; (e) manifesting and the off-site transportation of wastes; (f) procedures for using, inspecting, repairing, and replacing emergency equipment and monitoring equipment; (g) procedures for communicating with other employees and outside emergency response personnel; (h) responses to fires or explosions; (i) responses to leaks, spills, and potential groundwater contamination incidents ; (j) the shutdown of operations.

34. Time Weighted Average (TWA): The average time over a given work period (e.g., an 8-hour workday) of a person's exposure to a chemical or agent. The average is determined by sampling for the chemical or agent throughout the time period.

35. Trigger Activities: Certain activities that involve a disturbance of Lead-Containing Materials or Lead Wastes. Depending upon whether the performance of these activities exceeds an Action Level, PEL, or REL, the requirements may include additional worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. Examples of Trigger Activities include, but are not limited to, the following: abrasive blasting, welding, torch cutting/burning, heat gun usage, needle gunning/scaling, rivet busting, using a roto peen, mechanical sanding/grinding, using mechanical shears, hand scraping/sanding, chemical stripping, and the manual demolition of Lead-Containing Materials.

36. X-Ray Fluorescence (XRF): An analytical method that can be used in the field for determining the Lead content of paints/coatings on a building component or material surface.

B. Reference Standards

1. The Contractor shall comply with all applicable regulations, standards, and guidelines of federal, state, and local environmental and occupational safety and health agencies regarding Lead-Containing Materials and Lead Wastes. These regulations, standards, and guidelines include, but are not limited to the following:

a. United States (U.S.) Department of Transportation (DOT):

1) 49 CFR 171 - General Information, Regulations, and Definitions;

2) 49 CFR 172 – Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements;

3) 49 CFR 173 – Shippers: General Requirements for Shipments and Packaging's;

4) 49 CFR 178 – Specifications for Packaging.

b. United States Environmental Protection Agency (EPA):

1) 40 CFR 50 – National Primary and Secondary Ambient Air Quality Standards;

2) 40 CFR 116 – Designation of Hazardous Substances;

3) 40 CFR 117 – Determination of Reportable Quantities for Hazardous Substances;

4) 40 CFR 260 – Hazardous Waste Management Systems: General;

5) 40 CFR 261 – Identification and Listing of Hazardous Waste;

6) 40 CFR 262 – Standards Applicable to Generators of Hazardous Waste;

7) 40 CFR 263 – Standards Applicable to Transporters of Hazardous Waste;

8) 40 CFR 264 – Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities;

9) 40 CFR 265 – Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities;

10) 40 CFR 268 – Land Disposal Restrictions;

11) 40 CFR 302 – Designation, Reportable Quantities, and Notification;

12) 40 CFR 745 – Lead-Based Paint Poisoning Prevention in Certain Residential Structures.

c. National Institute for Occupational Safety and Health (NIOSH):

1) Method 5503 – Polychlorobiphenyls;

2) Method 7082 – Lead by FAAS;

3) Method 7105 – Lead by GFAAS;

4) Method 7300 – Elements by ICP;

5) NIOSH Pocket Guide (NPG) to Chemical Hazards.

d. New York City Department of Environmental Protection (DEP):

1) Environmental Health and Safety Policies and Procedures – Vol. III, Lead Management;

2) Environmental Health and Safety Policies and Procedures – Vol. IV, Hazardous Waste Management;

3) Environmental Health and Safety Policies and Procedures – Vol. III, EHS Reporting and Investigation

4) RCNY Title 15, Chapter 19 – Discharges of Wastewater and Other Materials to Public Sewers.

e. New York State Department of Environmental Conservation (NYSDEC):

1) 6 NYCRR 364 – Waste Transporter Permits;

2) 6 NYCRR 370 – Hazardous Waste Management Regulations;

3) 6 NYCRR 371 – Identification and Listing of Hazardous Waste;

4) 6 NYCRR 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities;

5) 6 NYCRR 373 – Hazardous Waste Management Facilities;

6) 6 NYCRR 376 – Land Disposal Restrictions.

f. Occupational Safety and Health Administration (OSHA):

1) 29 CFR 1910 – Occupational Safety and Health Standards;

2) 29 CFR 1910.28 – Safety Requirements for Scaffolding;

3) 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response;

4) 29 CFR 1910.134 – Respiratory Protection Standard;

5) 29 CFR 1910.1200 - Hazard Communication Standard;

6) 29 CFR 1926 – Safety and Health Regulations for Construction;

7) 29 CFR 1926.62 – Lead in Construction Standard;

g. Society for Protective Coatings (SSPC):

1) SSPC Guide 6, Guide for Containing Debris Generated During Paint Removal Operations;

2) SSPC Guide 7, Guide for the Disposal of Lead-Contaminated Surface Preparation Debris;

3) SSPC SP COM, Surface Preparation Commentary for Steel and Concrete Substrates;

4) SSPC SP 1, Solvent Cleaning;

5) SSPC SP 2, Hand Tool Cleaning;

6) SSPC SP 3, Power Tool Cleaning;

7) SSPC SP 11, Power Tool Cleaning to Bare Metal;

8) SSPC SP 13/ NACE No.6, Surface Preparation of Concrete;

9) SSPC SP 15, Commercial Grade Power Tool Cleaning.

h. Underwriters Laboratories, Inc. (UL):

1) UL 586 – Standard for Safety High Efficiency, Particulate, Air Filter Units.

1.05 DESCRIPTION

A. Commencement of Work: Five (5) business days prior to the proposed start of the Work required under this Section at each separate location, the Contractor shall notify the Engineer and the onsite EHS staff. No Work may proceed at any location until authorized by the Engineer.

B. The Contractor shall coordinate any required equipment shutdowns with the Engineer prior to starting the Work.

C. Access Restrictions: The Contractor shall inform the Engineer of proposed access restrictions (i.e., areas or items of equipment which will not be accessible during the proposed work) and provide estimated time frames (including specific dates) of such proposed access restrictions. The Contractor shall notify other contractors in advance of the disturbance, Abatement, spot removal, construction/demolition, and disposal Work included herein, to provide them with sufficient time for coordination of interrelated items that are included in their contracts and that must be performed before, after, or in conjunction with the Work included under this Section.

D. Unexpected Entry into a Lead Control Area: In the event that DEP personnel must enter a Lead Control Area for emergency reasons, the Contractor shall immediately stop work and cleanup any loose debris, so as to permit the safe entry by DEP personnel. Any disturbance of paints/coatings, dusts, materials, or wastes that may potentially generate airborne concentrations of contaminants equal to or above an OSHA Action Level shall not proceed until all DEP personnel have exited from the Lead Control Area.

E. Meetings: In addition to the pre-construction meeting and Site walk-through, other meetings may be required or may be requested by the Engineer, including briefings with Site operations personnel. Written documentation (i.e., “minutes”) of all

meetings shall be generated by the Contractor, and copies shall be provided to the DEP within three (3) business days following each meeting.

1.06 QUALITY ASSURANCE

A. Scheduling: The Contractor shall coordinate and schedule all phases of the Work to be performed under this Section with the DEP, subcontractors, material suppliers, and other parties as necessary to ensure the proper execution of the Work.

B. Compliance: In addition to the detailed requirements of this Section and DEP EHS Policies and Procedures, the Contractor shall comply with all applicable regulations of federal, state, and local authorities pertaining to the disturbance, Abatement, removal, construction/demolition, handling, storage, transportation, and disposal of Lead-Containing Materials and Lead Wastes. All matters regarding the interpretation of any regulations, standards, or policies shall be submitted to the Engineer for resolution before starting the Work. Where the requirements of this Section, DEP EHS Policies and Procedures, or federal, state, or local regulations conflict or vary, the most stringent requirements or regulations shall apply.

C. Rejection of Non-Complying Items:. The DEP reserves the right to reject Contractor materials/tools/submittal items that are deemed inappropriate or unacceptable by the Engineer or DEP. Submittal items that may be deemed inappropriate or unacceptable include proposed TSDFs, vendors, or subcontractors with previous regulatory citations/violations. The DEP further reserves the right, and without prejudice to other recourse, to accept non-complying items subject to an adjustment in the Contract amount, as approved by the DEP.

D. Suspect Material Characterization: To classify a paint or coating as Lead-containing, a paint chip/coating sample or an XRF reading must be collected. The bulk samples shall be sent to an analytical laboratory meeting the requirements of this Section.

1. Suspect Lead: Although there are no certification requirements pertaining to an individual that collects paint chip/coating samples in an industrial or commercial setting, this Section requires paint chip/coating sampling to be performed by a Lead Sampler.

E. Qualifications:

1. The Paint Removal Company shall have successfully completed at least two (2) projects of comparable scope and methodologies, and shall document the following: (a) the name, address, and phone number of each facility where the Work was performed; (b) the volume and type of each material that was abated/removed; (c) the specific methods of Abatement/removal used (including the tools, technologies, and engineering controls employed).

2. Competent Person:

a. The Competent Person shall have successfully completed:

1) EPA Lead-Based Paint Supervisor Training Certification (current) in accordance with 40 CFR 745.225 (b)(7)(vi); and

2) OSHA Lead Awareness Training (annual); and

3) 24-hr HAZWOPER Training.

b. The Competent Person shall have a minimum of two (2) years' experience on projects involving Lead and has served as the Competent Person on at least three (3) projects of comparable scope and methodologies to the work being conducted under this Section.

3. Waste Manager:

a. The Waste Manager shall have successfully completed:

1) DOT Hazardous Materials Transportation Training; and

2) RCRA Training - Each training course shall have been completed within the past year in the form of either an initial course or a refresher course.; and

3) 24-hr HAZWOPER Training; and

4) OSHA Lead Awareness Training (annual).

b. The Waste Manager shall have a minimum of two (2) years' experience on projects involving hazardous wastes (including Lead). It is acceptable for an individual who meets the criteria of the Competent Person, to also serve as the Waste Manager for this Contract as long as the individual fulfills all of the requirements of this paragraph.

4. Lead Worker:

a. Lead Workers shall have successfully completed:

1) OSHA Lead Awareness Training (annual) as defined in this Section; and

2) EPA-certified Lead Worker Training for all Lead Abatement activities (current). OSHA Lead Awareness Training satisfies the training requirement for other Lead removal activities (e.g., spot removal and demolition work).

b. Each Lead Worker shall have a minimum of one (1) year of experience on projects involving Lead and have worked on at least three (3) projects of comparable scope and methodologies to the work being conducted under this Section.

5. Lead Sampler:

a. Lead Sampler shall have successfully completed:

1) OSHA Lead Awareness Training (annual) as defined in this Section; and

2) EPA Certified Lead Inspector course or EPA-certified Risk Assessor course (current).

b. The Lead Sampler shall have documented experience in collecting paint chip samples.

c. The qualifications of the Lead Sampler must be approved by the Engineer prior to sample/reading collection.

6. Air Monitor:

a. The Air Monitor shall have successfully completed:

1) OSHA Lead Awareness Training (annual).

b. The Air Monitor shall have a minimum of two (2) years' experience in conducting Area Monitoring and Exposure Monitoring on projects involving hazardous wastes (including Lead). It is acceptable for an individual who meets the criteria of the Competent Person or Waste Manager to also serve as the Air Monitor for this Contract as long as the individual satisfies all of the requirements of this paragraph.

1.07 SUBMITTALS

A. Thirty (30) business days prior to the Work of this Section or as directed by the Engineer, the Contractor shall submit the following to the Engineer:

1. Lead Inspection and Sampling Plan: The Contractor shall provide a Lead Inspection and Sampling Plan to identify suspect Lead-Containing Materials and collect confirmatory samples, as appropriate during the inspection. The Lead Inspection and Sampling Plan shall include at a minimum:

a. At a minimum, the inspection shall be performed by an Environmental Professional, who has current OSHA Lead Awareness and EPA Lead Inspector Training, as applicable to the location of the work, and has performed inspection work on at least three (3) projects of comparable scope.

b. Credentials of the laboratory providing sample analysis, including current certification by the New York State Department of Health's (NYSDOH) Environmental Laboratory Approval Program (ELAP) and by the American Industrial Hygiene Association (AIHA).

c. Sample collection, analysis and reporting protocol.

d. Health and safety protocol (Job Hazard Analysis) for all investigative activities.

2. Lead Inspection Report: The Contractor shall provide a Lead Inspection Report prepared by the Environmental Professional summarizing the results of all inspection activities, and as applicable, a sampling narrative,

laboratory data packages and inventory, including photographs, of all identified suspect and confirmed Lead-Containing Materials.

3. Lead Management Plan(s): Work requiring a Lead Management Plan includes Lead Paint Abatement and Lead Paint spot removal activities. The Lead Management Plan shall be signed and dated by a CIH meeting the definition in this Section.

   a. If the Lead-Containing Materials or Lead Wastes that will be disturbed also contain PCBs, it is acceptable to integrate the Lead Management Plan elements into the relevant PCB Management Plan (required under Section 02 84 05 - PCB Management). The Lead Management Plan shall include the following elements:

      1) Lead Control:

         a) Drawings showing the location and details of the following: (a) each Lead Control Area; (b) each Hygiene Facility; (c) proposed electrical hookups; (d) proposed water hookups: (e) each waste storage area: (f) restroom areas; (g) areas designated for eating, drinking, and smoking;

         b) Section on the interfacing of trades (other Contractors) and the sequencing of Lead-Related Work;

         c) Section on the collection, handling procedures, and disposal of Lead-Containing Materials and Lead Wastes (including the collection, filtering, and disposal of wastewater);

         d) Section on the procedures and methodologies that will be used to conduct Exposure Monitoring and Area Monitoring for particulates. Also, provide the name and qualifications (i.e., training and experience documentation) of the Air Monitor who will be responsible for conducting the air monitoring activities. The Air Monitor shall at a minimum, satisfy the qualification requirements set forth in this Section;

         e) Section on housekeeping procedures to be used for maintaining clean work areas and clean Hygiene Facilities;

         f) Section on the specific methods and procedures of emissions control that will be used to ensure that airborne contaminant levels do not meet or exceed an OSHA Action Level outside of each Lead Control Area. It should be noted that even after paint/coating

removal, the DEP has found that demolition activities (e.g., torch-cutting abated steel) still have the potential to generate elevated airborne levels of Lead. Therefore, the Contractor shall provide engineering controls to capture potential Lead dusts or fumes emitted during demolition work that involves the cutting or burning of steel structures that have already been abated;

g) Task Analysis: Each task analysis shall include, but is not limited to, the following information: (a) the type of work activity; (b) the tools/equipment that will be used and their respective decontamination procedures; (c) operation and maintenance practices and procedures that will be used for the tools/equipment; (d) the types of Lead-Containing Materials that may be disturbed or Lead Wastes that may be generated when performing the activity; (e) the engineering controls that will be used to control the spread of contamination during the activity; (f) the proposed crew size for the activity and individual employee responsibilities during the activity; (g) housekeeping procedures that will be used during the activity; (h) PPE and proposed respiratory protection that will be used for the activity;

2) Equipment and Supplies: Identify the equipment and supplies that will be used to perform the Work;

3) Rental Equipment Notification: If rental equipment is to be used during the Work, the Contractor shall notify the rental agency in writing concerning the intended use of the equipment;

4) SDSs: Provide SDSs for all chemical products (including chemical stripping products) to be used for the Work;

5) The name and qualifications (i.e., experience and training documentation) of the Competent Person, who shall satisfy the qualification requirements set forth in this Section and be present whenever Work of this Section is being performed.

b. Waste Management:

1) The identification of Lead-Containing Materials, Lead Wastes, and hazardous wastes (as defined in 40 CFR 116, 40 CFR 260, 40 CFR 261, 6 NYCRR 370 and 6 NYCRR 371) associated with the Work;

2) The estimated quantity of each waste stream (regulated and non-regulated) that will be generated and disposed of/recycled as per 40 CFR 302;

3) The name, address, 24-hour phone number, and current permit documentation for each recycling facility or TSDF indicating that the facility is approved by federal, state, and local regulatory agencies to receive Lead-Containing Materials and Lead Wastes, and that there are no outstanding violations or enforcement actions;

4) Current 6 NYCRR 364 and 40 CFR 263 permit documentation for the waste transporter that will transport Lead-Containing Materials and Lead Wastes from the Work Site to the TSDF;

5) Spill prevention, containment, and cleanup contingency measures to be followed during a suspected Lead emissions/bulk material release or emergency situation;

6) Section on the on-site handling, storage, removal, and disposal of waste materials, including but not limited to, the following: (a) secondary containment system for each drum storage area; (b) description of the waste storage areas; (c) the methods and procedures that will be used to collect and containerize wastes on a daily basis; (d) the types of containers; (e) the submittal of weekly regulated waste inspection and inventory records;

7) The name and qualifications (i.e., experience and training documentation) of the Waste Manager.

c. A detailed schedule for the implementation of the Lead Management Plan elements, including start and completion dates that allow for adequate time for cleanup, inspections, and air monitoring activities.

d. Medical Surveillance: For all activities within a Lead Control Area, each worker shall have: (a) an initial blood testing (including Zinc Protoporphyrin (ZPP) testing), and have a Blood Lead Level (BLL) below 35 micrograms per deciliter (µg/dl)(if the worker's BLL is in excess of 35 µg/dl, the worker shall show medical approval for this Work); (b) a medical exam, including a Pulmonary Function Test (PFT) within the past year; (c) written medical clearance within the past year, by a licensed health care professional, to wear a respirator; (d) a qualitative/quantitative respirator fit-test for the specified respirator within the past year.

e. Employee Documentation: For all activities that take place within a Lead Control Area, each worker shall: (a) have written proof of resumes and training (e.g., certificates) for Lead Workers,

Competent Persons, Waste Managers, and Air Monitors; (b) dates and written proof of initial medical surveillance by the Contractor or other employer within the past year, and proof that the employee is currently participating in the employer's ongoing medical surveillance program in accordance with this Section; (c) dates and written proof of respiratory clearance and a medical exam; (d) dates and written proof of a respirator fit-test.

f. A current (i.e., within the last month) signed and notarized statement disclosing all of the Contractor's or subcontractor's OSHA, EPA, and DOT citations/violations on projects involving Lead within the past three (3) years.

4. Analytical Laboratory Qualifications for Analyzing Suspect Lead-Containing Materials and Lead Wastes: Submit the name, address, and telephone number of each analytical laboratory selected to perform the analyses of waste samples (solid and liquid), air samples collected for Area Monitoring and Exposure Monitoring purposes, and paint/coating samples collected to classify building components, including copies of current AIHA and ELAP certificates, including dates of accreditation/reaccreditation. .

B. Field Reports and Recordkeeping: The Contractor shall maintain and provide the following documentation:

1. Air Monitoring Documentation: All air monitoring results, including COC, and daily air monitoring reports shall be provided to the DEP within 24-hours from the date the samples are collected.

a. Each signed daily air monitoring report shall include, but not be limited to, the following information: (a) sample "start" and "stop" times; (b) flow rates (initial and final) for each sample; (c) the total volume of air collected for each sample; (d) sample location descriptions/sample location drawings/names of individuals being sampled; (e) types (i.e., makes and models) of sampling equipment used; (f) types of sample media (i.e., filters and cassettes) used; (g) the most recent calibration dates, along with the calibration results, for the sampling equipment used; (h) the name of the Air Monitor that conducted the air monitoring; (i) dates that the air monitoring was conducted; (j) work tasks being performed during the air monitoring; (k) unique sample numbers used to identify each sample.

2. Waste Documentation: Completed and signed waste manifests from TSDFs shall be provided to the DEP no later than thirty (30) days after disposal. In addition, on-site waste storage areas shall be inspected weekly by the Waste Manager.

a. Each waste storage area inspection shall be coordinated with the Engineer, documented in the form of a written signed report, and

shall be provided to the DEP within 24-hours of the inspection date. These reports shall include, but not be limited to, the following information: (a) the name of the inspector; (b) descriptions of waste streams; (c) waste container type, physical condition, and quantity; (d) proper label type; (e) secondary containment system; (f) storage area security method to prevent any unauthorized entry; (g) the presence of any containers that violate RCRA generator storage time limitations, as defined in 40 CFR 262.

b. In addition to performing weekly waste storage area inspections, the Waste Manager shall also maintain an ongoing waste inventory, including: (a) specific dates that each waste container was added/removed from the waste storage area; (b) the full name (printed) and signature of the individual responsible for adding/removing each waste container from the waste storage area.

3. Lead Control Area Inspection Documentation: Lead Control Areas shall be inspected daily by the Competent Person.

a. Each daily Lead Control Area inspection shall be documented in the form of a signed written report. All reports shall be provided to the DEP no later than 24-hours after the inspection is completed. The content of these reports shall include : (a) the types of Work being performed; (b) the names of the Lead Workers, Competent Person, Waste Manager, and Air Monitor on site, including company name; (c) the types of air monitoring and the number of samples being collected; (d) any non-compliance issues observed, including the corrective actions that were taken to achieve compliance.

4. Contractor Project Record: The Contractor's Competent Person shall maintain a project record at the Work Site that shall be made available to the Engineer or DEP for review at any time, and shall be submitted to the DEP within 24-hours after the completion of the Work.

a. At a minimum, the Contractor project record shall contain the following information: (a) copies of training certificates for all individuals involved with the Work; (b) copies of all air monitoring results generated during the Work; (c) copies of all available paint chip/coating sample analytical data and XRF analyzer data, as well as paint/coating survey reports related to the Work; (d) copies of all daily sign-in sheets; (e) a list of emergency phone numbers, including the local fire department, local police department, nearest hospital, as well as phone numbers for the Engineer and DEP personnel responsible for administering the Work; (f) a copy of the OSHA Lead in Construction Standard (29 CFR 1926.62); (g) copies of all SDSs pertaining to all chemicals being used during the Work; (h) a copy of the Contractor's Lead Management Plan; (i) copies of all daily Lead Control Area inspection records; (j) copies of all weekly waste storage area inspection records; (k) a copy of the waste

inventory; and (l) a copy of the Contractor's Hazard Communication (HAZCOM) program.

5. Daily Sign-In Sheets: The Contractor shall generate daily sign-in sheets for all individuals entering and exiting each Lead Control Area for the duration of the Work. The daily sign-in sheets shall be maintained by the Competent Person and shall be made available to the Engineer or DEP for review at any time during the Work. All daily sign-in sheets shall be submitted to the DEP within 24-hours after the completion of the Work.

   a. At a minimum, each daily sign-in sheet shall include: (a) the individual's printed name and signature; (b) company name; (c) the time of entry and exit from each Lead Control Area.

6. HAZCOM Program: The Contractor's HAZCOM program shall be made available to the Engineer or DEP for review at any time during the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Respirators: The Contractor shall select respirators approved by the NIOSH for use in areas where paints/coatings, dusts, materials, or wastes containing contaminants may be disturbed. At a minimum, the Contractor shall provide each individual with a half-face, negative pressure, air purifying respirator equipped with HEPA/P-100 Filter cartridges until Exposure Monitoring results indicate that respiratory protection can be modified. The Contractor's CIH shall make all determinations regarding respiratory protection modifications that will be implemented for the Work. All modifications shall be in accordance with the OSHA Lead in Construction Standard (29 CFR 1926.62).

B. PPE: The Contractor shall provide personnel who have a potential to be exposed to materials or wastes containing contaminants, with appropriate PPE as prescribed by the Contractor's CIH.

C. HEPA Filters: HEPA/P-100 Filters used in vacuuming equipment, power tools, and local exhaust equipment must meet or exceed any manufacturer's

specifications and recommendations, as well as specifications presented in the Standard for Safety High Efficiency, Particulate, Air Filter Units (UL 586).

D. Waste Containers: Containers for the storage of all wastes shall be DOT-approved, and shall be provided by the Contractor.

E. Abrasives: Mechanical paint/coating removal equipment shall not use any products containing crystalline silica, and the equipment shall not utilize any non-recoverable materials or any cutting materials which introduce toxic or hazardous materials into the environment.

F. Chemical Strippers: The Contractor shall utilize an environmentally safe chemical paint stripping system, with demonstrated suitability and efficiency in preparing cast-in-place concrete, cement, and plaster surfaces that are free of any visible residues of paints/coatings. The system shall include non-alkaline or alkaline strippers that provide the lowest possible level of toxicity consistent with the types of paints/coatings to be removed. Neutralization products and procedures shall be provided for all alkaline stripping systems, no stripping system shall contain methylene chloride, and the stripping system shall be low in volatile organic compounds (VOCs).

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. Hygiene Facilities: The Contractor shall provide functional Hygiene Facilities as defined in this Section that are appropriate for the types of Work to be performed under this Section. The Contractor shall ensure that employees do not leave a Lead Control Area wearing any potentially contaminated PPE. Using compressed air to dislodge dust from clothing/PPE shall be strictly prohibited. The Contractor shall collect, test, and properly dispose of all wastewater generated from Hygiene Facilities.

1. Handwash Stations: The Contractor shall provide functioning handwash stations on all projects that disturb Lead-Containing Materials or Lead Wastes. Handwash stations shall have running water at the tap, clean towels, and soap per 29 CFR 1926.51. Substituting “hand wipes” in place of soap and running water will not be acceptable.

2. Showers: The Contractor shall provide shower facilities in accordance with 29 CFR 1926.62, for use by employees whose airborne exposure to Lead is above the PEL. When shower facilities are necessary, employees are

required to shower at the end of the work shift each day prior to leaving the Lead Control Area that they are working in.

B. Utilities: The temporary use of any on-site utilities shall be subject to the approval of the DEP. The Contractor shall furnish all water, hoses and water filtration devices needed for the Work as per 01 51 11 Temporary Water and Sanitary Services; as well as any temporary electrical hookups and temporary lighting to the Lead Control Area as per 01 51 30 Temporary Electrical System. All temporary lighting and temporary electrical service to a Lead Control Area shall be provided by the Contractor and shall be in weather-proof enclosures and be ground fault protected. Also, the Contractor shall supply all heating and ventilation equipment needed for the Work as per 01 51 12 Temporary Heat and Ventilation.

C. Signs: The Contractor shall post conspicuous warning signs at all approaches to work areas and waste storage areas. Signs shall comply with federal, state, and local regulations, including the requirements of OSHA. Signs shall not be removed until all Abatement, removal, and construction/demolition activities have been completed. At a minimum, each sign shall bear the following information in English and the predominant language that is spoken by the Contractor's employees if English is not spoken:

WARNING

LEAD WORK AREA

POISON

NO SMOKING, EATING OR DRINKING

1. Each sign shall be appropriately modified to include additional warnings for other contaminants that are identified during Exposure Monitoring.

D. Physical Boundary Delineation: The Contractor shall clearly delineate each Work area and waste storage area with a Physical Boundary as defined in this Section.

E. Work Area Preparation: The Contractor shall utilize HEPA-filtered vacuums, and wet methods during the initial cleaning of each work area. Prior to removal from each work area, all movable objects and mounted objects that can be removed shall be pre-cleaned using HEPA-vacuums and wet methods. Fixed objects that must remain within each work area shall be pre-cleaned using HEPA vacuums and wet methods, and subsequently covered with 6-mil polyethylene sheeting.

3.02 IMPLEMENTATION

A. Bulk Removal

1. Protection of Existing Work to Remain: All Work involving the disturbance of Lead-Containing Materials or Lead Wastes must be conducted without damage to, or contamination of equipment or surfaces within the work areas or other areas adjacent to the work areas. All such damage or contamination

shall be immediately corrected and cleaned up by the Contractor at the Contractor's expense.

2. Prohibited Activities: Contractors shall not conduct activities that are prohibited by OSHA and EPA regulations. The following activities are prohibited, regardless of whether they are conducted subject to an exposure assessment and written compliance program: (a) burning-off paints/coatings; (b) using heat guns operating above 1100oF; (c) dry machine sanding, grinding, or blasting paint without a HEPA vacuum exhaust tool; (d) uncontained hydroblasting or high-pressure washing; (e) welding painted/coated surfaces unless the paint/coating is removed at least 4-inches from area of heat application (per 29 CFR 1926.345(c)(1)), and local exhaust ventilation is used.

3. Test Patches: Prior to choosing the paint removal method(s) for paints/coatings, the Contractor shall perform test patches on surfaces subject to Abatement, to determine if the method(s) meet the requirements of this Section.

4. Mechanical Removal Equipment: When removing paints/coatings from metal surfaces, the paints/coatings must be removed to the extent that only the bare metal remains (i.e., no mill scale remains) as per SSPC SP 2, 3, 11, 15 and COM, as applicable. In the case of substrates other than metal (e.g., concrete, brick, and block), paints/coatings shall be removed from the surface of the substrate as per SSPC SP 13 and SSPC SP COM, as applicable, and managed in accordance with SSPC Guide 7. Acceptance of the Work shall be contingent upon inspection of the substrate surfaces by the Engineer and must demonstrate the absence of residual paint/coating layers that can be physically measured, pried loose, or peeled away using a scraping device. The Contractor may only use products and tools meeting the performance specifications outlined below:

    a. Contractor shall utilize a vacuum-assisted power tool system with demonstrated suitability and efficiency in preparing metal surfaces as per SSPC Guide 6 and SSPC SP 11, and with demonstrated effectiveness in maintaining Lead emissions below OSHA exposure limits during the disturbance of paints/coatings. Such systems may include dustless needle guns, dustless roto peens, and dustless right-angle grinders, all of which capture dust and debris at the cutting tool edge and transport the material under vacuum conditions to an air-tight disposal container. Dustless needle guns shall only be utilized on metal surfaces.

    b. The vacuum-assisted power tool system shall also be designed to permit the removal and replacement of collection containers under negative pressure in order to prevent the release of dusts. The system shall be equipped with an automatic “shut-off” in the event of vacuum failure.

c. Abrasive/recovery tools shall be monitored at all times by a device capable of determining recovery at the face of each tool, and capable of automatically disabling the tool in the event that recovery levels are insufficient. The monitor, at a minimum, shall have the following features: (a) a remote warning light; (b) an adjustable recovery set point; (c) automatic equipment disabling capabilities; (d) a sensing range of 0 - 5 pounds per square inch (psi); (e) solid state photohelic instrumentation; (f) remote sensing at the face of the tool.

d. The safe recovery point shall be calibrated each day before start-up, or each time a new tool or vacuum source is used. All manufacturer recommendations shall be followed with respect to the set up and use of the monitor, and the manufacturer's operations manual shall be kept on site at all times. A daily log shall be maintained by the Contractor, identifying all calibrations of recovery levels, as well as any "down time" as a result of insufficient recovery levels.

e. The cutting head of the vacuum-assisted power tool system that is used on flat surfaces shall be capable of cutting to within 1-1/2" of any inside corner, molding, or edge, and may include dustless roto peens or dustless needle guns. Tools for corners and moldings shall be specifically designed for that purpose, and conform to all inside corners, outside corners, curved, flat, and angled surfaces that are to be abated under this Section. These tools shall also maintain vacuum control at the work surface/cutting head interface at all times. HEPA vacuum-shrouded needle guns may be used for non-flat surfaces in accordance with manufacturer recommendations. Vacuum-assisted finishing tools, such as right angle grinders, may be used to achieve the SSPC SP 11 standard, but may not be used for primary removal.

f. Vacuum-assisted power tool systems meeting all of the specifications outlined herein, may be used pending the submittal of all required performance documentation, and their acceptance by the Engineer. Any tools which do not meet all of the specifications outlined herein, shall be removed from the project Site immediately, and shall not be used for the Work to be performed under this Section.

5. Chemical Strippers: Acceptance of the Work shall be contingent upon inspection of the abated substrate surfaces by the Engineer, and must demonstrate the absence of residual paint/coating layers that can be physically measured, pried loose, or peeled away using a scraping device. The Contractor may only use products and paint stripping systems meeting the performance specifications outlined below:

a. The Contractor shall utilize a chemical paint stripping system with a demonstrated effectiveness in maintaining Lead emissions below OSHA exposure limits during the disturbance of paints/coatings.

The Contractor shall utilize a mechanical ventilation system during the Work that exhausts away from occupied areas. The application of all paint stripping systems shall be in accordance with manufacturer recommendations and SSPC SP 1. Debris shall be managed in accordance with SSPC Guide 7.

b. The Contractor should note that more than one product may be required to strip LCP/coatings. The use of multiple products shall be in accordance with Work practices approved by the individual manufacturer of each chemical paint stripping compound.

c. All chemical paint stripping products shall be presented to the Engineer for approval prior to the start of any Work to be performed under this Section. Also, the manufacturer's labels on each container shall be intact and legible.

d. Chemical paint stripping systems may be used pending the submittal of all required performance documentation, and its acceptance by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Air Monitoring

1. Air monitoring for airborne concentrations of Lead shall be conducted by the Air Monitor in accordance with OSHA and as defined in this Section.

a. Exposure Monitoring: For Work involving the disturbance of any detectable concentration of Lead, the Contractor shall collect personal air samples from employees who are anticipated to have the greatest risk of exposure, as determined by the Contractor's CIH or Competent Person. Personal air samples shall be collected during every work shift from at least one (1) employee that is representative of each type of work task that is being performed. Each personal air sample shall "run" for the employee's entire work shift to ensure that enough volume (of air) is collected and an accurate 8-hour TWA can be calculated. Documentation regarding the sample numbers, specific shift when the sampling was conducted, the work tasks that were sampled, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

2. Area Monitoring: The Contractor shall collect a minimum of two (2) area air samples outside of each Lead Control Area on a daily basis for the duration of the Abatement, removal, or construction/demolition Work, as well as any other Work involving the disturbance of Lead-Containing Materials or Lead Wastes. During sampling activities, all air sample filter cassettes shall be positioned approximately five to six feet above the ground (to simulate an individual's breathing zone), and shall not be placed immediately adjacent to obstructions (e.g., walls or columns) which may restrict the flow of air to the filter cassettes. Each air sample shall be

analyzed for all contaminants identified during the exposure assessment. If area air monitoring indicates an emission level in excess of an OSHA Action Level outside of a Lead Control Area, all Work in that area shall be stopped immediately. The Contractor shall then take immediate corrective actions to reduce emission levels to below the Action Level(s), and the Contractor shall clean all adjacent areas that may have become contaminated due to the emissions. Documentation regarding the sample numbers, sample locations, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

3. The Contractor shall submit all air monitoring results to the DEP within 24 hours of date of air sample collection.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleanup: The Contractor shall maintain all surfaces, including protective coverings (polyethylene sheeting) within each work area, free of accumulations of paint chips/coating debris, dusts, and wastes. Dry sweeping and using compressed air to cleanup a Work area shall be strictly prohibited. HEPA-filtered vacuums and wet methods shall be used to ensure that each Work area remains free of visible paint chips/coating debris, dusts, and wastes.

B. Collection, Separation, and Containerization of Wastes: The Contractor shall collect, separate (by waste stream/waste type), and containerize Lead Wastes (solid and liquid), debris, PPE, and containment materials on a daily basis in accordance with the Lead Management Plan. Where the TCLP analysis for the eight (8) RCRA metals are below hazardous waste standards, all PPE, poly and paint/coating waste will be characterized as Lead-Containing non-hazardous, contaminated waste, and should not be managed as construction and demolition (C&D) debris.

1. The Contractor shall store all wastes in DOT-approved container systems. No drum/container shall be filled in excess of the capacity marked on the drum/container. All drums/containers shall be sealed and covered immediately after filling, and each drum/container shall have an intact and legible label affixed to it.

2. No water mixed with or contaminated by hazardous waste may be released onto the ground or into any drain or sewer (RCNY Title 15, Chapter 19). It should be noted that a discharge of more than 10 pounds of Lead (this includes 10 pounds of debris containing Lead) onto the ground or into the water within a 24-hour period, shall be considered a violation of the Clean Water Act and shall be treated as a “reportable quantity” in accordance with 40 CFR 117. Such a release shall be grounds for immediate termination of this Contract, and the Contractor shall be liable for any fines, penalties, or remediation costs.

3. The Contractor shall store non-hazardous wastes separately from hazardous wastes, shall provide all non-hazardous waste containers, and shall make all transportation and disposal arrangements for non-hazardous wastes in accordance with federal, state, and local regulations.

C. Storage of Wastes: The Contractor shall ensure that all drummed wastes are stored in a secondary containment system, and that each waste storage area is demarcated with a Physical Boundary. In addition, the Contractor shall post weekly waste inspections and waste inventories in the regulated waste storage area, as well as the following emergency information in accordance with DEP's EHS Policies and Procedures: (a) the name and telephone number of the facility's Emergency Coordinator; (b) the location of fire extinguishers and fire alarms; (c) the location of spill control materials; (d) the telephone number for the fire department (unless the facility has a direct alarm).

D. Labeling: The Contractor shall affix warning labels to all waste drums/containers. At a minimum, all hazardous waste labels shall bear the following information in English:

HAZARDOUS WASTE
FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
HANDLE WITH CARE
[Generator Name, Address, and Telephone Number]
[Specific Contents of Container]
[EPA-Issued Generator Identification Number]
[EPA Waste Identification Number]
[Accumulation Start Date]
[Accumulation End Date]

1. If waste classification is pending analysis, labels shall indicate "Hazardous Waste - Pending Analysis." If wastes contain PCBs, drums/containers must also be labeled per Section 02 84 05 - PCB Management.

E. Sampling and Laboratory Analysis of Paint Removal Wastes: For hazardous waste characterization, the Waste Manager shall sample all potential Lead-Containing Waste Streams in accordance with 40 CFR 261 and 6 NYCRR Part 371. All waste samples shall be collected in the presence of the Engineer using the following procedure:

1. One (1) composite waste sample shall be collected for laboratory analysis from each waste drum that is generated. Each composite sample shall be a mixture of four (4) grab samples. As an example, if the drum is full, collect four grab samples, if the drum is half-full, collect two grab samples, and if the drum is one-tenth full, collect one sample. Grab samples shall be composited into one (1) bulk composite sample. Each composite sample shall undergo Toxicity Characteristic Leaching Procedure (TCLP) analysis for the eight (8) RCRA metals.

2. In addition, if the waste stream is associated with the use of a chemical paint stripping system, the Contractor shall have the laboratory analyze each sample for pH and any other RCRA characteristic that may fail due to the chemical composition of the waste. Furthermore, if the waste stream contains PCB-Containing paint/coating chips, the Contractor shall collect samples in accordance with Section 02 84 05 - PCB Management. The Contractor shall ensure that the laboratory being used is also capable of performing these additional analytical tests.

3. One (1) representative wastewater sample shall be collected for laboratory analysis using appropriate field sampling equipment (e.g., a pipette or bailer), and shall be labeled appropriately.

F. Sampling and Laboratory Analysis of Painted Demolition Debris: The Contractor shall collect representative bulk samples of demolition wastes to determine proper disposal. All bulk samples shall undergo TCLP analysis for the eight (8) RCRA metals. Furthermore, if the waste stream may contain PCB-Containing paint/coating chips, the Contractor shall collect samples in accordance with Section 02 84 05 - PCB Management.

1. Scrap Metal Exemption for Recycling: Under 6 NYCRR 371.1(c)(7), painted scrap metal can be sent to a recycling facility, rather than be discarded as hazardous waste. For the DEP to submit a "c7 notification" to the NYSDEC and claim the "scrap metal exemption," the Contractor must first submit notification to their recycling facility indicating that Lead is present on the scrap metal. If PCBs are detected in the paints/coatings on the scrap metal, the Contractor shall also disclose this information to the recycling facility as per Section 02 84 05 - PCB Management. The Contractor shall submit this documentation to the Engineer for approval prior to disposal.

G. Disposal of Wastes: The Contractor shall notify the DEP at least 14 business days prior to the removal of any waste drums/containers. All hazardous waste profiles for containerized wastes must be reviewed by the Engineer and signed by the DEP as the generator of the waste streams. Wastes shall be disposed of so that drums/containers do not remain on the job site for more than 90 calendar days from the initial "accumulation start date" on the drum/container label. Containers that have reached their storage capacity shall not remain on site, and transportation arrangements shall be made for their immediate removal.

H. Disposal Documentation: Once all waste profiles have been completed, the Contractor shall provide the DEP a "Letter of Acceptance" issued from the TSDF indicating that the wastes will be accepted, and a copy of the advance manifest. On the date of disposal, the Contractor shall submit one (1) copy of the completed manifest that has been signed and dated by the initial transporter in accordance with 6 NYCRR 372 and 40 CFR 262, to the DEP for signature as Generator. All hazardous waste documentation (e.g., waste profiles, manifests and Land Disposal Restrictions (LDRs)) must be signed by a DEP employee as described in Section

01 35 45- Hazardous Materials Control. Non-hazardous waste documentation may be signed by a DEP-designated alternate.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This Section details the requirements for construction and demolition activities affecting materials and structures coated with or containing polychlorinated biphenyls (PCBs), as shown on Table 3, attached to Section 01 35 45 – Hazardous Materials Control, specified herein, or required to complete the Work, including all affected coatings identified and impacted by the Work. No PCB-containing coatings were identified to be impacted by the Work. However, if suspect PCB coating is identified, it must be sampled and analyzed in accordance with these Specifications and applicable regulations.

B. All Work under this Section shall be performed to minimize the creation of airborne emissions (40 CFR 50); minimize 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.

C. In the absence of analytical testing results for a specific painted/bitumastic-coated material, the material shall be classified as PCB-containing and lead-containing. If the material is caulking or has a bitumastic coating, the material shall also be classified as asbestos-containing.

D. Small Capacitors and Fluorescent Light Ballasts manufactured prior to 1978 may contain PCBs in their capacitors or potting materials. Unless a Fluorescent Light Ballast is marked “No PCBs” by the manufacturer, it shall be assumed that the ballast contains PCBs. All PCB-containing light ballasts and Small Capacitors shall be removed, handled, packaged, and disposed of in accordance with this Section.

E. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment will be made for performing any work required under this Section. All costs 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 01 27 00 – Measurements and Payment.

B. Payment for the disposal of PCB Wastes will not be made until a signed copy of the manifest from the Treatment, Storage, and Disposal Facility (TSDF), certifying the amount of PCB Wastes delivered is returned with complete chain-of-custody (COC) documentation to the DEP.

1.03 RELATED SECTIONS

A. Section 01 35 27 – Environmental Health and Safety Requirements
B. Section 01 35 45 Hazardous Materials Control
C. Section 01 41 00 – Regulatory Requirements
D. Section 01 51 11 – Temporary Water and Sanitary Services
E. Section 01 51 12 – Temporary Heat and Ventilation
F. Section 01 51 30 – Temporary Electrical System
G. Section 01 74 20 – Construction Waste Management
H. Section 02 41 10 – Demolition and Removals
I. Section 02 82 05 – Asbestos Management
J. Section 02 83 05 – Lead Management

1.04 REFERENCES

A. Definitions

1. Abatement: Any measures or set of measures designed to permanently eliminate PCB paint/bitumastic coating hazards. Abatement includes, but is not limited to, the removal of PCB paints/bitumastic coatings or the replacement of PCB-painted/bitumastic-coated surfaces or fixtures. Abatement also includes the removal of paints/bitumastic coatings (with a PCB concentration greater than or equal to 50 parts per million (ppm)) when the underlying substrate is to remain in place. Abatement does not include renovation, remodeling, landscaping, or other activities, when such activities are not designed to permanently eliminate PCB hazards, but instead, are designed to repair, restore, or remodel a given structure or

dwelling, even though these activities may incidentally result in a reduction or elimination of PCB hazards. Furthermore, Abatement does not include interim controls (e.g., the spot removal of a PCB paint/bitumastic coating on a surface in order to perform torch cutting at that location), Operations and Maintenance (O&M) activities, or other measures and activities designed to temporarily reduce PCB hazards.

2. Area Monitoring: Stationary air sampling outside of a PCB Control Area for the purpose of determining compliance with OSHA's Limits for Air Contaminants Table (29 CFR 1910.1000, Table Z-1), and for the purpose of ensuring that airborne PCB concentrations remain below 1.0 mg/m^3 (Aroclor 1242) and 0.5 mg/m^3 (Aroclor 1254) outside of the PCB Control Area during all Work activities that have the potential to disturb PCB-Containing Materials with PCB concentrations greater than or equal to 50 ppm. Area Monitoring for lead will be required if Exposure Monitoring results exceed corresponding Action Levels, Permissible Exposure Limits (PELs), or Threshold Limit Values (TLVs). If asbestos is present, Area Monitoring shall also be conducted in accordance with DEP (RCNY Title 15, Chapter 1) or NYSDOL (12 NYCRR 56) regulations. All Area Monitoring shall follow pertinent NIOSH or ASTM sampling methodologies.

3. Certified Industrial Hygienist (CIH): Refers to an individual employed by the Contractor who is currently certified by the American Board of Industrial Hygiene (ABIH).

4. Competent Person: Defined by OSHA as someone who is capable of identifying existing and predictable hazards in the surroundings or working conditions, and who has authorization to take prompt corrective measures to eliminate them. Duties of the Competent Person include the following: (a) determining prior to the performance of the Work whether PCBs or lead are present in the workplace; (b) establishing PCB Control Areas and assuring that access to and from those areas is limited to authorized personnel; (c) assuring the adequacy of any employee Exposure Monitoring required by OSHA; (d) assuring that all employees exposed to airborne contaminant levels above Action Levels, PEL, or TLV wear appropriate Personal Protective Equipment (PPE), respiratory protection, and are trained in the use of appropriate methods of exposure control for all of the contaminants present; (e) assuring that proper Hygiene Facilities are provided and that workers are trained to use those facilities; (f) assuring that engineering controls specific to the contaminants present are implemented, maintained in proper operating condition, and functioning properly.

5. Decontamination Area: Designated area within the Hygiene Facilities for removing gross contamination from PPE (using a HEPA vacuum), washing away contamination that has accumulated on the skin and hair (using soap and water), removing, and disposing/washing of contaminated

PPE, and donning clean clothing that will not potentially contaminate areas outside of a PCB Control Area's Physical Boundary.

6. DOT Hazardous Materials Transportation Training: Training that meets the criteria outlined in 49 CFR 172.704. This training shall include discussions of the following: (a) hazardous materials tables within 49 CFR 172; (b) material packaging and labeling within 49 CFR 178; (c) shipping papers and placards within 49 CFR 173; (d) material loading and segregation.

7. Exclusion Zone: (See definition of "PCB Control Area").

8. Exposure Monitoring: Personal air sampling performed outside the respirator within the breathing zone of individuals, for the purpose of determining compliance with OSHA's Limits for Air Contaminants Table (29 CFR 1910.1000, Table Z-1). Analytical results obtained from Exposure Monitoring will be used to select appropriate respiratory protection and PPE for individuals within a work area. For the purpose of this Section, Exposure Monitoring samples shall be collected from individuals who are representative of each type work task being conducted by the Contractor, and all Exposure Monitoring shall follow pertinent NIOSH (Method 5503) or ASTM sampling methodologies.

9. Fluorescent Light Ballast: A device that electrically controls fluorescent light fixtures and includes a capacitor containing 0.1 kilograms (kg) or less of dielectric fluid.

10. Hazardous Waste Operations (HAZWOPER) Training: Training that meets the criteria outlined in the OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). A minimum of 24-hour HAZWOPER training will be required for Work being performed under this Section. However, certain types of Work may require 40-hour HAZWOPER Training. All decisions regarding the specific HAZWOPER Training that will be required for each Work task shall be made by the Engineer.

11. High-Efficiency Particulate Air (HEPA) Filter: A filter designed to remove 99.97% of all particles greater than 0.3 micrometers (μm) in diameter. For the purpose of this Section, HEPA vacuum and local exhaust filtration equipment used by the Contractor shall meet the Standard for Safety High-Efficiency, Particulate, Air Filter Units (UL 586) developed by Underwriters Laboratories.

12. Homogenous Materials: PCB-Containing Materials which are similar in appearance, color, texture, and substrate type.

13. Hygiene Facilities: Facilities within the Physical Boundary of a work area that are set up to prevent cross contamination and are equipped with change areas and separate storage facilities for PPE and clean clothing. Hygiene Facilities shall include adequately supplied hand washing station(s) (i.e., running water, soap, and clean towels) or shower(s) (hot

and cold water that is controllable at the tap, soap, shampoo, and clean towels).

14. Organic Vapor Cartridge: A respirator filter typically containing 25 to 40 grams of sorption media such as activated charcoal.

15. OSHA Monitoring: (See definition of "Exposure Monitoring").

16. P-100 Filter: (See definition of: "High-Efficiency Particulate Air (HEPA) Filter").

17. PCB Awareness Training: Training for individuals that have the potential to be exposed to PCB-Containing Materials or PCB Wastes. This training shall include discussions of the following: (a) sources of PCBs; (b) current federal, state, and local regulations pertaining to PCBs (including 40 CFR 761) and other contaminants that may be disturbed during the Work; (c) the health effects of PCBs and other contaminant exposures; (d) state-of-the-art work practices, engineering controls, and procedures for Abatement, removal, construction/demolition, materials handling, housekeeping, and waste management activities that involve PCB-Containing Materials and PCB Wastes; (e) the use and maintenance of PPE and the use and maintenance of respirators in accordance with 29 CFR 1910.134; (f) medical surveillance programs; (g) requirements regarding warning signs, labeling, and Safety Data Sheets (SDSs) in accordance with 29 CFR 1910.1200; (h) responsibilities of the Competent Person.

18. PCB Bulk Product Waste: Waste derived from manufactured products containing PCBs in a non-liquid state, at any concentration where the concentration at the time of designation for disposal is greater than or equal to 50 ppm of PCBs.

19. PCB-Containing Material: Any material that contains, or is coated with, a detectable concentration of PCBs.

20. PCB Control Area: The area within the Physical Boundary where worker Hygiene Facilities are located and where all Work activities take place that involve the disturbance of PCB-Containing Materials and PCB Wastes.

21. PCB Hazardous Waste (per NYSDEC): All solid wastes containing PCB concentrations greater than or equal to 50 ppm. Refer to 6 NYCRR Part 371.4(e) for specific details and exceptions regarding the classification of PCB Wastes as "hazardous wastes" (listed waste B001-B007) in New York State.

22. PCB Waste (TSCA-regulated): Non-specific liquid or solid waste generated during the Abatement, removal, construction/demolition, handling, or cleanup of a PCB-Containing Material with a PCB concentration greater than or equal to 50 parts per million (ppm). PCB Waste also includes any waste (including remediation waste, polyethylene sheeting and PPE) that has been in contact with a material that has a PCB

concentration greater than or equal to 50 ppm, regardless of whether the waste itself has a PCB concentration of less than 50 ppm. PCB Wastes are subject to the disposal requirements set forth in Toxic Substances Control Act (TSCA) (40 CFR 761, Subpart D).

23. Perimeter Monitoring: (See definition of "Area Monitoring").

24. Permissible Exposure Limit (PEL): Defined by OSHA as individual exposure, without regard to the use of respirators, to a specific airborne concentration of a contaminant expressed in milligrams per cubic meter of air (mg/m3) calculated as an 8-hour Time-Weighted Average (TWA). Once a PEL is met or exceeded for a particular contaminant, the Contractor is responsible for meeting specific OSHA requirements, which may include worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. The following PELs are pertinent to disturbance, removal, construction/demolition, and disposal activities associated with PCB-Containing Materials and PCB Wastes: (a) PCB Aroclor 1254 – 0.5 mg/m3 per 29 CFR 1910.1000, Table Z-1; (b) PCB Aroclor 1242 – 1.0 mg/m3 per 29 CFR 1910.1000, Table Z-1.

25. Personal Monitoring: (See definition of "Exposure Monitoring").

26. Physical Boundary: A physical barrier designated with ropes, "caution tape," or a partition that surrounds a work area in order to limit the entry of unauthorized personnel and delineate "clean areas" from areas that may meet or exceed an Action Level, PEL, or TLV.

27. PCBs: Any group of chlorinated isomers of biphenyl, formerly used in the form of a toxic, colorless, odorless, viscous liquid typically added to lubricants, heat-transfer fluids, and plasticizers.

28. Regulated Area: (See definition of "PCB Control Area").

29. Resource Conservation and Recovery Act (RCRA) Training: Training that meets the criteria outlined in 40 CFR 265.16. This training shall include site-specific discussions of the following: (a) hazardous waste identification; (b) waste storage container use and labeling; (c) waste storage area management; (d) personal health and safety, including fire safety; (e) manifesting and the off-site transportation of wastes; (f) procedures for using, inspecting, repairing, and replacing emergency equipment and monitoring equipment; (g) procedures for communicating with other employees and outside emergency response personnel; (h) responses to fires or explosions; (i) responses to leaks, spills, and potential groundwater contamination incidents; and (j) the shutdown of operations.

30. Small Capacitor: A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric fluid in a quantity less than 1.36 kg or three pounds. If the weight of the dielectric fluid is unknown, it can be assumed that a Small Capacitor is a

capacitor that has a total volume of less than 1,639 cubic centimeters (cm^3) or 100 cubic inches (in^3).

31. TLV: Threshold Limit Value

32. TWA: The average time over a given work period (e.g., an 8-hour workday) of a person's exposure to a chemical or agent. The average is determined by sampling for the chemical or agent throughout the time period.

33. Trigger Activities: Certain activities that involve a disturbance of PCB-Containing Materials or PCB Wastes. Depending upon whether the performance of these activities exceeds an Action Level, PEL or TLV, the requirements may include additional worker Exposure Monitoring, the use of PPE including respiratory protection, the use of Hygiene Facilities, medical surveillance, or training for workers. Examples of Trigger Activities include, but are not limited to, the following: abrasive blasting, welding, torch cutting/burning, heat gun usage, needle gunning/scaling, rivet busting, using a rotopeen, mechanical sanding/grinding, using mechanical shears, hand scraping/sanding, chemical stripping, and the manual demolition of PCB-Containing Materials.

B. Reference Standards

1. The Contractor shall comply with all applicable regulations, standards, and guidelines of federal, state, and local environmental and occupational safety and health agencies regarding PCB-Containing Materials and PCB Wastes. These regulations, standards, and guidelines include, but are not limited to the following:

   a. United States (U.S.) Department of Transportation (DOT):

      1) 49 CFR 171 - General Information, Regulations, and Definitions

      2) 49 CFR 172 – Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

      3) 49 CFR 173 – Shippers: General Requirements for Shipments and Packaging's

      4) 49 CFR 178 – Specifications for Packaging's

   b. United States Environmental Protection Agency (EPA):

      1) 40 CFR 50 – National Primary and Secondary Ambient Air Quality Standards

      2) 40 CFR 116 – Designation of Hazardous Substances

      3) 40 CFR 117 – Determination of Reportable Quantities for Hazardous Substances

4) 40 CFR 260 – Hazardous Waste Management Systems: General

5) 40 CFR 261 – Identification and Listing of Hazardous Waste

6) 40 CFR 262 – Standards Applicable to Generators of Hazardous Waste

7) 40 CFR 263 – Standards Applicable to Transporters of Hazardous Waste

8) 40 CFR 264 – Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

9) 40 CFR 265 – Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

10) 40 CFR 268 – Land Disposal Restrictions

11) 40 CFR 302 – Designation, Reportable Quantities, and Notification

12) 40 CFR 761 – Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

13) Method 8082A (SW-846) – Polychlorinated Biphenyls (PCBs) (soxhlet extraction method 3540) by Gas Chromatography

c. National Institute for Occupational Safety and Health (NIOSH):

1) Method 5503 – Polychlorobiphenyls

d. New York City Department of Environmental Protection (DEP):

1) Environmental Health and Safety Policies, Procedures and Guidelines – Vol. II, Spill Prevention, Environmental Release Reporting and Investigation;

2) Environmental Health and Safety Policies, Procedures and Guidelines – Vol. IV, Hazardous Waste Management;

3) Environmental Health and Safety Policies, Procedures and Guidelines – Vol. IV, PCB Management;

4) RCNY Title 15, Chapter 19 – Discharges of Wastewater and Other Materials to Public Sewers

e. New York City Department of Buildings (DOB) – Building Code (Chapter 33)

f. New York State Department of Environmental Conservation (NYSDEC):

1) 6 NYCRR 364 – Waste Transporter Permits

2) 6 NYCRR 370 – Hazardous Waste Management Regulations

3) 6 NYCRR 371 – Identification and Listing of Hazardous Waste

4) 6 NYCRR 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities

5) 6 NYCRR 373 – Hazardous Waste Management Facilities

6) 6 NYCRR 376 – Land Disposal Restrictions

7) 12 NYCRR 56 – Asbestos

g. Occupational Safety and Health Administration (OSHA):

1) 29 CFR 1910 – Occupational Safety and Health Standards

2) 29 CFR 1910.28 – Safety Requirements for Scaffolding

3) 29 CFR 1910.120 – Hazardous Waste Operations and Emergency Response

4) 29 CFR 1910.134 – Respiratory Protection Standard

5) 29 CFR 1910.1200 - Hazard Communication Standard

6) 29 CFR 1926 – Safety and Health Regulations for Construction

7) 29 CFR 1926.62 – Lead in Construction Standard

h. Society for Protective Coatings (SSPC):

1) SSPC Guide 6 - Guide for Containing Debris Generated During Paint Removal Operations

2) SSPC Guide 7 - Guide for the Disposal of Lead-Contaminated Surface Preparation Debris

3) SSPC SP 1, Solvent Cleaning

4) SSPC SP 2, Hand Tool Cleaning

5) SSPC SP 3, Power Tool Cleaning

6) SSPC SP 11, Power Tool Cleaning to Bare Metal

7) SSPC SP 13/ NACE No.6, Surface Preparation of Concrete

8) SSPC SP 15, Commercial Grade Power Tool Cleaning

i. Underwriters Laboratories, Inc. (UL):

1) UL 586 – Standard for Safety High Efficiency, Particulate, Air Filter Units.

1.05 DESCRIPTION

A. Commencement of Work: Five (5) business days prior to the proposed start of the work of this Section at each separate location, the Contractor shall notify the Engineer and the onsite safety staff. No Work may proceed at any location until authorized by the Engineer.

B. The Contractor shall coordinate any required equipment shutdowns with the Engineer prior to starting the Work.

C. Access Restrictions: The Contractor shall inform the Engineer of proposed access restrictions (i.e., areas or items of equipment which will not be accessible during the proposed Work) and give them estimated time frames (including specific dates) of such proposed access restrictions. The Contractor shall notify other contractors in advance of the disturbance, Abatement, removal, construction/demolition, and disposal Work included herein, to provide them with sufficient time for coordination of interrelated items that are included in their contracts and that must be performed before, after, or in conjunction with the Work included under this Section.

D. Unexpected Entry into a PCB Control Area: In the event that DEP personnel must enter a PCB Control Area for emergency reasons, the Contractor shall immediately stop Work and cleanup any loose debris, so as to permit the safe entry by DEP personnel. Any disturbance of paints/bitumastic coatings, dusts, materials, or wastes that may potentially generate airborne concentrations of contaminants equal to or above an OSHA Action Level shall not proceed until all DEP personnel have exited from the PCB Control Area.

E. Meetings: In addition to the pre-construction meeting and site walk-through, other meetings may be required or may be requested by the Engineer, including briefings to Site Operations personnel. Written documentation (i.e., “minutes”) of all meetings shall be generated by the Contractor, and copies shall be provided to the DEP within three (3) business days following each meeting.

1.06 QUALITY ASSURANCE

A. Scheduling: The Contractor shall coordinate and schedule all phases of the Work to be performed under this Section with the DEP, subcontractors, material suppliers, and other parties as necessary to ensure the proper execution of the Work.

B. Compliance: In addition to the detailed requirements of this Section, DEP EHS Policies and Procedures, and Section 01 35 27 – Environmental Health and Safety Requirements, the Contractor shall comply with all applicable regulations of federal, state, and local authorities pertaining to the disturbance, Abatement, removal, construction/demolition, handling, storage, transportation, and disposal of PCB-Containing Materials and PCB Wastes. All matters regarding the interpretation of any regulations, standards, or policies shall be submitted to the

Engineer for resolution before starting the Work. Where the requirements of this Section, DEP EHS Policies and Procedures, or federal, state, or local regulations conflict or vary, the most stringent requirements or regulations shall apply.

C. Rejection of Non-Complying Items: The DEP reserves the right to reject Contractor materials/tools/submittal items that are deemed inappropriate or unacceptable by the Engineer or DEP. Submittal items that may be deemed inappropriate or unacceptable include proposed TSDFs, vendors or subcontractors with previous regulatory citations/violations.

D. Suspect Material Characterization: To classify caulking or a paint or bitumastic coating as non-PCB containing, a paint chip/coating sample must be collected as a grab sample from the source. The sample shall be sent to an analytical laboratory meeting the requirements of this Section.

1. Suspect PCB-Containing Paints/Coatings: Although there are no certification requirements pertaining to an individual that collects paint chip samples in an industrial or commercial setting, this Section requires paint chip sampling to be performed by an individual who has successfully completed a PCB Awareness Training course (within the past year) as defined in this Section.

2. Suspect ACM: All caulking and bitumastic coatings are considered suspect ACM. Therefore, if a sample will be collected, the sampling shall be performed by a certified DEP Asbestos Investigator or NYSDOL Asbestos Inspector.

3. Estimate an approximate number of samples to adequately characterize painted/coated surfaces. Collect grab samples that include all layers of paint/coating from different areas randomly dispersed throughout the painted surface area. Grab samples are not to be composited.

4. PCB concentrations are based on the cumulative total of the nine (9) Aroclor cogeners (aka PCB compounds) analyzed by EPA Method SW 846-8082A (soxhlet extraction method 3540) by Gas Chromatography.

E. Qualifications:

1. The Contractor or their proposed PCB removal subcontractor shall have successfully completed at least two (2) projects of comparable scope and methodologies and shall document the following: (a) the name, address, and phone number of each facility where the work was performed; (b) the volume and type of each material that was abated/removed; (c) the specific methods of Abatement/removal used (including the tools, technologies, and engineering controls employed).

2. Competent Person:

a. When disturbing materials and wastes with PCB concentrations greater than or equal to 50 ppm, the Contractor shall have on staff and assigned to this Contract a Competent Person who has successfully completed:

1) 40-hr HAZWOPER Training;

2) PCB Awareness Training (annual), and RCRA Training courses as defined in this Section.

a) Each training course shall be current in accordance with the course and regulatory requirements.

b. The Competent Person shall have a minimum of two (2) years' experience with work involving PCBs, and shall have served as the Competent Person on at least three (3) projects of comparable scope and methodologies to the work being performed under this Section.

c. The Competent Person shall be on site during all PCB-related work activities. It should be noted that depending upon the specific contaminants present during the work, additional training for the Competent Person may be required.

3. PCB Waste Manager:

a. When disturbing materials and wastes with PCB concentrations greater than or equal to 50 ppm, the Contractor shall have on staff and assigned to this Contract a PCB Waste Manager who has successfully completed:

1) DOT Hazardous Materials Transportation Training;

2) RCRA Training course, completed within the past year in the form of either an initial course or a refresher course;

3) 24-hr HAZWOPER Training;

4) PCB Awareness Training (annual) as defined in this Section.

b. The PCB Waste Manager shall have a minimum of two (2) years experience on projects involving PCB Wastes. It is acceptable for an individual who meets the criteria of the Competent Person, to also serve as the PCB Waste Manager for this Contract as long as the individual fulfills all of the requirements of this paragraph.

4. PCB Worker:

a. When disturbing materials and wastes with PCB concentrations greater than or equal to 50 ppm, the Contractor shall have on staff and assigned to this Contract a sufficient number of PCB Workers who have successfully completed:

1) PCB Awareness Training course (annual) as defined in this Section.

b. Each PCB worker shall have a minimum of one (1) year of experience on projects involving PCBs and shall have worked on

at least three (3) projects of comparable scope and methodologies to the work being performed under this Section.

5. Worker (low PCB concentrations):

   a. When disturbing materials and wastes with PCB concentrations less than 50 ppm, the Contractor shall have on staff and assigned to this Contract a sufficient number of workers who have successfully completed:

      1) PCB Awareness Training course (annual) as defined in this Section.

   b. Until a negative exposure assessment has been established via Exposure Monitoring, workers must wear appropriate respiratory protection.

6. Air Monitor:

   a. When disturbing any detectable concentration of PCBs, the Contractor shall have an Air Monitor assigned to this Contract who has successfully completed:

      1) PCB Awareness Training course (annual) as defined in this Section.

   b. The Air Monitor shall have a minimum of two (2) years experience in conducting Area Monitoring and Exposure Monitoring on projects involving PCBs.

   c. It is acceptable for an individual who meets the qualification requirements for Competent Person or PCB Waste Manager to also serve as the Air Monitor for this Contract, as long as the individual satisfies all of the requirements of this paragraph.

1.07 SUBMITTALS

A. Thirty (30) business days prior to the Work of this Section or as directed by the Engineer, the Contractor shall submit the following to the Engineer:

1. PCB Inspection and Sampling Plan: The Contractor shall provide a PCB Inspection and Sampling Plan to identify suspect PCBs, not otherwise sampled during Design, and collect samples, as appropriate during the inspection. This plan shall include at a minimum:

   a. At a minimum, the inspection shall be performed by an Environmental Professional, as defined in this Contract, who shall have PCB awareness training (annual), and OSHA 10-hr certification, and shall have performed similar inspection work on at least three (3) projects of similar scope.

   b. Credentials of the laboratory providing sample analysis, including current certification by the New York State Department of

Health's Environmental Laboratory Approval Program (ELAP) and by the American Industrial Hygiene Association (AIHA).

c. Sample collection, analysis, and reporting protocol.

d. Health and safety protocol (Job Hazard Analysis) for all investigation activities.

2. PCB Inspection Report: The Contractor shall provide a PCB Inspection Report prepared by the Environmental Professional summarizing the results of all inspection activities, and as applicable, a sampling narrative, laboratory data packages, and inventory of all identified suspect and confirmed PCB-Containing Materials.

3. PCB Safe Work Practices: Each Contractor that will disturb PCB-Containing Materials with a PCB concentration less than 50 ppm during the course of Work to be performed under this Section shall submit detailed, project-specific PCB Safe Work Practices designed to protect their workers and control the spread of potential PCB contamination. Work requiring the development of PCB Safe Work Practices includes, but is not limited to, the mechanical disturbance of paints/coatings (e.g., drilling or sawing, or spot removal). The PCB Safe Work Practices shall be signed and dated by a CIH meeting the definition in this Section, and shall include the following elements:

a. Section on the procedures and methodologies that will be used to conduct Exposure Monitoring. Also, provide the name and qualifications (i.e., training and experience documentation) of the Air Monitor who shall, at a minimum, satisfy the qualification requirements set forth in this Section;

b. Section on housekeeping procedures to be used for maintaining clean work areas and clean Hygiene Facilities;

c. Task Analysis: Each task analysis shall include, but is not limited to, the following information: (a) the type of Work activity; (b) the tools/equipment that will be used and their respective decontamination procedures; (c) operation and maintenance practices and procedures that will be used for the tools/equipment (SSPC SP 1, 2, 3, 11, 13 and 15 as applicable); (d) the types of PCB-Containing Materials that may be disturbed when performing the activity; (e) the engineering controls that will be used to control the spread of contamination during the activity; (f) housekeeping procedures that will be used during the activity; (g) PPE and proposed respiratory protection that will be used for the activity;

d. Equipment and Supplies: Identify the equipment and supplies that will be used to perform the Work;

e. Rental Equipment Notification: If rental equipment is to be used during the Work, the Contractor shall notify the rental agency in writing concerning the intended use of the equipment;

f. SDSs: Provide SDSs for all chemical products to be used for the Work;

g. Medical Clearance for Respiratory Protection: For all activities that disturb PCB-Containing Materials with a PCB concentration less than 50 ppm, the Contractor shall provide a sufficient number of properly trained and experienced workers, each of whom shall: (a) have received a medical exam that included a Pulmonary Function Test (PFT) within the past year; (b) have received written medical clearance within the past year, by a licensed physician, to wear a respirator; (c) have received a qualitative or quantitative respirator fit-test for the specific respirator the employee will be using for this Work within the past year;

h. Employee Documentation: For all activities that may disturb PCB-Containing Materials with a PCB concentration less than 50 ppm, the Contractor shall provide a sufficient number of properly trained and experienced workers, each of whom shall: (a) have written proof of training (e.g., certificates) in accordance with the qualification requirements of this Section for workers and Air Monitors that will be used for the Work; (b) dates and written proof of respiratory clearance and a medical exam in accordance with this Article; (c) dates and written proof of a respirator fit-test in accordance with this Article.

4. PCB Management Plan: Each Contractor that will disturb PCB-Containing Materials with a concentration of PCBs greater than or equal to 50 ppm, and PCB Wastes during the course of Work to be performed under this Section shall submit a detailed, project-specific PCB Management Plan that addresses work procedures and equipment to be used during the disturbance, removal, handling, collection, and disposal of PCB-Containing Materials and PCB Wastes. Work requiring a PCB Management Plan includes, but is not limited to, Abatement, spot removal and construction/demolition activities. The PCB Management Plan shall be prepared in accordance with OSHA Construction Standards and all other pertinent federal, state, and local regulations, including DEP (RCNY Title 15, Chapter 1) or New York State Department of Labor (NYSDOL) (12 NYCRR 56) asbestos regulations, only if asbestos is present. In addition, the PCB Management Plan shall follow all DEP EHS Policies and Procedures (referenced in this Section) and shall be coordinated with the Engineer. The PCB Management Plan shall also be signed and dated by a CIH meeting the definition in this Section.

   a. If the PCB-Containing Materials or PCB Wastes that will be disturbed also contain asbestos or lead, it is acceptable to integrate

the PCB Management Plan elements into the relevant Asbestos Work Plan (required under Section 02 82 05 - Asbestos Management) or Lead Management Plan (required under Section 02 83 05 - Lead Management and SSPC Guide 7). PCB Management Plan elements that are integrated into an Asbestos Work Plan or Lead Management Plan must still satisfy all of the requirements of this Section. The PCB Management Plan (or relevant Asbestos Work Plan or Lead Management Plan) shall include the following elements:

1) PCB Control:

   a) Drawings showing the location and details of the following: (a) each PCB Control Area; (b) each Hygiene Facility; (c) proposed electrical hookups; (d) proposed water hookups: (e) each waste storage area: (f) restroom areas; (g) areas designated for eating, drinking, and smoking;

   b) Section on the interfacing of trades (i.e., other contractors) and the sequencing of PCB-Related Work;

   c) Section on the collection, handling procedures, and disposal of PCB-Containing Materials with a PCB concentration equal to or greater than 50 ppm, and PCB Wastes (including the collection, filtering, and disposal of wastewater). If reusable equipment used during the Work will be in contact with PCB-Containing Materials or PCB Wastes, the Contractor shall submit an equipment decontamination procedure using a Performance-based Decontamination Fluid (PODF) in accordance with 40 CFR 761;

   d) Section on the procedures and methodologies that will be used to conduct Exposure Monitoring and Area Monitoring. Also, provide the name and qualifications (i.e., training and experience documentation) of the Air Monitor who will be responsible for conducting the Air Monitoring activities. The Air Monitor shall at a minimum, satisfy the qualification requirements set forth in this Section;

   e) Section on housekeeping procedures to be used for maintaining clean work areas and clean Hygiene Facilities;

f) Section on the specific methods and procedures of emissions control that will be used to ensure that airborne contaminant levels do not meet or exceed an OSHA PEL outside of each PCB Control Area;

g) Task Analysis: Each task analysis shall include, but is not limited to, the following information: (a) the type of Work activity; (b) the tools/equipment that will be used; (c) operation and maintenance practices and procedures that will be used for the tools/equipment; (d) the types of PCB-Containing Materials that may be disturbed or PCB Wastes that may be generated when performing the activity; (e) the engineering controls that will be used to control the spread of contamination during the activity; (f) the proposed crew size for the activity and individual employee responsibilities during the activity; (g) housekeeping procedures that will be used during the activity; (h) PPE and proposed respiratory protection that will be used for the activity;

h) Equipment and Supplies: Identify the equipment and supplies that will be used to perform the Work;

i) Rental Equipment Notification: If rental equipment is to be used during the Work, the Contractor shall notify the rental agency in writing concerning the intended use of the equipment.;

j) SDSs: Provide SDSs for all chemical products (including chemical stripping products and PODFs) to be used for the Work;

k) The name and qualifications (i.e., experience and training documentation) of the Competent Person who shall satisfy the qualification requirements set forth in this Section.

2) Waste Management:

a) The identification of PCB-Containing Materials with a PCB concentrations equal to or greater than 50 ppm, and PCB Wastes associated with the Work;

b) The estimated quantity of each waste stream (regulated and non-regulated) that will be generated and disposed of;

c) The name, address, 24-hour phone number, and current permit documentation for each TSDF

indicating that the facility is approved by federal, state, and local regulatory agencies to receive PCB-Containing Materials with a PCB concentration equal to or greater than 50 ppm, and PCB Wastes. The documentation shall include an "acceptance letter" from each TSDF indicating its ability to accept the specific waste streams that will be generated during Work performed under this Section;

d) Current 6 NYCRR 364 permit documentation for the waste transporter that will transport PCB-Containing Materials with a PCB concentration equal to or greater than 50 ppm, and PCB Wastes from the work site to the TSDF.;

e) Spill prevention, containment, and cleanup contingency measures to be followed during a suspected PCB emissions/bulk material release or emergency situation.;

f) Section on the on-site handling, storage, removal, and disposal of waste materials, including but not limited to the following: (a) secondary containment system for each drum storage area; (b) description of the waste storage areas; (c) the methods and procedures that will be used to collect and containerize wastes on a daily basis; (d) types of containers; (e) the submittal of weekly regulated waste inspection and inventory records;

g) The name and qualifications (i.e., experience and training documentation) of the PCB Waste Manager.

b. A detailed schedule for the implementation of the PCB Management Plan elements, including starting and completion dates for the Work, and shall allow adequate time for cleanup, inspections, and Air Monitoring activities.

c. Medical Surveillance: For all activities that disturb PCB Containing Materials with PCB concentrations that are greater than or equal to 50 ppm, and PCB Wastes, the Contractor shall provide a sufficient number of properly trained and experienced workers, each of whom shall: (a) have completed initial blood testing for PCBs; (b) have received a medical exam that included a PFT within the past year; (c) have received written medical clearance within the past year, by a licensed physician, to wear a respirator; (d) have received a qualitative or quantitative respirator fit-test

within the past year for the specific respirator the employee will be using for this Work.

d. Employee Documentation: For all activities that take place within a PCB Control Area, each worker shall: (a) have resumes and training (e.g., certificates) for PCB workers, Competent Persons, PCB Waste Managers, and Air Monitors; (b) initial medical surveillance, dated within the past year, and proof of participation in the employer's ongoing medical surveillance program; (d) dates and written proof of respiratory clearance and a medical exam; (e) dates and written proof of a respirator fit-test.

e. A current (i.e., within the last month) signed and notarized statement disclosing all OSHA, EPA, and DOT citations/violations within the past three (3) years for the company performing the PCB Abatement.

5. Analytical Laboratory Qualifications for Analyzing Suspect PCB-Containing Materials and Wastes: Submit the name, address, and telephone number of each analytical laboratory selected to perform the analyses of waste samples (solid and liquid), air samples collected for Area Monitoring and Exposure Monitoring purposes, and paint/bitumastic coating samples collected to classify painted/coated surfaces, including. copies of current AIHA and ELAP certificates.

B. Field Reports and Recordkeeping: During all Work performed under this Section, the Contractor shall maintain and provide the following documentation:

1. Air Monitoring Documentation: All PCB Air Monitoring results and daily Air Monitoring reports shall be provided to the DEP within 24-hours from the date the samples are collected, including signed, complete COC documentation.

a. Each signed daily Air Monitoring report shall include, but not be limited to, the following information: (a) sample “start” and “stop” times; (b) flow rates (initial and final) for each sample; (c) the total volume of air collected for each sample; (d) sample location descriptions/sample location drawings/names of individuals being sampled; (e) types (i.e., makes and models) of sampling equipment used; (f) types of sample media (i.e., filters and cassettes) used; (g) the most recent calibration dates, along with the calibration results, for the sampling equipment used; (h) the name of the Air Monitor that conducted the Air Monitoring; (i) dates that the Air Monitoring was conducted; (j) work tasks being performed during the Air Monitoring; (k) unique sample numbers used to identify each sample; and, (l) highlighting of all PEL exceedances.

2. Waste Documentation: Completed and signed waste manifests from TSDFs shall be provided to the DEP no later than thirty (30) calendar days

of disposal. In addition, on-site waste storage areas shall be inspected weekly by the PCB Waste Manager.

a. Each waste storage area inspection shall be coordinated with the Engineer, signed by the inspector, and shall be provided to the DEP within 24-hours of the inspection date. The report shall include: (a) the name of the inspector; (b) descriptions of waste streams; (c) types, quantities, and physical condition of waste containers;(d) proper labeling for each waste containers; (e) secondary containment systems being used; (f) storage area security method to prevent any unauthorized entry.

b. In addition to performing weekly waste storage area inspections, the PCB Waste Manager shall also maintain an ongoing waste inventory, including: (a) specific dates that each waste container was added/removed from the waste storage area; (b) the full name (printed) and signature of the individual responsible for adding/removing each waste container from the waste storage area.

3. PCB Control Area Inspection Documentation: PCB Control Areas shall be inspected daily by the Competent Person.

a. All signed reports shall be provided to the DEP within 24-hours after the inspection is completed. The content of these reports shall include: (a) the types of work being performed; (b) the names of the PCB workers, Competent Person, PCB Waste Manager, and Monitor on site, including company names; (c) the types of Air Monitoring, including the number of samples being collected; (d) any non-compliance issues observed, including the corrective actions that were taken to achieve compliance.

4. Contractor Project Record: The Contractor's Competent Person shall maintain a project record at the Work Site that shall be made available to the Engineer or DEP for review at any time and shall be submitted to the DEP within 24-hours after the completion of the Work.

a. At a minimum, the Contractor Project Record shall contain the following information: (a) copies of training certificates for all individuals involved with the Work; (b) copies of all Air Monitoring results generated during the Work; (c) copies of all available caulking and paint chip/bitumastic coating sample analytical data and survey reports related to the Work; (d) copies of all daily sign-in sheets; (e) copies of all SDSs pertaining to all chemicals being used during the Work; (f) a copy of the Contractor's PCB Management Plan; (g) copies of all daily PCB Control Area inspection records; (h) copies of all weekly waste storage area inspection records; (i) a copy of the waste inventory; (j) a copy of the Contractor's Hazard Communication (HAZCOM) program.

5. Daily Sign-In Sheets: The Contractor shall generate daily sign-in sheets for all individuals entering and exiting each PCB Control Area. The daily sign-in sheets shall be maintained by the Competent Person and shall be made available to the Engineer or DEP for review at any time during the Work. All daily sign-in sheets shall be submitted to the DEP within 24-hours after the completion of the Work.
    a. At a minimum, each daily sign-in sheet shall include: (a) the individual's printed name and signature; (b) company name; (c) the time of entry and exit from each PCB Control Area.
6. HAZCOM Program: The Contractor's HAZCOM program shall be made available to the Engineer or DEP for review at any time during the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Respirators: The Contractor shall select respirators approved by the NIOSH for use in areas where paints/bitumastic coatings, dusts, materials, or wastes containing contaminants may be disturbed. At a minimum, the Contractor shall provide each individual with a half-face, negative pressure, air purifying respirator equipped with HEPA/P-100 Filter cartridges and Organic Vapor Cartridges, until Exposure Monitoring results indicate that respiratory protection can be modified. The Contractor's CIH shall make all determinations regarding respiratory protection modifications that will be implemented for the Work. All modifications shall be in accordance with OSHA requirements, the Contractor's PCB Management Plan, and any relevant Asbestos Work Plan or Lead Management Plan associated with the Work.

B. PPE: The Contractor shall provide personnel who have a potential to be exposed to materials or wastes containing contaminants, with appropriate PPE as prescribed by the Contractor's CIH.

C. HEPA Filters: HEPA/P-100 Filters used in vacuuming equipment, power tools, and local exhaust equipment must meet or exceed any manufacturer's

specifications and recommendations, as well as specifications presented in the Standard for Safety High Efficiency, Particulate, Air Filter Units (UL 586).

D. Waste Containers: Containers for the storage of all PCB Wastes shall be DOT-approved and shall be provided by the Contractor.

E. Abrasives: Mechanical paint/bitumastic coating removal equipment shall not use any products containing crystalline silica, and the equipment shall not utilize any non-recoverable materials or any cutting materials which introduce toxic or hazardous materials into the environment.

F. Chemical Strippers: The Contractor shall utilize an environmentally safe chemical paint stripping system, with demonstrated suitability and efficiency in preparing cast-in-place concrete, cement, and plaster surfaces that are free of any visible residues of paints/bitumastic coatings. The system shall include non-alkaline or alkaline strippers that provide the lowest possible level of toxicity consistent with the types of paints/bitumastic coatings to be removed. Neutralization products and procedures shall be provided for all alkaline stripping systems, no stripping system shall contain methylene chloride, and the stripping system shall be low in volatile organic compounds (VOCs).

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. Hygiene Facilities: The Contractor shall provide functional Hygiene Facilities as defined in this Section that are appropriate for the types of Work to be performed under this Section. The Contractor shall ensure that employees do not leave a PCB Control Area wearing any potentially contaminated PPE. Using compressed air to dislodge dust from clothing/PPE shall be strictly prohibited. The Contractor shall collect, test, and properly dispose of all wastewater generated from Hygiene Facilities.

1. Handwash Stations: The Contractor shall provide functioning handwash stations on all projects that disturb PCB-Containing Materials with a PCB concentration equal to or greater than 50 ppm, or PCB Wastes. Handwash stations shall have running water at the tap, clean towels, and soap per 29 CFR 1926.51. Substituting “hand wipes” in place of soap and running water will not be acceptable.

2. Showers: The Contractor shall provide shower facilities for use by employees whose airborne exposure to PCBs is above an OSHA PEL. When shower facilities are necessary, employees are required to shower at

the end of the work shift each day prior to leaving the PCB Control Area that they are working in.

B. Utilities: The temporary use of any on-site utilities shall be subject to the approval of the DEP. The Contractor shall furnish all water, hoses and water filtration devices needed for the Work as per 01 51 11 Temporary Water and Sanitary Services; as well as any temporary electrical hookups and temporary lighting to the PCB Control Area as per 01 51 30 Temporary Electrical System. All temporary lighting and temporary electrical service to a PCB Control Area shall be provided by the Contractor and shall be in weather-proof enclosures and be ground fault protected. Also, the Contractor shall supply all heating and ventilation equipment needed for the Work as per 01 51 12 Temporary Heat and Ventilation.

C. Signs: The Contractor shall post conspicuous warning signs at all approaches to work areas and waste storage areas. Signs shall comply with federal, state, and local regulations, including the requirements of OSHA. Signs shall not be removed until all Abatement, removal, and construction/demolition activities have been completed. At a minimum, each sign shall bear the following information in English and the predominant language that is spoken by the Contractor's employees if English is not spoken:

WARNING
PCB WORK AREA
POISON
NO SMOKING, EATING OR DRINKING

1. Each sign shall be appropriately modified to include additional warnings for other contaminants that are identified during Exposure Monitoring.

D. Physical Boundary Delineation: The Contractor shall clearly delineate each work area and waste storage area with a Physical Boundary as defined in this Section.

E. Work Area Preparation: The Contractor shall utilize HEPA-filtered vacuums, and wet methods during the initial cleaning of each work area. Prior to removal from each work area, all movable objects and mounted objects that can be removed shall be pre-cleaned using HEPA-vacuums and wet methods. Fixed objects that must remain within each work area shall be pre-cleaned using HEPA vacuums and wet methods, and subsequently covered with 6-mil polyethylene sheeting.

3.02 IMPLEMENTATION

A. Bulk Removal

1. Protection of Existing Work to Remain: All Work involving the disturbance of PCB-Containing Materials and PCB Wastes must be conducted without damage to, or contamination of equipment or surfaces within the work areas or other areas adjacent to the work areas. All such damage or contamination shall be immediately corrected and cleaned up by the Contractor at the Contractor's expense.

2. Prohibited Activities: Contractors shall not conduct activities that are prohibited by OSHA and EPA regulations. The following activities are prohibited, regardless of whether they are conducted subject to an exposure assessment and written compliance program: (a) burning-off paints/bitumastic coatings; (b) using heat guns operating above 1100° F; (c) dry machine sanding, grinding, or blasting paint without a HEPA vacuum exhaust tool; (d) uncontained hydroblasting or high-pressure washing; (e) welding painted/coated surfaces unless the paint/coating is removed at least 4-inches from area of heat application (per 29 CFR 1926.345(c)(1)), and local exhaust ventilation is used.

3. Test Patches: Prior to choosing the paint removal method(s) for paints/bitumastic coatings, the Contractor shall perform test patches on surfaces subject to Abatement or spot removal, to determine if the method(s) meet the requirements of this Section.

4. Mechanical Removal Equipment: The use of mechanical equipment to remove asbestos-containing caulking or bitumastic coatings will require compliance with DEP (RCNY Title 15, Chapter 1) or NYSDOL (12 NYCRR 56) asbestos regulations, including the use of a full containment enclosure under negative air pressure.

    a. When removing paints/bitumastic coatings from metal surfaces, the paints/bitumastic coatings must be removed to the extent that only the bare metal remains (i.e., no mill scale remains). In the case of substrates other than metal (e.g., concrete, brick, and block), paints/bitumastic coatings shall be removed from the surface of the substrate to the extent that flaking and peeling will not occur subsequent to the performance of the Work. Acceptance of the Work shall be contingent upon inspection of the substrate surfaces by the Engineer and must demonstrate the absence of residual paint/coating layers that can be physically measured, pried loose, or peeled away using a scraping device. The Contractor may only use products and tools meeting the performance specifications outlined below:

        1) The Contractor shall utilize a vacuum-assisted power tool system with demonstrated suitability and efficiency in preparing metal surfaces to the SSPC SP-11 standard, and with demonstrated effectiveness in maintaining PCB emissions below OSHA exposure limits during the disturbance of paints/bitumastic coatings. Such systems may include dustless needle guns, dustless roto peens, and dustless right-angle grinders, all of which capture dust and debris at the cutting tool edge, and transport the material under vacuum conditions to an air-tight disposal container. Dustless needle guns shall only be utilized on metal surfaces.

2) The vacuum-assisted power tool system shall also be designed to permit the removal and replacement of collection containers under negative pressure in order to prevent the release of dusts. The system shall be equipped with an automatic “shut-off” in the event of vacuum failure.

3) Abrasive/recovery tools shall be monitored at all times by a device capable of determining recovery at the face of each tool, and capable of automatically disabling the tool in the event that recovery levels are insufficient. The monitor, at a minimum, shall have the following features: (a) a remote warning light; (b) an adjustable recovery set point; (c) automatic equipment disabling capabilities; (d) a sensing range of 0 5 pounds per square inch (psi); (e) solid state photohelic instrumentation; (f) remote sensing at the face of the tool.

4) The safe recovery point shall be calibrated each day before start-up, or each time a new tool or vacuum source is used. All manufacturer recommendations shall be followed with respect to the set up and use of the monitor, and the manufacturer's operations manual shall be kept on site at all times. A daily log shall be maintained by the Contractor, identifying all calibrations of recovery levels, as well as any “down time” as a result of insufficient recovery levels.

5) The cutting head of the vacuum-assisted power tool system that is used on flat surfaces shall be capable of cutting to within 1-1/2" of any inside corner, molding, or edge, and may include dustless roto peens or dustless needle guns. Tools for corners and moldings shall be specifically designed for that purpose, and conform to all inside corners, outside corners, curved, flat, and angled surfaces that are to be abated under this Section. These tools shall also maintain vacuum control at the Work surface/cutting head interface at all times. HEPA vacuum-shrouded needle guns may be used for non-flat surfaces in accordance with manufacturer recommendations. Vacuum-assisted finishing tools, such as right-angle grinders, may be used to achieve the SSPC SP 11 standard, but may not be used for primary removal.

6) Vacuum-assisted power tool systems meeting all of the specifications outlined herein, may be used pending the submittal of all required performance documentation, and their acceptance by the Engineer. Any tools which do not meet all of the specifications outlined herein, shall be

removed from the project site immediately, and shall not be used for the Work to be performed under this Section.

5. Chemical Strippers: Acceptance of the Work shall be contingent upon inspection of the abated substrate surfaces by the Engineer and must demonstrate the absence of residual paint/bitumastic coating layers that can be physically measured, pried loose, or peeled away using a scraping device. The Contractor may only use products and paint stripping systems meeting the performance sections outlined below:

   a. The Contractor shall utilize a chemical paint stripping system with a demonstrated effectiveness in maintaining PCB emissions below OSHA exposure limits during the disturbance of paints/bitumastic coatings. The Contractor shall utilize a mechanical ventilation system during the Work that exhausts away from occupied areas. The application of all paint stripping systems shall be in accordance with manufacturer recommendations.

   b. The Contractor should note that more than one (1) product may be required to strip PCB-containing paints/bitumastic coatings. The use of multiple products shall be in accordance with work practices approved by the individual manufacturer of each chemical paint stripping compound.

   c. All chemical paint stripping products shall be presented to the Engineer for approval prior to the start of any Work to be performed under this Section. The manufacturer's labels on each container shall be intact and legible.

   d. Chemical paint stripping systems may be used pending the submittal of all required performance documentation, and its acceptance by the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Air Monitoring

1. Exposure Monitoring: For Work involving the disturbance of any detectable concentration of PCBs, the Contractor shall collect personal air samples from employees who are anticipated to have the greatest risk of exposure, as determined by the Contractor's CIH or Competent Person. Personal air samples shall be collected during every work shift from at least one (1) employee that is representative of each type of work task that is being performed. Each personal air sample shall "run" for the employee's entire work shift in order to ensure that enough volume (of air) is collected, and an accurate 8-hour TWA can be calculated. Documentation regarding the sample numbers, specific shift when the sampling was conducted, the work tasks that were sampled, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

a. If PCB concentrations being disturbed are less than 50 ppm, Exposure Monitoring may be discontinued following a complete negative exposure assessment and approval from the Engineer and the Contractor's CIH. A negative exposure assessment is defined as current initial exposure monitoring using breathing zone air samples representing the 8-hour TWA exposure for each individual who are representative of each task being conducted. Following discontinuation of exposure monitoring, if there is a change to work practices, exposure monitoring shall again be performed until a second negative exposure assessment is conducted and analyzed.

2. Area Monitoring: If PCB concentrations being disturbed are greater than or equal to 50 ppm, the Contractor shall collect a minimum of two (2) area air samples outside of each PCB Control Area on a daily basis for the duration of the Abatement, removal, or construction/demolition Work, as well as any other Work involving the disturbance of PCB-Containing Materials or PCB Wastes. During sampling activities, all air sample filter cassettes shall be positioned approximately five to six feet above the ground (to simulate an individual's breathing zone) and shall not be placed immediately adjacent to obstructions (e.g., walls or columns) which may restrict the flow of air to the filter cassettes. Each air sample shall be analyzed for all contaminants identified during the exposure assessment. If area Air Monitoring indicates an emission level in excess of an OSHA PEL outside of a PCB Control Area, all Work in that area shall be stopped immediately. The Contractor shall then take immediate corrective actions to reduce emission levels to below the OSHA PEL(s), and the Contractor shall clean all adjacent areas that may have become contaminated due to the emissions. Documentation regarding the sample numbers, sample locations, the dates of sampling, the employee hours that were worked during the shift, and the total sampling times, shall accompany each laboratory COC form.

3. The Contractor shall submit all Air Monitoring results to the DEP within 24 hours after the air sample was collected.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleanup: The Contractor shall maintain all surfaces, including protective coverings (polyethylene sheeting) within each work area, free of accumulations of paint chips/coating debris, dusts, and wastes. Dry sweeping and using compressed air to cleanup a work area shall be strictly prohibited. HEPA-filtered vacuums and wet methods shall be used to ensure that each work area remains free of visible paint chips/coating debris, dusts, and wastes. Perform work in accordance with SSPC Guide 6.

1. Equipment Decontamination: All reusable equipment (e.g., hand tools and power tools) that has been in contact with materials that have a PCB concentration greater than or equal to 50 ppm and PCB Wastes, shall be thoroughly decontaminated prior to being removed from the PCB Control Area in accordance with 40 CFR 761.79(c)(2)(i), which permits "swabbing surfaces that have contacted PCBs with a solvent." The solvent shall be a PODF as defined in 40 CFR 761.79(c)(3)(iv)(C) or (D). Used decontamination materials (e.g., rags used to swab equipment) shall be collected, stored, and disposed of in accordance with this Article.

B. Collection, Separation, and Containerization of Wastes: The Contractor shall collect, separate (by waste stream/waste type), and containerize PCB containing wastes (solid and liquid), debris, PPE, and containment materials on a daily basis in accordance with the PCB Safe Work Practices or PCB Management Plan.

1. If any source sample from a specific work area indicates that PCBs in paints/coatings are greater than or equal to 50 ppm, then all waste from that area will be characterized as TSCA-regulated waste. All waste streams must be segregated into separate drums and labeled with PCB waste labels, including out of service date (when PCB waste is first place in the drum) in addition to RCRA hazardous waste labels (pending analysis). This may include one or more drums for paint chips, chemical stripper waste, and HEPA filters associated with HEPA vacuums. Other waste such as PPE, rags and polyethylene sheeting from a specific work area may be comingled in drums separate from the drums containing paint chips, stripper waste and HEPA filters.

2. If all source samples from a specific work area indicate that PCBs in paints/coatings are less than 50 ppm, then all PPE, poly and paint/coating waste from that area will be characterized as PCB-containing non-hazardous or hazardous waste pending TCLP analysis of the eight (8) RCRA metals in the waste stream and should not be managed as C&D debris. Drums should be labeled with RCRA hazardous waste labels (pending analysis). All waste streams shall be segregated into separate drums. Paint chips and HEPA filters shall be drummed as one waste stream from each work area, and polyethylene sheeting, rags, paper towels and PPE from each work area will be drummed as a separate waste stream.

3. The Contractor shall store all wastes in DOT-approved container systems. All drums/containers shall be labeled, sealed and covered immediately after filling.

4. No water mixed with or contaminated by hazardous waste may be released onto the ground or into any drain or sewer. It should be noted that a discharge of more than 1 lb. of PCBs onto the ground or into the water within a 24-hour period, shall be considered a violation of the Clean Water Act and shall be treated as a "reportable quantity" in accordance with 40 CFR 116, 40 CFR 117, and 40 CFR 302. Such a release shall be grounds

for immediate termination of this Contract, and the Contractor shall be liable for any fines, penalties, or remediation costs.

5. The Contractor shall store non-hazardous wastes separately from hazardous wastes and TSCA-regulated wastes, shall provide all non-hazardous waste containers, and shall make all transportation and disposal arrangements for non-hazardous wastes in accordance with federal, state, and local regulations. TSCA-regulated PCB waste must be disposed within 180 days subject to the requirements of 40 CFR 761.65, in addition to any RCRA hazardous waste storage requirements (i.e., 90 days), as applicable.

C. Storage of Wastes: The Contractor shall ensure that all drummed wastes have secondary containment, and that each waste storage area has a Physical Boundary. In addition, the Contractor shall post weekly waste inspections and waste inventories in the regulated waste storage area, including the following emergency information: (a) contact details for the facility's Emergency Coordinator; (b) map indicating the location of fire extinguishers and spill control materials; (d) the telephone number for the fire department (unless the facility has a direct alarm).

D. Labeling: The Contractor shall affix warning labels to all waste drums/containers. Labels must be filled out completely at the point of generation when waste is first containerized. PCB labels shall be used to designate PCB waste, including out-of-service date, in addition to RCRA hazardous waste labels. At a minimum, all PCB and hazardous waste labels shall bear the following information in English:

CAUTION
CONTAINS PCBs
[Out-of-Service Date – when PCB waste is first placed in drum]
HAZARDOUS WASTE
FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
HANDLE WITH CARE
[Generator Name, Address, and Telephone Number]
[Specific Contents of Container]
[EPA-Issued Generator Identification Number]
[EPA Waste Identification Number]
[Accumulation Start Date]

1. Since waste classification is pending analysis for RCRA/NYSDEC hazardous waste, the RCRA hazardous waste labels shall indicate "PCB/Hazardous Waste - Pending Analysis."

E. Sampling and Laboratory Analysis of PCB-Containing Wastes: For PCB Waste characterization, the PCB Waste Manager shall sample all potential PCB-Containing Waste Streams in accordance with the TSCA (40 CFR 761). According to the EPA, characterizing PCB-containing waste streams (i.e., determining whether wastes are regulated or non-regulated under TSCA) shall be

made based upon the total PCB concentration at the "source" (e.g., the paint/bitumastic coating) prior to any disturbance that may be initiated through Abatement, removal, or construction/demolition activities. Unlike hazardous waste determinations that are made under RCRA (40 CFR 260 and 40 CFR 261), sampling to determine whether a waste is TSCA-regulated shall not be made based on the sampling and analysis of mixed bulk waste materials/debris generated as a result of Abatement, removal, or construction/demolition activities. Instead, source materials for PCBs must be collected as grab samples and must not be composited during collection or analysis as that may reduce the concentration of PCBs detected. Rather, individual source samples shall be submitted for analysis to determine the highest concentration of PCBs contained in the source material or wastes.

1. PCB concentrations are based on the cumulative total of the nine (9) Aroclor congeners (aka PCB compounds) analyzed by EPA Methods SW 846-8082A (soxhlet extraction method 3540) by Gas Chromotography.

2. If PCB concentrations in paints/coatings are present greater than or equal to 50 ppm, all PCB-containing waste generated during paints/coatings disturbance will be classified as TSCA-regulated PCB waste. If PCB concentrations in paints/coatings are less than 50 ppm, all PCB-containing waste generated in the area will be classified as non-TSCA PCB-containing waste.

3. If it cannot be confirmed that the source of drummed waste (e.g., paints/coatings) is non-TSCA-regulated, or no source samples are available, or the soxhlet extraction method 3540 was not used for previous analyses, then four (4) biased worse-case grab samples shall be collected from the drum and each sample analyzed for Total PCBs. If any one grab sample result has a PCB concentration of equal to or greater than 50 ppm, the drummed waste shall be characterized as TSCA-regulated waste.

4. Waste materials/debris generated during Abatement, removal, or construction/demolition activities may be classified as RCRA or NYSDEC hazardous waste (6 NYCRR Part 370 and 6 NYCRR Part 371.4(e)) in addition to being TSCA-regulated. Therefore, wastes/debris must still be sampled and characterized prior to disposal. All waste samples shall be collected in the presence of the Engineer using the following procedure:

    a. Sampling of drummed waste will be biased for the worst-case (highest result) and will be based on inspection of drum contents. For drums with paint chips, with or without stripper waste, collect one grab sample for every quarter of the drum, from any hot spots (i.e., paint chips). As an example, if the drum is full, collect four grab samples, if the drum is half-full, collect two grab samples, and if the drum is one-tenth full, collect one sample. Grab samples shall be composited into one (1) bulk composite sample. For drums with PPE, polyethylene sheeting, rags, and towels, collect up to four (4) grab samples with positive bias for paint chips or paint-

related staining. As such, samples are likely to be collected from dust or chips at the bottom of the drum. Each grab sample shall be composited into one (1) bulk composite sample, labeled, and submitted to a laboratory. Composite samples shall undergo Toxicity Characteristic Leaching Procedure (TCLP) analysis for the eight (8) RCRA metals and Total PCBs to determine if waste is a NYSDEC hazardous waste (i.e., listed waste B007), and any additional parameters that are required by the specific TSDF being used. Furthermore, if the waste stream is associated with the use of a chemical paint stripping system, the Contractor shall have the laboratory analyze each sample for pH and any other RCRA characteristic that may fail due to the chemical composition of the waste.

b. One (1) representative wastewater sample shall be collected for laboratory analysis from each drum generated. Each sample shall be collected using appropriate field sampling equipment (e.g., a pipette or bailer), and shall be labeled and submitted to a laboratory that satisfies the requirements of this Section.

F. Sampling and Laboratory Analysis of PCB-Containing Demolition Debris: The Contractor shall collect representative bulk samples of anticipated demolition wastes to determine proper disposal. In addition to a total PCB analysis of the source materials (e.g., paints/bitumastic coatings), representative bulk samples shall be collected from painted/bitumastic-coated building materials for TCLP analysis for the eight (8) RCRA metals and Total PCBs to determine if waste is a NYSDEC listed hazardous waste (i.e., listed waste B007).

1. Scrap Metal Exemption for Recycling: Under 6 NYCRR Part 371.1(c)(7), painted scrap metal can be sent to a recycling facility, rather than be discarded as hazardous waste. In order for the DEP to submit a “c7 notification” to the NYSDEC and claim the “scrap metal exemption,” the Contractor must first submit notification to their recycling facility indicating that PCBs are present on the scrap metal in concentrations less than 50 ppm. If concentrations are greater than or equal to 50 ppm, the scrap metal cannot be recycled and instead must be disposed of as a TSCA-regulated waste. If Lead or other heavy metals are detected in the paints/bitumastic coatings on the scrap metal, the Contractor shall also disclose this information to the recycling facility. The Contractor shall submit this documentation to the Engineer for approval prior to disposal.

G. Bulk demolition debris (e.g., painted concrete) that is sampled and determined to be non-RCRA-regulated and non-TSCA-regulated waste may be disposed of as construction and demolition (C&D) debris as per Section 01 74 20 – Construction Waste Management and Section 02 41 10 – Demolition and Removals.

H. Disposal of Wastes: The Contractor shall notify the DEP at least 14 business days prior to the removal of any waste drums/containers. All waste profiles for containerized wastes must be reviewed by the Engineer and signed by the DEP as

the generator of the waste streams. As per 40 CFR Part 761.207, a Uniform Hazardous Waste Manifest shall be completed for TSCA-regulated and/or NYSDEC hazardous wastes. Wastes shall be disposed of to ensure that drums/containers do not remain on the job site for more than 90 calendar days from the initial "accumulation start date" on the label affixed to the drum/container. Containers that have reached their storage capacity shall not remain on site, and transportation arrangements shall be made for their immediate removal.

1. Small Capacitors and Fluorescent Light Ballasts: Small Capacitors and Fluorescent Light Ballasts are not classified as hazardous wastes under NYSDEC regulations (6 NYCRR 371.3(e)). However, these items are assumed to contain PCBs, and therefore must be disposed of as PCB Bulk Product Wastes unless marked "No PCBs" by the manufacturer. Small Capacitors and Fluorescent Light Ballasts that are not marked "No PCBs" or are leaking (regardless of PCB concentration), must be managed at one of the following facilities in accordance with 40 CFR 761.62(a): (a) in facilities using a TSCA-approved incinerator; (b) at a TSCA/RCRA-permitted landfill; (c) in facilities using an approved alternate method of destroying PCBs; (d) at a facility using an approved method of removing/decontaminating PCBs; (e) using a TSCA PCB Coordinated Approval issued by the EPA Regional Administrator.

I. Disposal Documentation: If asbestos or lead (as defined in Section 02 82 05 - Asbestos Management and Section 02 83 05 - Lead Management) were detected in the wastes, the Contractor shall also ensure that the TSDF is approved by federal, state, and local regulatory agencies to receive these wastes. Once all waste profiles have been completed, the Contractor shall provide the DEP with a "Letter of Acceptance" issued from the TSDF indicating that the wastes will be accepted, and a copy of the advance manifest. On the date of disposal, the Contractor shall submit one (1) copy of the completed manifest that has been signed and dated by the initial transporter in accordance with 6 NYCRR 372, 6 NYCRR 373, 40 CFR 262, 40 CFR 263 and 40 CFR 264, to the DEP for signature as Generator. All waste containing PCBs must be identified on the manifest, including out of service date for hazardous waste manifests. All hazardous waste documentation (e.g., waste profiles, manifests, and Land Disposal Restrictions (LDRs)) must be signed by a DEP employee as described in Section 01 35 45 - Hazardous Materials Control. Non-hazardous waste documentation may be signed by a DEP-designated alternate.

END OF SECTION

SECTION 03 01 30.71 – REHABILITATION OF CAST-IN-PLACE CONCRETE
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all labor, materials, equipment and appliances required for the complete execution of concrete rehabilitation to existing structures as indicated on the Contract Drawings, determined by field survey directed by the Engineer and in accordance with the requirements specified herein.

B. Principal items of Work include:

1. The Contractor shall determine by field survey, in conjunction with the Engineer, the extent of concrete to be repaired, stabilized and resurfaced. Areas to be replaced or modified by new work shall not be included. Report of field survey shall be submitted by the Contractor to the Engineer for review and approval prior to starting work.

C. This specification provides the requirements for multiple types of concrete repairs required by the Contract Documents. For the spall repairs, where indicated in the Contract Documents, the Contractor may elect to use either marine concrete, non-shrink underwater grout, or shotcrete. See Sections 03 31 29 – Marine Concrete and 03 37 13 – Shotcrete for requirements.

D. The following index of this Section is presented for convenience:

E.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 02 41 10 – Demolition and Removals

B. Section 03 31 29 – Marine Concrete

C. Section 03 37 13 – Shotcrete

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1. ASTM C33 - Concrete Aggregates.

2. ASTM C881 - Epoxy-Resin Base Bonding System for Concrete.

3. ACI 503.4 - Standard Specification for Repairing Concrete with Epoxy Mortars.

4. ISO 14025 - Environmental labels and declarations - Type III environmental declarations

1.05 DESCRIPTION

A. Services of Manufacturer’s Representatives

1. The Contractor shall provide the services of a qualified manufacturer's technical representative who shall instruct the Contractor's personnel in the mixing, proper use and application of the epoxy, polyurethane, polymer-modified and cement-based compounds.

2. The manufacturers' representative shall provide written certification that materials have been mixed and applied properly and surfaces to receive these products have been prepared properly, all in conformance with manufacturer's requirements.

3. The onsite time required for the manufacturer's representative to achieve a successful installation shall be at the expense of the Contractor. The manufacturer's representative shall sign in and out at the office of the Resident Engineer and provide written verification of the areas he has approved on each day he is at the project.

1.06 QUALITY ASSURANCE

A. The Contractor shall furnish the name of all subcontractors which he proposes to use for this work including necessary evidence and/or experience records to ascertain their qualifications in the application of epoxy, polyurethane, polymer-modified and cement-based compounds.

B. Approved applicator qualifications shall include:

1. A minimum of five years of experience in applying epoxy, polyurethane and polymer-modified and cement-based compounds similar to those specified in this Section.

2. A letter from the manufacturer of the specified materials, on the manufacturer's letterhead, signed by an officer of the company, stating that the subcontractor/applicator has been trained in the proper techniques for the preparation of the surface, and proper methods for mixing, placing, curing, and caring of the manufacturer's products. This letter shall further state that the subcontractor/applicator is on the manufacturer's approved list of contractors.

1.07 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. Proposed methods and corresponding area to be repaired.

2. Samples of all materials proposed to be used.

3. Material certifications and technical data sheets on all grouts, mortars, chemical resins, sealers, aggregates, and repair products specified.

4. Name, address and detailed qualifications of the subcontractor to which the Contractor intends to award the work under this Section.

B. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with

Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

C. Comply with pertinent provisions of the project specifications for Submittals.

D. Details shall be carried out in accordance with the New York City Building Code and where no requirements are set forth in the Code, with the Standard ACI requirements, and as shown on plans.

E. Product Data: Product data shall include (but not be limited to) the manufacturer's recommended surface preparation procedures and application instructions where applicable.

1. Cementitious non-shrink grout (for concrete spall repairs, for grouting beneath the bollard base, and for the underdeck)
2. Liquid Salt Remover
3. Concrete Bonding Agent
4. Corrosion Inhibitor
5. Description of proposed admixtures
6. Quick connection adapter for end of pump hose and pumping ports
7. Spacers for placement of reinforcing steel
8. Formwork catalog cuts; submit at least 21 days prior to ordering any material or constructing any formwork
9. Non-shrink Underwater Repair Mortar
10. Structural Epoxy Paste
11. Epoxy Resin Adhesive

F. Shop Drawings

1. Formwork with anchoring details, pumping port construction, spacers, and form sealing details
2. Reinforcing Steel

G. Design Data

1. Concrete mix proportions: indicating strength, brand and type of Portland cement, amounts of any admixtures and proportions and size of aggregates. The concrete mix design(s) shall be prepared by an accredited laboratory experienced in this field and under the direction of the Contractor's Professional Engineer, licensed in the State of New York, who shall sign all reports and designs.
2. Pumping Plan: indicate equipment and methods that will be used to place concrete within forms, including maximum time between mixing and placement of concrete.

H. Certifications

1. Reinforcing Steel
2. Aggregate
3. Admixtures
4. Cement and other cementitious materials

I. Quality Assurance Documents

1. Proposed method of sealing and resealing of pipe line and pump ports.
2. Cold and/or hot weather concreting procedures
3. Name and address of all testing companies
4. All concrete testing reports
5. Details of standby facilities for concrete production and placement

J. Closeout Submittals

1. Submit as-built drawings showing locations and details of all repairs, modifications to details, etc

K. Return Time

1. The Resident Engineer will respond to Contractor RFIs and submittals within two weeks.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All materials shall be delivered in original unopened and undamaged cartons or packing bearing the name of manufacturer.

B. Cementitious materials shall be stored in waterproof locations to prevent intrusion of moisture and other damage from the elements. Containers showing evidence of damage will be rejected.

C. Aggregates shall be stored in separate bins to prevent mixing with foreign particles.

D. Any materials that have hardened, partially set, become caked and/or been contaminated or deteriorated shall be rejected.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.010 WARRANTY

A. Not used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The epoxy bonding agent resin shall be:

1. Sika Armatec 110 as manufactured by Sika Corp. Lyndhurst, NJ;
2. CR 246 as manufactured by Sto Concrete Restoration Division, Atlanta, GA;

3. Duralbond as manufactured by Tamms Industries Co., Kirkland, IL;
4. Or an approved equal.

B. Anti-corrosion coating material shall be:

1. Sika Armatec 110 as manufactured by Sika Corp., Lyndhurst, NJ;
2. CR 246 manufactured by Sto Concrete Restoration Division, Atlanta, GA;
3. Or an approved equal.

C. Structural crack repair material shall be:

1. Sikatop 123 Plus as manufactured by Sika Corp., Lyndhurst, NJ;
2. CR 735 Trowel-Grade Mortar as manufactured by Sto Concrete Restoration Division, Atlanta, GA;
3. Duraltop Gel as manufactured by Tamms Industries, Kirkland, IL;
4. Or an approved equal.

D. Epoxy crack repair binder shall be:

1. Sikadur 35-Hi-Mod LV as manufactured by Sika Corp., Lyndhurst, NJ;
2. CR 633 Epoxy Binder as manufactured by Sto Concrete Restoration Division, Atlanta, GA;
3. Duralcrete LV as manufactured by Tamms Industries, Kirkland, IL;
4. Or an approved equal.

E. Non-Shrink Cementitious Grout

1. In addition to being used for the caisson spall repairs and for grouting beneath the bollard base the contractor may substitute a high strength, non-metallic, non-segregating grout, in lieu of pumped concrete, designed with special anti-washout admixtures, corrosion inhibitors and polymers with permission of the Resident Engineer.
2. Non-shrink cementitious underwater grout shall be a blended, packaged cement-based mortar requiring only the addition of potable water
3. Product shall be FX-225 by Simpson Strong-Tie Company Inc., Cementitious Underwater High-Strength Grout by Five Star Products Inc., Seashield 510 UW grout by Denso North America, or approved equal. The material shall meet all the following typical performance criteria when cured at 73°F:
    a. Compressive Strength (ASTM C109) 7,000 psi minimum 28 days
    b. Bond Strength (ASTM C882) 2,000 psi 1 day
    c. Length Change (ASTM C157) wet cured expansion 0.15% max, dry cured shrinkage 0.15% max

F. Liquid Salt Remover

1. Liquid Salt Remover shall be Chlor*Rid DTS by Chlor*Rid International Inc. or approved equal.

G. Concrete Bonding Agent

1. Concrete Bonding Agent shall be a high- solids, acrylic polymer latex bonding agent and admixture that conforms to the ASTM C1059 Type I standard such as Intralok by WR Meadows or approved equal.

H. Corrosion Inhibitor

1. Corrosion inhibitor shall be Armatec Epocem 110 by Sika Corporation or approved equal.

I. Non-shrink Underwater Repair Mortar

1. Non-shrink Underwater Repair Mortar shall be Speedcrete Blueline by the Euclid Chemical Company or approved equal.

J. Corrosion Inhibitor

1. Corrosion inhibitor shall be Armatec Epocem 110 by Sika Corporation or approved equal.

K. Epoxy Resin Adhesive

1. Sikadur 35-Hi-Mod LV as manufactured by Sika Corp., Lyndhurst, NJ;
2. CR 633 Epoxy Binder as manufactured by Sto Concrete Restoration Division, Atlanta, GA;
3. Duralcrete LV as manufactured by Tamms Industries, Kirkland, IL;
4. Or an approved equal.

2.02 MATERIALS / EQUIPMENT

A. Water

1. The water used for mixing concrete repair products shall be clear, potable and free of deleterious substances.

B. Aggregate

1. All aggregates shall conform to ASTM C33 and the requirements listed below:
   a. Pea Gravel: Pea gravel shall meet the gradation of New York State size #9 and meet all material requirements specified in Section 703 for coarse aggregate as described by the New York State Department of Transportation Standard Specifications and shall be clean and free from deleterious matter. Pea gravel shall contain no limestone.

C. Epoxy Bonding Agent

1. Epoxy bonding agent shall conform to ASTM C881 Type I, II, IV or V; Grade 2 for epoxy resin adhesives, depending on the application. The class

of epoxy bonding agent shall be suitable for all ambient and substrate temperatures.

D. Anti-Corrosion Coating

1. Anti-corrosion coating shall be a two-component, polymer-modified cementitious material.

E. Epoxy Crack Repair Binder

1. Epoxy crack repair binder shall be a two-component, 100 percent solids, high-modulus, low viscosity epoxy adhesive designed for structural repair.

F. Concrete

1. See Section 03 31 29 – Marine Concrete

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

2.05 FORMWORK

A. General

1. Formwork material and thickness shall be chosen by the contractor and shall conform to the recommendations of ACI 347R. Forms shall be designed to confine the concrete and shape it to the required dimensions. Forms shall have sufficient strength to withstand the pressure resulting from all environmental forces prior to the placement of concrete as well as forces exerted during the placement of concrete and shall have sufficient rigidity to maintain specified tolerances.

2. Shop drawings of all formwork shall be submitted. These submittals shall include: material type and strength of formwork, method of sealing formwork in order to prevent leakage of concrete, type and locations of all pumping ports and vents, anchoring system into existing concrete underdeck, all supports and the location of shoring and reshoring, and structural computations relating test strength of concrete at the various stages to the strength requirements for the proposed forming and shoring system and the anticipated loads.

3. All spacers, straps, and ties shall be non-metallic and non-corrosive. Spacers shall be secured so as not to move out of position during the placement of concrete.

4. Shop drawings and computations shall be certified by, and bear the seal of, a Professional Engineer experienced in the design of formwork and licensed in the State of New York.

B. Design and Installation

1. Design, engineering, and construction of formwork shall be the responsibility of Contractor. Approval of formwork shop drawings by Resident Engineer is for overall conception only, and shall not relieve Contractor from its responsibility for final safety and conformance with specified requirements.
2. Contract drawings of formwork show one pump port and vent placed at the corner of the form. This is for visual representation only. The final design, overall number of pump ports and vents and placement of these pump ports and vents is the sole responsibility of the Contractor.
3. All pump ports shall have method of closure so that after the tube is removed from the port no concrete shall exit the port.
4. Form facing materials shall be nonreactive with concrete and shall be selected to produce, or facilitate, the required concrete surface finish. The maximum deflection of facing materials reflected in concrete surfaces to be exposed to view in the finished work shall be 1/240 of the span between structural members.
5. Forms shall be sufficiently tight to prevent the loss of any material during the pumping and curing processes. The means and methods of maintaining the intended form shape and seal shall be the sole responsibility of the contractor.
6. Forms shall be securely braced against deflections.
7. Formwork shall be so anchored to shores or other supporting surfaces or members so that downward or lateral movement of any part of the formwork system, during concrete placement, will be prevented.

C. Tolerances

1. Formwork shall be constructed so that concrete surfaces will conform to the tolerance limits recommended in ACI 347R.

D. Preparation of Form Surfaces

1. All surfaces of forms and embedded materials shall be cleaned of any debris and of all other foreign material, before concrete is placed.

E. Removal of Forms

1. Removal of forms shall be in a manner to ensure complete safety of the structure, shall be in accordance with the applicable requirements of ACI 318 and this Section of the specifications, and shall be subject to the approval of the Resident Engineer.
2. When repair of surface defects or finishing is required at an early age, as specified herein or as directed by the Resident Engineer, forms shall be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.

2.06 REINFORCMENT

A. Reinforcement

1. Reinforcement, if required, shall be new material, of the sizes and shapes shown on the Contract Documents.

2. Reinforcing bars shall be deformed bars conforming to ASTM A615, Grade 60. Bars shall be epoxy-coated in accordance with ASTM A775.

B. Wire Bar Supports

1. Except as otherwise specified, wire bar supports shall be Class 1, "Maximum Protection", or Class 2, "Moderate Protection", as applicable, in accordance with the CRSI "Manual of Standard Practice".

C. Welding

1. Welding of reinforcing steel is not permitted.

D. Fabrication

1. All reinforcement shall be bent cold unless otherwise approved by the Resident Engineer.

E. Fabricating and Placing Tolerances

1. Reinforcing bars shall be fabricated in accordance with the tolerances given in ACI 315.

2. Reinforcing bars shall be placed within tolerances conforming to the requirements of ACI 318 and the following:

a. Minimum spacing between bars: Plus or minus 1/4 inch.

b. Uniform spacing of bars: Plus or minus 2 inches, but the required number of bars shall not be reduced.

c. Uniform spacing of stirrups: Plus or minus 1 inch, and ties: but the required number of stirrups and ties shall not be reduced.

d. Length of bar laps: Plus or minus 1-1/2 inches

e. Embedded length: Plus or minus 1 inch

3. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, embedded items or to accommodate conditions found in the field. If bars are moved more than one bar diameter, or enough to exceed the specified tolerances, the resulting arrangement of bars shall be subject to approval by the Resident Engineer.

F. Placing

1. Placing of reinforcement shall be as called for on the Contract Documents and on Contractor's shop drawings, and as specified hereinafter.

2. Unless otherwise indicated on the Contract Drawings, concrete cover for all reinforcing shall be 3 inches.

3. Reinforcing steel reduced in section or with bends not shown on the Contract Documents, shall not be placed. At the time concrete is placed, reinforcement shall be free of mud, oil, or other materials that might adversely affect, or reduce, bond. Reinforcement with rust, mill scale, or a combination of both will be accepted as being satisfactory without cleaning or brushing provided that the dimensions and weights, and heights of deformations, of a hand-wired-brushed sample is not less than required by the referenced specification for reinforcing steel.

4. Reinforcement shall be supported and fastened together to prevent displacement, by construction loads or concrete placement, beyond the specified tolerances. Bars shall be tied, with wire-ties, at intersections (at approximately 24 inches) and at contact lap splices. Wire-ties shall be installed with ends pointing away from the nearest form. Tie wires shall be 16 gage black annealed wire. Epoxy-coated reinforcing bars shall be fastened with nylon, epoxy, or plastic coated wire ties.

   a. Supports for epoxy-coated reinforcing bars supported from formwork shall be dielectric material or shall be coated with dielectric material. Reinforcing bars used as supports and spreader bars shall be epoxy-coated or shall be coated with dielectric material.

5. Splices of reinforcing bars shall be as called for on the Contract Drawings, as specified herein, and as approved by the Resident Engineer.

   a. Continuous reinforcing bars, #11 and smaller, shall be spliced by lapping in accordance with the requirements of ACI 318.

   b. All splices must be staggered, unless noted otherwise.

6. Reinforcing steel shall not be bent or straightened in a manner that could be injurious to the steel or the concrete. Prior approval by the Resident Engineer shall be obtained by Contractor for bending procedures to be used. Heat, to bend or straighten reinforcing steel, shall be used only as approved by the Resident Engineer.

2.07 JOINTS AND EMBEDED ITEMS

A. Construction and Expansion Joints

1. No construction or expansion joints shall be permitted, unless they are explicitly shown on the Contract Documents. Each spall repair location shall be placed in a continuous manner from start to finish.

B. Other Embedded Items

1. All inserts, anchors, dowels, and other embedded items, including those required for adjoining work, or for its support, shall be in place prior to placement of concrete. Anchor dowels and other items of miscellaneous metal shall be installed by the Contractor in accordance with the manufacturer’s recommendations and procedures.

2. All Work required to be installed before concrete is placed shall be verified prior to placement of concrete.

3. Contractor shall provide all templates and devices necessary for the accurate positioning and setting of all embedded items specified herein or in other Contract Documents.

2.08 PRODUCTION OF CONCRETE

A. See Section 03 31 29 – Marine Concrete

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The type and extent of deteriorated or delaminated concrete to be repaired shall be as shown on the Contract Drawings. The Resident Engineer shall be notified (and approve) all additional repairs beyond those listed in the repair schedule as they are identified after removal of the membrane and follow up inspection of the underdeck surfaces.

B. Membrane Removal

1. Prior to any concrete repairs being performed, the Contractor shall remove the existing membrane from the underdeck as directed by DEP. See the Contract Documents and Specification 02 41 10 – Demolition and Removals for details.

C. Spall Repairs

1. The Contractor shall square off the concrete area that shall be repaired with a 1 in. deep sawcut, and shall remove all loose, deteriorated and delaminated concrete.

2. Removal of loose, deteriorated, and delaminated concrete, efflorescence and incrustation on concrete surfaces by means of pneumatic or mechanical chipping tools shall be done as follows:

a. Pneumatic hammers heavier than nominal 15-pound class shall not be used.

b. Pneumatic hammers or mechanical chipping tools shall be operated at an angle not to exceed 45 degrees relative to the area of the surface being repaired.

c. The Contractor shall remove concrete to a sound surface for a depth not less than ¼ in. nor greater than ¾ in. beyond the deteriorated layer of concrete.

d. All concrete and reinforcing steel surfaces to be repaired shall be cleaned of dirt, dust, laitance, corrosion, marine growth, and other contaminants conforming to SSPC-12 WJ-2, to yield a sound concrete surface. Such work shall be performed within the same

work period that the installation of the concrete spall repair material takes place.

1) All concrete to be repaired shall be cleaned of marine growth prior to installation of any repairs. The elapsed time between cleaning of the repair area and installation of the repair material shall not exceed 72 hours. If this timeframe is exceeded, the Contractor shall re-clean the area prior to repair installation.

3. The Contractor shall mechanically abrade the surface to achieve a minimum surface profile of 1/8", CSP-7 in accordance with ICRI guideline 310.2, or as specified by the manufacturer. The Contractor shall take all precautions necessary to minimize microcracking or bruising of the prepared concrete surface.

4. The Contractor shall not use power tools to remove concrete adhered to exposed reinforcing steel. Removal of concrete, and corrosion adhered to reinforcing steel shall be conforming to SSPC-12 WJ-2.

5. Presoak the existing prepared concrete surface to a saturated surface-dry (SSD) condition or apply bonding agent in accordance with the manufacturer's recommendation. SSD is defined by the American Concrete Institute (ACI) as the "condition of an aggregate particle or other porous solid when the permeable voids are filled with water and no water is on the exposed surfaces."

6. If concrete removal has exposed more than half of the perimeter of the reinforcing steel, the reinforcing steel shall be completely exposed to clear the remaining concrete by 1" in. The Contractor shall not pry up or displace reinforcing steel in order to accomplish this clearance. Contractor shall notify the Resident Engineer if this condition is encountered and receive approval of chipping prior to placing formwork.

7. Corroded reinforcing bars exhibiting 25% loss of cross-sectional area or more after cleaning shall be repaired in accordance with the Contract Drawings as approved by the Resident Engineer.

8. Exposed steel reinforcement shall be abrasive cleaned to bare metal. Finished surface shall be free of dirt, surface residues, and all other contaminants that may affect the bond to the repair material. Exposed steel reinforcement shall be coated with a corrosion inhibitor.

9. The concrete and exposed steel surfaces shall be cleaned with a liquid salt remover. The liquid salt remover shall be applied and rinsed with potable water in accordance with the manufacturer's recommendations. The application and rinse cycle shall be performed three times.

10. Concrete chipping and reinforcing steel condition requires the approval of DEP prior to forming and pumping of repair material.

D. Forms

1. Forms shall be mortar tight. An individual or individuals shall be engaged by the Contractor to monitor the placement of the concrete continuously and shall caulk any joints or leaks which show evidence of loss of mortar or cement.

2. Form coating shall not be used.

E. Standby Facilities

1. To ensure a continuous concrete placement, prior arrangements shall be made to have an alternate concrete plant on standby. Backup cranes, pumps and other equipment necessary to continue the placement shall be readily available on site. All standby facilities shall be subject to the same requirements as applicable to the primary facilities and require approval of DEP.

F. Tube Details

1. The word "tube" in this Section shall refer to the pipeline through which the concrete shall be pumped.

a. Tubes shall be watertight. Tubes may be steel pipe, not aluminum, and shall be minimum one-quarter inch wall thickness (or stronger, if the depth of placement requires). Flexible pipelines may be any material having the strength to resist the incident pumping pressure and all environmental forces.

b. All tubes shall have a means to seal the open end so that when the tube is relocated from one pump port to another, no concrete shall escape the open end of the tube. Use of a Go-Devil or Pig will not be permitted for restarting an interrupted placement operation.

c. The end of all tubes shall have a quick connect type fitting that shall fit securely and be easily installed on and removed from the pumping ports of the form. This quick connect fitting shall be watertight.

d. The diameter of tube shall be sufficient to permit unimpeded, smooth flow of concrete through the tube into final position. The diameter of the tube shall not be less than 2 in.

e. The Resident Engineer may require a demonstration of these requirements and shall be provided with a safe means of inspecting assembled tubes for watertightness prior to concrete placement.

G. Pumping Equipment

1. Mixing and pumping equipment used in mixing and handling of pumped concrete shall be as approved by the Resident Engineer. All oil and other rust inhibitors shall be removed from the mixing drums, stirring mechanisms and other portions of the equipment that would be in contact with the concrete before the mixers are used.

H. Embedded Dowels

1. All dowels and anchoring systems which will be embedded in concrete shall be cleaned of all debris, marine growth, rust and oily deposits.

3.02 IMPLEMENTATION

A. A. General Requirements

1. All exterior Work shall be performed during dry weather and appropriate temperature conditions in accordance with the manufacturer's recommendations. All unfinished work shall be protected during inclement weather with tarpaulins or heavy gage polyethylene sheeting.

2. All Work in spaces within structures shall be performed at temperature and conditions suitable for proper curing in accordance with the manufacturer's recommendations.

3. Concrete rehabilitation Work shall be coordinated and sequenced by the Contractor. Scaling, broken, loose and disintegrating materials shall be removed by use of hand tools or power driven saws, down to solid unyielding material.

4. Scaling, broken, loose and disintegrating materials shall be removed by use of hand tools or power driven saws, down to solid unyielding material.

5. All surfaces shall be thoroughly cleaned of efflorescence, oils, grease and other objectionable material in area to be repaired in accordance with the manufacturer's recommendations.

B. B. Epoxy Bonding Agent

1. As directed by the Engineer, an epoxy bonding agent shall be used to adhere fresh concrete to existing concrete. Existing concrete surfaces shall be roughened prior to application of bonding agent. Concrete surface shall be clean and sound, free of all foreign particles and laitance. Repair material shall be placed while bonding agent is still tacky. If bonding agent cures prior to placement of repair material, bonding agent shall be reapplied.

2. Repairing concrete with epoxy mortars shall conform to all the requirements of ACI 503.4, and as specified herein.

C. C. Anti-corrosion Coating

1. Reinforcing steel cut or exposed during alteration and/or repair operations shall be sandblasted, cleaned and coated with an anti-corrosive coating.

2. Coating shall thoroughly cover all exposed parts of the steel and shall be applied according to manufacturer's recommendations.

D. Structural Crack Repair

1. As directed by the Engineer, all existing structural cracks 1/16 inch and wider to be repaired shall utilize a structural crack repair material. Rout

crack to 3/4 inch wide by 3/4 inch deep V-notch to expose sound concrete. Clean routed cracks with wire brush and compressed air.

2. Where rebar has deteriorated, crack shall be routed to expose 3/4 inch all around rebar. The resulting void in concrete shall be patched flush with the existing concrete surface using structural crack repair material.

E. Epoxy Crack Repair

1. Cracks 1/4-Inch and Narrower: As directed by the Engineer, all existing structural cracks 1/4-inch or narrower to be repaired shall be pressure injected an epoxy crack repair binder into the prepared crack. Crack surface shall be sealed and injection ports installed per manufacturer's recommendations.

   a. Holes drilled for injection ports shall not cut rebar at maximum 12” spacing. If rebar is encountered during drilling, the hole shall be abandoned and relocated, and the abandoned hole shall be patched immediately with non-shrink grout flush with the surface of the existing concrete.

   b. Once the surface sealing material has cured, inject crack with epoxy crack repair binder using pressure injection equipment as directed by the manufacturer.

2. Cracks wider than 1/4-Inch: As directed by the Engineer, all existing structural cracks wider than 1/4 inch to be repaired shall be gravity fed an epoxy crack repair binder into the prepared crack.

   c. Concrete surface shall be routed to form a minimum 1/4 inch wide by 1/4 inch deep V-notch and the crack cleaned with wire brush and compressed air to remove all loose and foreign particles. Crack shall be filled with clean, dry sand and then epoxy crack repair binder poured into V-notch, completely filling crack.

   a. As binder penetrates into crack, additional binder shall be applied to the V-notch.

F. Spall Repair

1. As directed by the Engineer, all voids or spalled areas to be repaired shall be chipped back a minimum of 1/8-inch to sound concrete and the area cleaned and repaired to original dimensions with spall repair patching material according to manufacturer's recommendations.

2. All patching shall provide a final finished surface which is flat, level and even with the existing concrete surface. Repair mortar shall not be feathered to meet existing concrete surface.

3. Final patching on horizontal surfaces shall receive a finish consistent with the finish on the existing structure.

3.03 FIELD TESTING / QUALITY CONTROL

A. General

1. Testing agencies shall conform to the requirements of ASTM E239
2. Concrete and construction operations will be tested and inspected as the Work progresses. Failure to detect any defective Work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate DEP for final acceptance.
3. The Contractor shall provide all necessary testing services for qualifications of proposed materials and procedures, and establishment of mix designs. The Construction Manager shall provide all necessary testing services for the performance of tests to verify form removal and strength of concrete.
4. Testing services, required to be provided by Contractor, shall be performed by a testing agency approved by the Construction Manager. Test reports, including results and interpretations of results, and certification of conformance with specified requirements, shall be transmitted directly from the testing agency to the Construction Manager.
5. Field concrete testing services shall be provided by the Construction Manager. The Contractor shall cooperate with the Construction Manager in providing access to the Work for any testing and inspection as required by the Construction Manager.

B. Testing Services

1. Qualification of Materials
    a. Cement shall be tested in accordance with ASTM C150 and the requirements specified herein. The manufacturer shall certify testing and conformance of the material supplied to the requirements specified.
    b. Air-entraining admixture shall be tested in accordance with ASTM C233, as specified in ASTM C260. Tests shall be performed using cement and aggregates to be used in the Work.
    c. Water-reducing, retarding, and accelerating admixtures shall be tested in accordance with ASTM C494; including testing for uniformity and equivalence by infrared spectrophotometry. Tests shall be performed using cement and aggregates to be used in the Work.
    d. Pozzolanic admixtures, as approved for use by the Resident Engineer, shall be tested in accordance with ASTM C6l8. Tests shall be performed using cement and aggregates to be used in the Work.
    e. Water shall be tested in accordance with ACI 318, and the requirements specified.

f. Aggregates shall be tested in accordance with ASTM C33 and the requirements specified.

g. Reinforcing steel shall be tested and certified by the manufacturer for compliance with ASTM A615, and ASTM A497, as applicable, and the requirements specified. Contractor shall submit to the Resident Engineer, certified mill test reports indicating chemical composition and physical properties of reinforcing steel.

2. Mix Designs

a. The contractor shall provide the necessary testing services and certifications required for the establishment of mix designs. The use of testing services shall in no way relieve the Contractor of the responsibility for full compliance with the Contract Documents.

1) Adequacy of proportions of the design mix, at a minimum, for each specified compressive strength of concrete, shall be tested in accordance with ASTM C192 and ASTM C39. For each specified compressive strength, two specimens shall be tested at three days and two at seven days; and three specimens shall be tested at 28 days.

2) Soluble chlorides in concrete shall be determined as specified.

3. Concrete Strength Testing

a. Testing of field cured cylinders and cementitious grout cubes to verify concrete strength prior to removal of forms, and as applicable, shall be performed as follows:

1) Samples used in testing procedures shall be taken from the end of the hose that will be attached directly to the pumping ports of the form.

2) Contractor shall secure concrete samples in accordance with ASTM C172

3) Contractor shall secure 8 specimens from each concrete sample, which shall be molded and cured in accordance with ASTM C31

4) Contractor shall secure 6 specimens from each cementitious grout sample, which shall be molded and cured in accordance with ASTM C109

5) One strength test, as specified, shall be performed for each 50 cubic yards placed. A minimum of one strength test shall be performed for each day that concrete or grout is delivered and placed. For concrete, two specimens shall be tested at 7, 14 and 28 days, and two shall be held in reserve for

additional testing if required. For cementitious grout, two specimens shall be tested at 7, 14, and 28 days.

6) Concrete specimens shall be tested in accordance with ASTM C39. The apparent strength of concrete, to be used in computations for form removal, shall be the average of the strengths of the two specimens tested. If one specimen in a test manifests evidence of improper sampling, molding, or testing, it shall be discarded, and the strength of the remaining specimen shall be considered the test result.

7) Cementitious grout specimens shall be tested in accordance with ASTM C109.

b. Contractor shall provide for such additional testing and inspection services as may be required as a result of changes in materials or proportions requested by Contractor.

c. The contractor shall provide for such additional testing of materials or concrete as may be required by their failure, as evidenced by test or inspection, to meet the requirements of this Section of the Specification.

4. Concrete (including cementitious grout)

a. Quality of concrete supplied in accordance with this Section of the Specification will be determined by the Resident Engineer, based on tests of concrete samples secured and tested during construction.

b. The Construction Manager will conduct strength tests as required by ACI 318 and such additional testing as may be required to verify the Contractor's conformance with the requirements of this Section of the Specification. The Contractor shall provide all concrete required for testing purposes and shall provide and maintain adequate facilities for storing and curing concrete test specimens, on the site, for the first 24 hours, as required by ASTM C31.

c. Conformance to concrete strength requirements specified in this Section of the Specification will be based on strength test results as required by ACI 318 for evaluation and acceptance of concrete.

d. If the results of strength tests indicate that concrete already placed does not meet specified requirements, and if so, directed by the Resident Engineer, Contractor shall perform core tests and/or load tests, as required by ACI 318, and submit test reports to the Resident Engineer.

e. The contractor shall pay all costs and bear all expenses for testing and analysis necessitated by strength test results indicating deficient concrete.

f. Concrete Work judged, by structural analysis or load test, to be inadequate due to deficient concrete shall be reinforced or replaced, as directed by the Resident Engineer, at Contractor's expense.

C. Hot and Cold Weather Procedures

1. The general requirements for hot and cold weather concreting, detailed in ACI 305R and ACI 306R, shall also apply to all remedial work under this specification.

2. Cold weather is defined as a period when for three successive days the average daily outdoor temperature drops below 40° F. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight.

3. During periods of cold weather, protection must be taken in accordance with ACI 306R. Before performing any cold weather repairs, the contractor shall submit a plan as required by Section 1.07.G.2 of this specification.

4. No repairs shall be performed if the concrete substrate temperature drops below 35°F or if the temperature is expected to drop below 35°F within 36 hours of completion of the repairs.

5. Maximum concrete temperature shall be limited to 90° F at the time of discharge.

D. Inspection

1. The Work to be provided in accordance with this Section of the Specification shall be subject to inspection by the Resident Engineer at any time(s) during the progress of the Work. The Contractor shall provide access and any labor, materials, tools, and equipment required by the Resident Engineer to complete inspection of the Work as specified herein.

2. Acceptance of structure shall be contingent on the Work meeting all of the requirements of the Contract Documents as indicated by the results of all testing, inspection, and other quality assurance procedures required by the Resident Engineer.

3. Approval, by the Resident Engineer, of any remedial measures shall not be construed to mean approval of the results of such remedies. Modifications resulting from any remedial measures performed shall be subject to the approval of the Resident Engineer.

4. Tolerances specified herein for the construction of formwork and the placing of reinforcement are individual maximums and shall not be construed to permit the accumulation of any group of tolerances that will infringe on any of the specified maximums. The Work shall meet all tolerance requirements

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Pumps and hoses used for crack repair shall be completely flushed. A sharp sided tool such as a putty knife or trowel shall be used to remove excess material from walls, floors, etc. Material shall be cured before removing.

B. Misplaced repair materials shall be removed using methods and materials recommended by the manufacturers, and the finished work and work area shall be left in a neat and clean condition.

3.06 INSPECTION SERVICES

A. Following removal of the existing membrane, an inspection shall be conducted of the underlying concrete surface for additional defects concealed by the membrane. The Construction Manager shall contract a 3rd party inspector to identify any additional repair areas exposed during membrane removal..

1. The Contractor shall be responsible for providing access to the site and for all coordination with the 3rd party inspector.

2. No inspections shall take place prior to approval of the proposed 3rd party inspector or approval of the inspection work plan by the Resident Engineer.

3. Following the inspection, the 3rd party inspector shall prepare a memo outlining all findings following the inspection to be provided to the Resident Engineer for review. The memo shall include identification of the location, size, and severity of all observed repairable defects presented in tabular format along with accompanying representative photos.

4. After review and acceptance of the inspection findings, a schedule of additional repairs to be performed shall be provided by the Resident Engineer to the Contractor. Repairs will be based on the existing repair details provided in the Contract Drawings. Payment for the additional repairs shall be based on the unit prices for the repairs listed in Section 1.02 of this specification.

END OF SECTION

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Work specified in this Section consists of designing, furnishing materials for, fabricating, erecting, and removing formwork, falsework and shoring for cast-in-place concrete as indicated on the Contract Drawings, specified herein and needed for a complete installation.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 01 30.71 - Rehabilitation of Cast-In-Place Concrete

B. Section 03 31 29 - Marine Concrete

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1. ACI 117 - Standard Tolerances for Concrete Construction and Materials
2. ACI 303 - Guide to Cast-in-Place Architectural Concrete Practice
3. ACI 347 - Guide to Formwork for Concrete
4. ACI 562 - Assessment, Repair, and Rehabilitation of Existing Concrete Structures
5. ACI SP-4 - Formwork for Concrete
6. American Plywood Association (APA): APA Grade - Trademark
7. ISO 14025 - Environmental labels and declarations - Type III environmental declarations
8. New York City Building Code
9. Western Wood Products Association (WWPA): Western Lumber Product Use Manual

1.05 DESCRIPTION

1. Formwork materials shall be protected before, during and after erection to insure acceptable finished concrete Work. In-place materials and other operations of work in connection with concrete pours shall be protected.
2. In the event of damage to erected forms, necessary repairs or replacements prior to concrete pours shall be performed at no expense to the City.
3. The Contractor shall allow sufficient time, as determined by the Engineer from the approved schedule, between erection of forms and placing of concrete for the various trades to properly install their Work.
4. External or superimposed loads, lateral or vertical, shall not be applied on casting concrete until concrete has developed specified 28-day compressive strength and reached the minimum curing age required by Section 03 31 29-Marine Concrete.
5. Stay-in-place forms are not permitted unless otherwise shown on the Contract Drawings or approved by the Engineer.

B. Design of Formwork:

1. Formwork shall be designed and constructed in compliance with ACI SP-4 and, if applicable, ACI 303.

2. The Contractor shall assume responsibility for the design, engineering and construction of formwork. Forms shall be designed to produce concrete members identical in shape, lines and dimensions to members shown on the Contract Drawings.

3. The formwork shall be designed for the loads and lateral pressures in accordance with ACI 347 and wind loads as specified by the New York City Building Code.

4. Construction and control joints, openings, offsets, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, waterstops, anchorages, inserts, and other features shall be provided as required by the Contract Documents.

5. Formwork shall be designed to be readily removable without impact, shock, or damage to 'green' concrete surfaces and adjacent materials.

6. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads.

7. Formwork surface materials shall meet the requirements of Section 03 35 00 - Concrete Finishing.

1.06 QUALITY ASSURANCE

A. Unless otherwise noted on the Contract Drawings, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits as given in ACI 117.

B. A full size mock-up of a cast-in-place wall shall be erected on the Site where directed. Mock-up shall conform to requirements of Section 03 35 00 - Concrete Finishing.

C. Shop Drawings approvals shall be obtained before custom fabrication is started and before delivery of materials to the Site.

D. Work of this Section shall be coordinated with the work of other trades so that construction is not delayed.

E. Formwork erection procedures and health and safety of the work force shall be the responsibility of the Contractor. The requirements of authorities having jurisdiction shall be complied with.

F. Errors of detailing and fabrication and the correct fit of the formwork shall be the responsibility of the Contractor.

G. Materials, fabrications and workmanship found defective shall be promptly removed and replaced and new acceptable work shall be provided in accordance with Contract requirements at no additional expense to the City.

H. Design of formwork layout, spans, fastenings, joints, and framed openings shall be under the direct supervision of a Professional Engineer, who is licensed and registered in the State of New York with minimum of 10 years of experience in structural design of formwork.

1.07 SUBMITTALS

A. Shop Drawings submitted for approval of the Engineer shall include, but not be limited to, the following data:

1. Design of all field-constructed and prefabricated formwork. The Contractor shall submit drawings and calculations signed and sealed by a professional engineer licensed in the State of New York for form designs and re-shoring.

2. For each type of form required, material type, material thickness, finish, and a dimensional cross-sectional profile.

3. Details of erection, including various connections, layouts of form units placement directions, anchoring and support details, attachment of accessories, each condition requiring enclosures, cut opening, special jointing, and other accessories as required to complete the work.

B. Manufacturer's specifications and installation instructions for each type of required formwork and accessory shall be submitted. These include each type of sheeting, chamfer strips, form facing materials, form ties, form liners, rustication strips, form release agent, dovetail anchor slots, form coating material, form caulking, and similar items.

C. Plan for Reshoring: When reshoring is permitted or required, the operations shall be planned in advance and in accordance with acceptable procedures and the requirements of this Section.

1. The Contractor shall submit as a part of the shop drawings a Plan for Reshoring prepared and sealed by a New York State registered professional engineer.

D. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor’s

approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in an undamaged condition and at such intervals as will avoid delay in the work.

B. Material shall be stored and protected in a clean, properly drained location. Material shall be kept off the ground under a weather-tight covering permitting good air circulation. Formwork materials shall be stored on dry wood sleepers, pallets, platforms or other appropriate supports which have slope for positive drainage. Materials shall be protected from distortion, excessive stresses, corrosion and other damage. Materials shall not be stored on the structure in a manner that might cause distortion or damage to the supporting structure. The maximum uniform distributed storage load shall not exceed 20 pounds per square foot.

C. Material shall be handled safely in a manner that will prevent distortion or other damage. Care shall be exercised at all times to avoid damage through careless handling during unloading, storing and erecting. Panels shall be supported by using strong backs while lifting panels in a horizontal position.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. A-2 Cone Snap-in Form Tie shall be as manufactured by:

1. Dayton Superior.

2. Williams Form Engineering Corp.

3. Symons Corp.

4. Or approved equal.

B. Form caulking shall be as manufactured by:

1. Series 1200 Construction Caulking; GE Silicones/Momentive Performance Materials, Inc., Waterford, NY.

2. Dow Corning 999-A; Dow Corning Co., Auburn, MI.

3. Or approved equal.

C. Form release agent shall be as manufactured by:

1. Specco F-100; Specco Industries, Inc., Lemont, IL.
2. Debond Form Coating; L&M Construction Chemicals, Inc., Omaha, NE.
3. Magic Kote; Symons Corporation, Des Plaines, IL.
4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Lumber

1. Only stress-grade lumber shall be provided. Form framing, sheathing and shoring shall conform to WWPA Western Lumber Product Use Manual.
2. For lumber in contact with concrete, the lumber shall be provided with dressed or tongue-and groove edges on at least the side contacting the concrete, unless otherwise indicated on the Contract Drawings.

B. Plywood

1. Only grade-marked plywood conforming to APA shall be provided.
2. B-B Plyform, Exterior Class 1 or 2, or High Density Overlay (HDO) form plywood, Class 1 or 2 conforming to U.S. Product Standard PS-1 shall be provided.
3. Thickness shall be as required to maintain alignment and surface smoothness, but not less than 5/8 inch thick.

C. Steel Forms

1. Commercial grade sheets not less than 16 gage shall be provided.
2. Steel forms in rust-free condition shall be maintained by use of steel wool and light grinding, followed by coats of the specified release agent.
3. Stock material that is free from warps, bends, kinks, cracks, and rust or other matter that could stain the concrete shall be provided.
4. Panels shall be fabricated in conformance with the approved submittals.
5. Outward facing surfaces shall be reinforced as required to prevent warpage and deformation during concrete placement.

D. Form Ties

1. Commercially manufactured type form ties, hangers, and clamps of such type that, after removal of the forms, metal will not be closer than concrete cover as indicated on the Contract Drawings from concrete surface shall be provided. Non-fabricated wire ties will not be permitted.

2. A cone-shaped, snap-in type form tie suitable for the intended use with a working load as required and an integral hot forged head shall be provided.

3. Ties with swaged washers or other suitable devices to prevent seepage of fluid along the ties shall be provided. Ties shall be left in place. She-bolt with water seals shall be provided.

4. Form ties for all liquid-retaining structures shall have waterstop at mid-thickness of wall.

5. Lugs, cones, washers, or other devices which do not leave holes or depressions greater than 1-inch in diameter shall be provided.

E. Chamfer Strips

1. 3/4 inch by 3/4 inch triangular fillets shall be provided, all of which shall be milled from clear, straight-grain pine, surfaced each side, or all of which shall be extruded vinyl type with or without nailing flange unless otherwise indicated on the Contract Drawings.

F. Inserts

1. Galvanized cast steel or galvanized welded steel inserts, complete with anchors to concrete and fittings such as bolts, wedges and straps shall be provided.

G. Dovetail Anchor Slots

1. Dovetail anchor slots manufactured from 22 gage, electro-galvanized steel with removable felt or polyurethane filler shall be provided, where indicated on the Contract Drawings.

H. Shop Fabricated Form

1. Forms shall be fabricated in accordance with the approved submittals.

2. Forms shall be maintained clean, smooth, and free from imperfections and warpage.

3. Locate joints as indicated on the approved Shop Drawings.

   a. Form panels shall be arranged in symmetrical patterns conforming to the general lines of the structure.

   b. Except when otherwise indicated on the Contract Drawings, panels on vertical surface shall be oriented with the long dimension horizontal joints level and continuous.

   c. Form panels on each side of the panel joint shall be precisely aligned by means of fasteners common to both panels, to result in a continuous, unbroken concrete surface.

d. Largest stock size practicable shall be provided.

e. Between form joints, areas less than the stock size of the form liner material shall be lined with a single piece of liner material.

I. Form Caulking

1. Form caulking shall be a one-component, gun-grade silicone sealant that is capable of producing flush, watertight and non-absorbent surfaces and joints. Sealant shall be compatible with the type of forming material and concrete ingredients used.

J. Form Release Agent

1. Form release agent shall be a VOC compliant commercial formulation form-coating compound that will not bind with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compounds. Form release agent shall be a nonreactive type as approved by ANSI/NSF standard 61.

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. Field Measurements

1. Prior to commencement of the Work, existing dimensions, elevations, locations and conditions applicable to the Work shall be field verified. Variances and discrepancies from the Contract Drawings and potential interferences shall be reported promptly to the Engineer.

2. Sufficient field measurements shall be taken prior to preparation of Shop Drawings and fabrication of construction materials, where possible, to ensure proper fitting of the work. However, job progress shall not be delayed. The Contractor shall allow for adjustments and fittings wherever the taking of field measurements before fabrication may not be possible or might delay the work.

3. Actual field-verified conditions may require modifications to the fabrication and/or erection details as indicated on the Contract Drawings. The Work shall be performed to meet actual field conditions encountered.

B. Preparation

1. The Contractor shall examine the areas and conditions under which the Work of this Section is to be performed. Conditions detrimental to the proper and timely completion of the Work shall be corrected. Work shall not proceed until unsatisfactory conditions have been corrected. Prior to placement of concrete, forms shall be inspected for cleanliness and accuracy of alignment.

3.02 IMPLEMENTATION

A. Erection and Installation

1. Forms shall be constructed in accordance with ACI 347 to required dimensions, plumb, straight and mortar tight, and all joints and seams shall be made mortar-tight. Forms shall be substantial, properly braced, and tied together to maintain position and shape and to resist all pressures to which they may be subject. Unless otherwise noted on the Contract Drawings, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits in ACI 117.

2. The size and spacing of studs and wales shall be determined by the nature of the work and the height to which concrete is placed. Forms shall be made adequate to produce true, smooth surfaces.

3. Forms shall be supplied for repeated use in sufficient number to ensure the required rate of progress. Forms shall be cleaned and inspected immediately prior to depositing concrete. Deformed, broken or defective forms shall be removed from the work.

4. Joints shall be snug and tight and shall occur only at the designated locations. Construction and control joints other than those shown on the Contract Drawings shall be approved by the Engineer. Horizontal joints shall be level, and vertical joints shall be plumb. Joints shall be made perpendicular to the main reinforcement except where otherwise indicated on the Contract Drawings.

5. Temporary openings shall be provided where the interior area of formwork is inaccessible for cleanout or inspection before concrete placement, and for placement of concrete. Temporary openings shall be securely braced and set tightly to forms to prevent the loss of concrete mortar. Temporary openings shall be located on forms in locations as inconspicuous as possible consistent with the requirements of the work.

6. Openings shall be provided in concrete formwork of the correct size and in the proper location to accommodate other operations of construction work in the project. Expansion joint material, waterstops, and other embedded items to be built into forms shall be accurately placed and securely

supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

7. Edge forms or bulkheads and intermediate screed strips for slabs shall be set to obtain required elevations and contours in the finished slab surface.

8. Forms shall be set sufficiently to prevent joints in wood forms from opening prior to concrete pour.

9. Cutting form ties back from the face of the concrete shall not be permitted.

10. Formwork shall be observed continuously while concrete is being placed to see there are no deviations from desired elevation, alignment, plumbness and camber. If, during casting, weakness develops and the formwork shows settlement, deflection or distortion, the Work shall be stopped, improperly cast concrete shall be removed and the formwork shall be reconstructed to perform properly.

    a. Forms for columns, beams, girders, walls and window openings shall be erected in accordance with ACI 117, with a maximum camber of 3/4-inch in 20 feet. Column sides shall be clamped with metal column clamps, or equal, spaced according to manufacturer’s recommendation. Exposed external angles of columns, beams, girders and walls, except where specially shown on the Contract Drawings shall be provided with 3/4-inch bevel strips securely nailed on all concrete formwork including concrete encasement of structural steel shapes.

11. Form release agents shall be applied in accordance with manufacturer's instructions and as specified herein:

    a. Form contact surfaces shall be coated with form release agent compound before reinforcement is placed. Excess form release agent material shall not be allowed to accumulate in the forms or to come into contact with surfaces which are required to be bonded to fresh concrete such as concrete reinforcement and embedded items.

    b. Steel forms shall be coated with non-staining, rust-preventive form oil or otherwise shall be protected against rusting. Rust-stained steel surfaces in contact with concrete shall not be used.

12. Excess form coating material shall not be allowed to accumulate in the forms.

13. Form coatings shall not be allowed to come in contact with construction joints or reinforcing steel.

14. Runways for moving equipment shall be provided with struts or legs and supported directly on the formwork or structural member without resting on the reinforcing steel.

15. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.

16. All sleeves, inserts, anchors, and embedded items required for adjoining work or for support of joining work shall be placed prior to concreting.

17. Architectural Formwork:

    a. Form liners and rustication strips shall be installed in strict accordance with the manufacturer's written instructions and recommendations. The ends of the form liner pattern shall be clogged and all form joints and edges shall be taped using 1/8-inch thick by 3/4-inch wide foam tape centered on the joints, then caulked in accordance with the manufacturer's recommendations each time forms are set. A representative of the manufacturer shall be present at the site to supervise the installation of the form liner for the entire project.

    b. Forms for smooth concrete shall be installed in such a manner that there will be no horizontal form joints, and the forms shall be aligned so that vertical joints occur only at "V-Groove" rustications. Form ties shall be spaced in a uniform pattern vertically and horizontally. Form ties shall be positioned in smooth concrete bands and in panels between "reveal" rustications, if any.

    c. Beam and girder soffits shall be erected in accordance with ACI 117 and sufficiently braced, shored, and wedged to prevent deflection. Column sides shall be clamped in accordance with this specification with metal column clamps, spaced according to the manufacturer's directions.

B. Reshoring

1. During reshoring the concrete in beams, slabs, columns, or any other structural members shall not be loaded with combined dead and construction loads in excess of the loads permitted by the Engineer for the developed concrete compressive strength at the time of reshoring.

2. Reshores shall be placed after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.

3. Reshoring for the purpose of early form removal shall be performed so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no live loads shall be

permitted on the new construction. Reshores shall be tightened to carry their required loads but they shall not be overtightened so that the new construction is overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise noted on the Contract Drawings.

4. For floors supporting shores under newly placed concrete, the original supporting shores or reshores shall be left in place. The shoring or reshoring system shall have a capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one-half of the capacity of the shoring system above. Reshores shall be located directly under the floors supporting shores unless other locations are permitted or shown on the Contract Drawings.

5. In multi-story buildings reshoring shall be extended over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads so the design superimposed loads of the floors supporting shores are not exceeded.

C. Removal of Forms and Ties

1. Forms shall be removed in accordance with ACI 347 recommendations without damage to concrete and in a manner to ensure complete safety to the structure. Forms, form ties and bracing shall not be removed without specific permission of the Contractor's Registered Professional Engineer.

2. Top forms on sloping surfaces of concrete shall be removed as soon as removal operations will not allow the concrete to sag. Any needed repairs or treatment required on sloping surfaces shall be performed at once and shall be followed immediately with the specified curing.

3. Upon removal of forms, the Engineer shall be notified in order that a review of the newly stripped surfaces may be made before patching.

4. Wood forms for wall openings shall be loosened without causing damage to the concrete. The face of concrete shall not be pried against. Only wooden wedges shall be used.

5. Whenever the formwork is removed during the curing period, the exposed concrete shall be cured in accordance with one of the methods specified in Section 03 30 00 - Cast-in-Place Concrete.

6. In general, forms shall not be removed until the concrete has hardened sufficiently to safely support its own load, plus any superimposed load that might be placed thereon. As a minimum the forms shall be left in place for length of time specified below. These times represent cumulative days, not necessarily consecutive, during which the air surrounding the concrete is above 50 degrees F.

	Min Time (days)	Min Strength (psi)
1. Curbs and Walks	2	1500
2. Columns	2	2000
3. Side forms for girders and beams	2	2000
4. Walls	2	2000
5. Bottom forms of slabs:		
a. Under 20 feet clear span	7	3000
b. Over 20 feet clear span	10	3500
6. Bottom forms of beams and girders:		
a. Under 10 feet clear span	7	3000
b. 10 to 20 feet clear span	14	3500
c. Over 20 feet clear span	21	4000

a. These times shall be increased if the concrete temperature following placement is permitted to drop below 50 degrees F.

7. Care shall be taken in removing forms, wales, shorings, supports and form ties to avoid spalling or marring the concrete. Rubbed finish, if required, and such patching as may be necessary shall be started immediately after removal.

D. Re-Use of Forms

1. Forms for re-use shall meet requirements for new forms with respect to effect on cast-in-place concrete appearance and structural stability.

2. Re-use of forms shall in no way delay or change the concrete placement schedule as compared to the schedule obtainable if all forms were new (in the case of wood forms) of if the total required forms were available (in the case of metal forms).

3. Formwork shall be cleaned and re-oiled prior to re-use. Plywood forms shall not be re-used if unused holes from form ties exist from a previous use. High density overlay plywood panels shall be thoroughly cleaned and

lightly recoated before each additional use. Wood forms shall not be used more than three times.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Protection

1. During installation, the forms shall not be used as a storage platform nor as a working platform until the forms have been permanently fastened in position.

2. The surface of installed forms shall not be overloaded.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install all reinforcing steel as indicated on the Contract Drawings including all labor, materials, hardware, equipment, transportation, and services required for fabricating, cutting, bending, fastening and any special work and supplies necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this Section and needed for a complete installation as approved by the Engineer.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 01 30.71 - Rehabilitation of Cast-in-Place Concrete.

B. Section 03 31 29 - Marine Concrete.

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures
2. ACI 318 - Building Code Requirements for Reinforced Concrete
3. ACI MNL-66 - Detailing Manual
4. AWS D1.4 - Structural Welding Code - Reinforcing Steel
5. ASTM A82 - Steel Wire, Plain, for Concrete Reinforcement
6. ASTM A184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
7. ASTM A 1064 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
8. ASTM A496 - Steel Wire, Deformed, for Concrete Reinforcement.
9. ASTM A497 - Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
10. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
11. ASTM A616 - Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
12. ASTM A617 - Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
13. ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement
14. ASTM A767 - Zinc-Coated (Galvanized) Steel Bars for

			Concrete Reinforcement
15.	ASTM A775	-	Epoxy-Coated Reinforcing Steel Bars.
16.	CRSI DA4	-	Concrete Reinforcing Steel Institute Manual of Standard Practice
17.	ISO 14025	-	Environmental labels and declarations - Type III environmental declarations

1.05 DESCRIPTION

A. Shop drawings showing all dimensions necessary for fabrication and installation of the reinforcing steel and accessories without reference to the Contract Documents shall be submitted for approval. Approval shall be obtained from the Engineer before fabrication.

B. Details of concrete reinforcement not covered in the Contract shall be in accordance with ACI 315, ACI 318 and CRSI DA4.

C. When it is found necessary to move reinforcement beyond the specified placing tolerances to avoid interference with other reinforcement, conduits, or embedded items, a submittal showing the resulting arrangement of reinforcement shall be submitted to the Engineer for approval.

D. All reinforcement, at the time concrete is placed, shall be free of mud, oil or other materials that may adversely affect or reduce the bond. Reinforcement with rust, mill scale or a combination of both shall be considered satisfactory provided the minimum dimensions, weight and height of deformation of a hand-wire-brushed test specimen are not less than the applicable ASTM specification requirement.

E. Provide accurate templates for column dowels to secure their position and to ensure their proper placement in concrete, unless otherwise approved by the Engineer.

1. To obtain approval to place column dowels without using templates, the Contractor must submit:

a. Request for such approval with details on how column dowels will be secured in their position; and

b. Placing drawings as specified herein.

2. The Engineer reserves the right to grant approval to place column dowels without using templates based on review of the placing drawing submittal. The Engineer’s determination on use of templates will be final, and the Contractor shall abide by such determination.

F. All splices shall be as indicated on the Contract Documents unless otherwise permitted by the Engineer. Mechanical connections that provide a minimum of 125 percent of the yield strength of the reinforcing bars may be used when permitted by the Engineer.

1. Reinforcement coating shall be removed in the area of the mechanical connection, if so required by the connection manufacturer.

2. After installation of mechanical connections on zinc-coated (galvanized) or epoxy-coated reinforcing bars, coating damage shall be repaired in accordance with the requirements of this Section. All external parts of mechanical connections used on coated bars, including steel splice sleeves, bolts and nuts shall be coated with the same material used for repair of coating damage.

G. Temperature Reinforcing

1. Unless otherwise shown on the Contract Drawings or in the absence of the concrete temperature reinforcing being shown:

a. The minimum cross-sectional area of horizontal and vertical concrete temperature reinforcing in walls shall be 0.0033 times the gross concrete area.

b. The minimum cross-sectional area of temperature reinforcing perpendicular to the principal reinforcing in slabs shall be 0.0020 times the gross concrete area.

2. Temperature reinforcing shall not be spaced further apart than five times the slab or wall thickness, nor more than 18 inches.

1.06 QUALITY ASSURANCE

All reinforcement shall be supported and fastened before concrete is placed and shall be secured against displacement within the tolerances permitted in this Section.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not limited to:

1. Detailed placement and shop fabrication drawings, prepared in accordance with ACI 315 and ACI MNL-66 shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, layout, bending, assembly diagrams, bar schedules, spacing, lapping and splicing of the bars.

2. Certified copies of mill reports shall accompany all deliveries of reinforcing steel.

3. Description of the reinforcing steel manufacturer's marking pattern.

4. Description of proposed supports for each type of reinforcing.

5. Description of reinforcing weld locations and weld procedures.

B. The Contractor shall also include the following:

1. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.
2. Request to use splices not shown on the Contract Drawings.
3. Request to use mechanical couplers along with manufacturer's literature on mechanical couplers with instructions for installation, and certified test reports on the couplers' capacity.
4. Request for placement of column dowels without the use of templates.
5. Request and procedure to field bend or straighten partially embedded reinforcing.

C. Sustainability Submittals:

1. Environmental Product Declarations
   a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.
2. Envision Submittals
   a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.

B. Coating damage zinc-coated (galvanized) reinforcing bars due to handling, shipping and placing shall be repaired in accordance with the requirements of this Section.

C. Equipment for handling epoxy-coated reinforcing bars shall have protected contact areas. Bundles of coated bars shall be lifted at multiple pickup points to prevent bar-to-bar abrasion from sags in the bundles. Coated bars or bundles of coated bars shall not be dropped or dragged. Coated bars shall be stored on protective cribbing. Coating damage due to handling, shipping and placing shall be repaired in accordance with the requirements of this Section.

D. Reinforcing steel shall be stored above ground on platforms or other supports and shall be protected from the weather at all times by suitable covering. It shall be stored in an orderly manner and plainly marked to facilitate identification.

E. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.

F. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be re-inspected and if necessary re-cleaned.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Dowel Adhesive System

1. The adhesive system shall be:

a. HIT HY-150 Injection Adhesive Anchor System as manufactured by Hilti, Inc., Plano, TX.

b. Epcon System as manufactured by ITW Ramset/Redhead, Glendale Heights, IL.

c. Sikadur Injection Gel as manufactured by Sika Corp., Lyndhurst, NY.

d. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Reinforcement

1. Reinforcing Steel:

a. All reinforcing steel shall be deformed except spirals and welded wire fabric, which may be plain bars. Reinforcement shall be the grades required by the Contract Documents and shall conform to one of the following specifications:

1) ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

2) ASTM A616 - Rail-Steel Deformed and Plain Bars for Concrete Reinforcement (including supplementary requirements S1).

3) ASTM A617 - Axle-Steel Deformed and Plain Bars for Concrete Reinforcement.

4) ASTM A706 - Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

5) Wire or wire fabric with a specified yield strength fy exceeding 60,000 psi shall have the stress fy corresponding to a strain of 0.35 percent.

6) Reinforcing steel shall conform to the applicable requirements of Sections 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete, 03 31 29 – Marine Concrete.

2. Coated Reinforcing Bars:

a. Furnish and install coated reinforcing bars for structural concrete Work wherever shown and/or noted on the Contract Drawings.

b. Reinforcing bars shall be zinc-coated (galvanized) or epoxy-coated. The reinforcing bars to be coated shall conform to the requirements of this Section.

1) Zinc-Coated (Galvanized) Reinforcing Bars: Zinc-coated (galvanized) reinforcing bars shall conform to ASTM A767. Supplementary requirements S1 and S2 shall apply when fabrication after galvanization includes cutting and bending. Supplementary requirement S2 shall apply when fabrication after galvanization includes only bending. Repair of damaged zinc coating when required shall be made with a zinc-rich formulation conforming to ASTM A767. Repair shall be done in accordance with the material manufacturer's recommendations.

2) Epoxy-Coated Reinforcing Bars: Epoxy-coated reinforcing bars shall conform to ASTM A775. Coating damaged due to shipping, handling and placing need not be repaired in cases where the damaged area is 0.1 square inches or smaller. Repair damaged areas larger than 0.1 square inches with patching material conforming to ASTM A775 and in accordance with the material manufacturer's recommendations. The maximum amount of damage including repaired and unrepaired areas shall not exceed 2 percent of the surface area of each bar. Fading of the coating color will not be cause for rejection of epoxy-coated reinforcement.

3. Bar Mats:

a. Furnish and install bar mats for structural concrete Work where shown and/or noted on the Contract Drawings.

b. Bar mats shall be of the clipped type conforming to ASTM A184 and shall be fabricated from reinforcing bars that conform to the requirements of this Section.

1) Bar mats shall be fabricated from zinc-coated (galvanized) reinforcing bars. Metal clips shall be zinc-coated (galvanized). Non-metallic clips may be used. Coating damage at the clipped intersections shall be repaired in accordance with the requirements of this Section.

2) Bar mats shall be fabricated from epoxy-coated reinforcing bars. Metal clips shall be epoxy-coated. Non-metallic clips may be used. Coating damage at the clipped intersections shall be repaired in accordance with the requirements of this Section.

4. Wire:

a. Wire shall be smooth or deformed wire as indicated in the Contract Documents.

1) Smooth wire shall conform to ASTM A82.

2) Deformed wire shall conform to ASTM A496, size D4 and larger.

5. Welded Wire Fabric:

a. Welded wire fabric shall be fabricated from smooth or deformed wire and shall conform to the wire size and wire spacing required or indicated on the Contract Documents. Welded wire fabric shall conform to one of the following specifications:

1) Plain wire fabric ASTM 1064, except welded intersections shall be spaced not farther apart than 12 inches in the direction of the principal reinforcement.

2) Deformed wire fabric ASTM A497, except welded intersections shall be spaced not farther apart than 16 inches in the direction of the principal reinforcement.

6. Spirals:

a. As indicated in the Contract Documents, spirals shall be fabricated from reinforcing bars or wire.

B. Wire Bar Supports

1. Unless noted otherwise on the Contract Drawings, wire bar supports shall be in accordance with Class 1, maximum protection or Class 2, moderate protection in Chapter 3 of CRSI DA4.

C. Coated Wire Reinforcement Supports

1. Epoxy-Coated Reinforcement:

a. Use wire reinforcement supports coated with dielectric material including epoxy or other polymer for a minimum distance of 2 inches from the point of contact with epoxy-coated reinforcement.

2. Zinc-Coated Reinforcement:

a. Use galvanized wire reinforcements supports or wire reinforcement supports coated with dielectric material with zinc-coated reinforcement.

D. Precast Concrete Reinforcement Supports

1. Concrete supports used for supporting reinforcement shall be not less than 4 inches square having a compressive strength equal to or greater than the specified compressive strength of the concrete being placed.

E. Dowel Adhesive System

1. Where shown on the Contract Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.

2. The embedment depth of the bar shall be per manufacturer's recommendations, so as to provide a minimum allowable bond strength that is equal to 125 percent of the yield strength of the bar, unless noted otherwise on the Contract Drawings.

3. The adhesive system shall be as specified in this Section:

4. The Engineer's approval is required for use of this system in locations other than those shown on the Contract Drawings.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Welding

1. When required or permitted, all welding of reinforcing bars shall conform to ANSI/AWS D1.4. Unless otherwise permitted by the Engineer, welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.

2. Welding of wire to wire, and of wire or welded wire fabric to reinforcing bars or structural steels, shall conform to applicable provisions of ANSI/AWS D1.4 and any supplementary requirements specified by the Supervising Engineer for Concrete Construction for the particular application.

3. After completion of welding on zinc-coated (galvanized) or epoxy-coated reinforcing bars, coating damage shall be repaired in accordance with the requirements of this Section. All welds and all steel splice members when

used to splice bars shall be coated with the same material used for repair of coating damage.

B. Fabrication

1. All reinforcement shall be bent cold unless otherwise permitted by the Engineer.

2. Fabricating and Placing Tolerances:

3. Reinforcing bars shall be fabricated in accordance with the standard fabricating tolerances in Figures 4 and 5 of ACI 315. Tolerances shall not permit a reduction in cover.

4. Placing Tolerances for Reinforcement:

Item	Tolerances, Inches
1. Clear distance: a. To formed soffit b. To other formed surfaces	 -1/4 ±1/4
2. Minimum spacing between bars:	-1/4
3. Clear distance from unformed surface to top reinforcement: a. Members 8 inches deep or less b. Members more than 8 inches deep but less than 24 inches deep c. Members 24 inches deep or greater	 ±1/4 -1/4, +1/2 1/4, +1
4. Uniform spacing of bars, but the required number of bars shall not be reduced:	±2
5. Uniform spacing of stirrups and ties, but the number of stirrups and ties shall not be reduced:	±1
6. Longitudinal locations of bends◦ and ends of reinforcement: a. General b. Discontinuous ends of members	 ±2 ±1/2
7. Length of bar laps:	1-1/2
8. Embedded length: a. For bar sizes No. 3 through 11 b. For bar sizes No. 14 and 18	 -1 -2

5. When it is necessary to move bars to avoid interference with other reinforcement, conduits or embedded items exceeding the specified placing tolerances, the resulting arrangement of bars shall be subject to approval of the Engineer.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Testing

1. The Contractor shall provide samples from each load of reinforcing steel delivered in a quantity as directed by the Engineer for testing.

2. In addition,, the Contractor shall provide samples of each type of welded splice used in the work in a quantity and of dimensions as directed by the Engineer for testing. At the discretion of the Engineer, radiographic testing of direct butt-welded splices will be performed. The Contractor shall provide assistance necessary to facilitate testing. The Contractor shall repair any weld which fails to meet the requirements of AWS D1.4.

3. The testing will be performed by QA/QC consultant employed and paid by the City to ensure that reinforcing steel and welded splice comply with the technical requirements of the Contract.

4. The Contractor shall be charged by the City for the cost of any additional tests and investigation on work performed which does not meet the specifications.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Placing

1. Minimum concrete cover to reinforcement, shall be as indicated on the Contract Documents.

2. For bundled bars, minimum concrete cover shall be equal to the equivalent diameter of the bundles but need not be greater than 2 inches; except for concrete deposited against and permanently in contact with ground, minimum cover shall be 3 inches. The equivalent diameter of the bundle shall be based on a single bar of a diameter derived from the equivalent total area.

3. Unless otherwise indicated on the Contract Documents, reinforcement supported from the ground or mud mat shall rest on precast concrete blocks not less than 4 inches square and having a compressive strength equal to or greater than the specific compressive strength of the concrete being placed. Other means of support may be used if accepted by the Engineer.

4. Reinforcement supported from formwork shall rest on bar supports made of concrete, metal, plastic or other acceptable materials. Where the concrete surface will be exposed to the weather in the finished structure,

the portions of all bar supports within 1/2 inch of the concrete surface shall be non-corrosive or protected against corrosion.

5. Zinc-coated (galvanized) reinforcing bars supported from formwork shall rest on galvanized wire bar supports coated with dielectric material or on bar supports made of dielectric material or other acceptable materials. All other reinforcement and embedded steel items in contact with galvanized reinforcing bars or within a minimum clear distance of 2 inches from galvanized reinforcing bars unless otherwise required or permitted shall be galvanized.

6. Epoxy-coated reinforcing bars supported from formwork shall rest on coated wire bar supports or on bar supports made of dielectric material or other acceptable materials. Wire bar supports shall be coated with dielectric material for a minimum distance of 2 inches from the point of contact with the epoxy-coated reinforcing bars. Reinforcing bars used as support bars shall be epoxy coated. In walls having epoxy-coated reinforcing bars, spreader bars, where specified, shall be epoxy coated. Proprietary combination bar clips and spreaders used in wall with epoxy-coated reinforcing bars shall be made of corrosion-resistant material or coated with dielectric material.

7. Zinc-coated (galvanized) reinforcing bars shall be fastened with zinc-coated tie wire or non-metallic-coated tie wire or other acceptable materials.

8. Epoxy-coated reinforcing bars shall be fastened with nylon-epoxy or plastic-coated tie wire; or other acceptable materials.

9. Welded wire fabric for slabs on grade shall extend to within 2 inches of the concrete edge. Welded wire fabric may extend through the contraction joints. Welded wire fabric shall be adequately supported during placing of concrete to assure proper positioning in the slab.

10. Bending or straightening of bars partially embedded in concrete shall not be permitted except when specifically approved by the Engineer. Bending and preheating shall be in accordance with the requirements of this Section.

B. Bending of Bars

1. Minimum Inside Bend Diameters:

a. The minimum inside bend diameters shall conform to the following requirements unless otherwise permitted by the Engineer.

Bar Size	Minimum Diameter
No. 3 through 8	6 bar diameters
No. 9, 10, 11	8 bar diameters

Bar Size	Minimum Diameter
No. 14 and 18	10 bar diameters

2. The beginning of the bend shall not be closer to the concrete surface than the minimum diameter of bend. Preheating, if required, shall be in accordance with the requirements of the Section. The following requirements shall be adhered to for individual bar sizes:

Bar Size	BEND REQUIREMENTS
No. 3 through No. 5	Bars may be cold bent the first time. Cold bend bars only when temperature is above 32 degrees Fahrenheit. Preheating is required for subsequent straightening or bending.
No. 6 and larger	Preheating is required.

3. When zinc-coated (galvanized) or epoxy-coated reinforcing bars are field bent, coating damage shall be repaired in accordance with the applicable requirements of the Section.

C. Preheating of Bars

1. Preheating prior to bending or straightening, when required and approved by the Engineer, shall be in accordance with the following requirements:

   a. The preheat shall be applied to a length of bar equal to at least 5 bar diameters each way from the center of the bend except that preheat shall not extend below the surface of the concrete. The temperature of the bar at the concrete interface shall not exceed 500 degrees Fahrenheit.

   b. The preheat temperature shall be 1100 to 1200 degrees Fahrenheit.

   c. The preheat temperature shall be maintained until bending or straightening is complete.

   d. The preheat temperature shall be measured by temperature measurement crayons, contact pyrometer or other acceptable method.

   e. Heated bars shall not be artificially cooled until the material temperature is less than 600 degrees Fahrenheit.

2. Preheating may be applied by any method which does not harm the bar material or cause damage to the concrete.

D. Splicing

1. Reinforcing bar splices shall only be used at locations shown on the Contract Drawings. When it is necessary to splice reinforcing at points other than where shown, the character of the splice shall be approved by the Engineer.
2. The length of lap for reinforcing bars, unless otherwise shown on the Contract Drawings shall be in accordance with ACI 318 for a class B splice.
3. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
4. Mechanical and welded splices shall be used only where shown on the Contract Drawings or when approved by the Engineer.
5. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as shown on the Contract Drawings. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an 0-ring seal.

E. Dowel Adhesive System Installation

1. The installation of the dowels shall be done in strict conformance with the manufacturer's recommendations. The dowels shall be supported in the correct position until the adhesive sets and gains enough strength to prevent any dislocation.
2. At least 25 percent of the dowels to be installed shall be proof tested to 1.33 times the allowable load specified by the manufacturer of the adhesive-injection system.
3. If the dowels are required to have a hook at the end to be embedded in the new work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate the testing.

F. Miscellaneous Installation Requirements

1. Exposed Reinforcement:
    a. Reinforcement left exposed for the bonding of future construction shall be effectively protected from corrosion by encasement in cement mortar or by other temporary covering as approved by the Engineer.
2. Field Cutting of Reinforcement:

a. Reinforcement shall not be cut in the field except when specifically permitted by the Engineer in writing.

3. Reinforcement Through Expansion Joint:

a. Reinforcement or other embedded metal items bonded to the concrete shall not be continuous through any joint intended as an expansion joint. Dowels bonded on only one side of a joint and waterstops may extend through the joint.

3.03 FIELD TESTING / QUALITY CONTROL

A. Inspection

1. No concrete shall be deposited until the Engineer has inspected the placing of the reinforcing steel and has given permission to place the concrete. Concrete placed in violation of this provision may be rejected with subsequent removal by the Contractor.

2. The Contractor shall advise the Engineer of his intentions to place concrete and shall allow him adequate time to inspect all reinforcing steel before concrete is placed.

3. The Contractor shall advise the Engineer of his intentions to place grout in masonry walls and shall allow him adequate time to inspect all reinforcing steel before grout is placed.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 03 31 29 – MARINE CONCRETE
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Work specified in this Section consists of providing all labor, materials, equipment, supervising, testing and incidentals necessary to furnish and install Marine cast-in-place concrete as indicated on the Contract Drawings and as specified herein. For spall repairs, the Contractor may submit cementitious non-shrink underwater grout or shotcrete in lieu of concrete for approval. See Specifications 03 01 30.71 and 03 37 13 for details. Unless otherwise specified, work must be in accordance with ACI 301, Specifications for Concrete Construction.

B. The following index of this Section is presented for convenience:

C.

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1.02 PAYMENT

A. See Section 1.02 of Specification 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete.

1.03 RELATED SECTIONS

A. Section 02 41 10 - Demolition and Removals

B. Section 03 37 13- Shotcrete

C. Section 03 01 30.71 - Rehabilitation of Cast-in-Place Concrete

D. Section 03 10 00 - Concrete Forming and Accessories

1.04 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. American Concrete Institute (ACI):

1. ACI 117 - Specification for Tolerances for Concrete Construction Materials.
2. ACI 301 - Specifications for Concrete Construction.
3. ACI 305.1 - Specification for Hot Weather Concreting.
4. ACI 306.1 - Standard Specification for Cold Weather Concreting.
5. ACI 308.1 - Specification for Curing Concrete.
6. CP-1 - Technical Workbook for ACI Certification of Concrete Field Testing Technician – Grade 1.

2. ASTM International (ASTM):

1. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
2. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
3. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
5. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
6. ASTM C138/C138M - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
7. ASTM C150/C150M - Standard Specification for Portland Cement.
8. ASTM C157/C157M - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
9. ASTM C231/C231M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

10. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.
11. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
12. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements.
13. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
14. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
15. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete.
16. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars.
17. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
18. ASTM C1074 - Standard Practice for Estimating Concrete Strength by the Maturity Method.
19. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
20. ASTM C1218/C1218M - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
21. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
22. ASTM C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
23. ASTM C1293 - Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
24. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).

25. ASTM C1581/C1581M - Standard Test Method for Determining Age at Cracking and Induced Tensile Stress Characteristics of Mortar and Concrete under Restrained Shrinkage.

26. ASTM C1582/C1582M - Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete.

27. ASTM C1583/C1583M - Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).

28. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

29. ASTM C1610/C1610M - Standard Test Method for Static Segregation of Self-Consolidating Concrete Using Column Technique.

30. ASTM C1611/C1611M - Standard Test Method for Slump Flow of Self-Consolidating Concrete.

31. ASTM C1621/C1621M - Standard Test Method for Passing Ability of Self-Consolidating Concrete by J-Ring.

32. ASTM D4791 - Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

33. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

3. International Concrete Repair Institute (ICRI): PC1-10, Concrete Surface Profile Chip Set.

4. National Ready Mixed Concrete Association (NRMCA).

B. Definitions

1. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

2. Cold Weather: When ambient temperature is below 40 degrees F or is approaching 40 degrees F and falling.

3. Defective Area:

1. Surface defects that include honeycomb, rock pockets, indentations, and surface voids greater than 3/16-inch deep, surface voids greater than 3/4-inch in diameter, and cracks that are 0.010-inch wide and wider, spalls, chips, embedded debris, sand streaks, mortar leakage from form joints, deviations in formed surface that exceed specified tolerances and include but are not limited to fins, form pop-outs, and other projections.
2. At exposed concrete, defective areas also include texture irregularities, stains, and other color variations that cannot be removed by cleaning.
3. Any deviations from the contract documents determined by the engineer to affect the longevity, durability, or structural integrity of the concrete.

4. Exposed Concrete: Concrete surface that can be seen inside or outside of structure regardless of whether concrete is above water, dry at all times, or can be seen when structure is drained. Surfaces must be considered exposed concrete, even if covered by paint, sealers, or similar applications.
5. Flat and Elongated Particles of Aggregates: Those particles having a ratio of length to thickness greater than a 5 to 1.
6. Hot Weather: As defined in ACI 305.1.
7. Marine Concrete: Concrete indicated as such in Contract Documents that is typically exposed to salt spray or salt fog, in contact with, or submerged in salt water or brackish water where high density, low permeability, and low shrinkage is desired. Requires special care in selection of concrete materials, placing and finishing in order to obtain the desired performance.
8. New Concrete: Less than 60 days old.

1.05 DESCRIPTION

A. This Section specifies requirements for the production, transportation, placement, testing, and curing of Marine Concrete.

B. Contractor shall provide all labor, materials, tools, and equipment required for the completion of the following Work, as shown on the Contract Documents and specified herein:

1. Prepare existing areas, as defined by these specifications and related Contract Drawings, designated to receive concrete encasements.
2. Furnish, transport, place, and consolidate all concrete
3. Design, furnish, fabricate, install, and remove, when called for, all formwork, shores, and bracing
4. Furnish, fabricate, and install all reinforcing steel and all necessary supports for reinforcing steel

5. Prepare fabrication and placement shop drawings listed below
6. Prepare design drawings for formwork, shores, and bracing as specified herein
7. Coordinate testing services
8. Furnish all submittals required by this Section of the Specifications
9. Coordinate all work with other trades on site.

1.06 QUALITY ASSURANCE

A. The Contractor shall be responsible for the quality of the marine concrete and marine concrete construction. Quality of marine concrete will be evaluated by the Resident Engineer, based on conformance with the requirements of this Section.

B. The Contractor shall provide labor and means for obtaining all samples of concrete required for tests and for curing and protecting concrete cylinders at the construction site.

C. 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.

1. Testing agencies that perform testing services on concrete shall meet the requirements of ASTM E 329 and be licensed by the New York City Department of Buildings.
2. Testing laboratory shall have been inspected within the last 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.
3. Testing and inspection shall be conducted in accordance with the requirements of ASTM C 1077 and other applicable standards.
4. Prior to performing any Work, the qualifications of the proposed testing agency shall be submitted for review and acceptance by the DEP.
5. 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.

D. Qualifications:

1. Batch Plant: National Ready Mixed Concrete Association (NRMCA) Program for Certification of Ready-Mixed Concrete Production Facilities or approved equivalent program.

2. Mix Designer: Mix designs shall be prepared, signed and sealed by a Professional Engineer licensed in the State of New York and qualified in developing concrete mix designs.

3. Testing Agency: Unless otherwise permitted, an independent agency, qualified according to ASTM C1077 and ASTM E329 for testing indicated.

    1. Where field testing is required of Contractor, personnel conducting field tests must be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

    2. Personnel performing laboratory tests must be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor must be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

1.07 SUBMITTALS

A. Action Submittals:

1. Mix Designs:

a. Contain proportions of materials and admixtures to be used on Project, signed by mix designer.

b. Documentation of average strength for each proposed mix design in accordance with ACI 301.

c. Manufacturer's Certificate of Compliance, for the following:

1) Portland cement.

2) Blended cement.

3) Fly ash.

4) Slag cement.

5) Silica fume.

6) Aggregates, including specified class designation for coarse aggregate.

7) Admixtures.

8) Concrete producer has verified compatibility of constituent materials in design mix.

d. Test Reports:

1) Cement: Chemical analysis report.

2) Supplementary Cementitious Materials: Chemical analysis report and report of other specified test analyses.

3) Aggregates:

a) Deleterious substances in fine aggregate per ASTM C33/C33M, Table 2.

b) Deleterious substances in coarse aggregate per ASTM C33/C33M, Table 4.

c) Combined gradation for coarse and fine aggregates. List gradings and percent passing through each sieve.

2. Water-Soluble Chloride-Ion Content in Hardened Concrete:

   a. One of the following:

      1) Test report in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.

      2) Calculation of water-soluble chloride content based on certified chloride content of each constituent material and proportion of constituent material in concrete mixture.

3. Shrinkage Test Results: In accordance with ASTM C157/C157M as modified herein.

4. Resistance to Alkali Silica Reaction: Supporting information for one of the options for mitigating alkali silica reaction listed in Article Concrete Mix Design. Include documentation of test results per applicable standards.

5. Product Data:

   a. Admixtures:

      1) Manufacturer's catalog cut sheets and product data sheets for each admixture used in proposed mix designs.

6. Detailed plan for curing and protection of concrete placed and cured in cold weather. Details must include, but not be limited to, the following:

   a. Procedures for protecting subgrade from frost and accumulation of ice or snow on reinforcement, other metallic embeds, and forms prior to placement.

   b. Procedures for measuring and recording temperatures of reinforcement and other embedded items prior to concrete placement.

   c. Methods for temperature protection during placement.

   d. Types of covering, insulation, housing, or heating to be provided.

   e. Curing methods to be used during and following protection period.

   f. Methods for verification of in-place strength.

   g. Procedures for measuring and recording concrete temperatures.

   h. Procedures for preventing drying during dry, windy conditions.

7. Detailed plan for hot weather placements including curing and protection for concrete placed in ambient temperatures over 80 degrees F. Plan must include, but not be limited to, the following:
    a. Procedures for measuring and recording temperatures of reinforcement and other embedded items prior to concrete placement.
    b. Use of retarding admixture.
    c. Methods for controlling temperature of reinforcement and other embedded items and concrete materials before and during placement.
    d. Types of shading and wind protection to be provided.
    e. Curing methods, including use of evaporation retardant.
    f. Procedures for measuring and recording concrete temperatures.
    g. Procedures for preventing drying during dry, windy conditions.

B. Informational Submittals:

1. Manufacturer's application instructions for bonding agent.

1. Manufacturer's Certificate of Compliance to specified standards:
    a. Bonding agent.
    b. Repair materials.
    c. Bond breaker.
2. Statement of Qualification:
    a. Batch Plant: Certification as specified herein.
    b. Mix designer.
    c. Installer.
    d. Testing agency.
3. Field test reports.
4. Cold/Hot weather work plan
5. Concrete Delivery Tickets:
    a. For each batch of concrete before unloading at Site.
    b. In accordance with ASTM C94/C94M, including requirements 14.2.1 through 14.2.10.
    c. Indicate amount of mixing water withheld and maximum amount that may be permitted to be added at Site.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Unless otherwise specified, Work must be in accordance with ACI 301.

2.02 MATERIALS / EQUIPMENT

A. Cementitious Materials:

1. Cement:

1. Portland Cement: Unless otherwise specified, conform to requirements of ASTM C150/C150M Type II.

2. Blended Hydraulic Cement:

a. Unless otherwise specified, excluding Type IS(MS) (greater than 70), conforming to ASTM C595/C595M.

3. Furnish from one source.

2. Supplementary Cementitious Materials (SCM):

1. Fly Ash (Pozzolan): Class F and Class C fly ash in accordance with ASTM C618, except as modified herein:

a. When air-entrainment is specified, fly ash shall comply with uniformity requirements of Table 3 of ASTM C618.

b. Loss on Ignition: Unless permitted otherwise, maximum 3 percent.

2. Silica Fume: In accordance with ASTM C1240.

B. Aggregates: Furnish from one quarry location for each aggregate type used in a mix design.

1. Aggregates:

1. In accordance with ACI 301, except as modified herein.

2. Free of materials and aggregate types causing popouts, discoloration, staining, or other defects on surface of concrete.

3. Aggregates that are susceptible to alkali-carbonate reactions shall not be used.
4. Resistance to Alkali Silica Reaction: See Article Concrete Mix Design.

2. Fine Aggregates:
   1. In accordance with ACI 301, except as modified herein.
   2. In the event manufactured sand is included in mix design, material must be from same source as coarse aggregate.
   3. Limit deleterious substances in accordance with ASTM C33/C33M, Table 2 and as follows:
      a. Limit material finer than 75-µm (No. 200) sieve to 3 percent mass of total sample.
      b. Limit coal and lignite to 1.0 percent.
3. Coarse Aggregate:
   1. Crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles as determined by ASTM D4791.
   2. Class designation in accordance with ASTM C33/C33M, Table 3: Type 4S unless otherwise specified.
   3. Limit deleterious substances in accordance with ASTM C33/C33M, Table 4 for specified class designation.
4. Characteristics:
   1. Compatible with other constituents in mix.
   2. Contain at most, only trace amount chlorides in solution.
   3. Furnish type of admixture as recommended by manufacturer for anticipated temperature ranges.
   4. Do not use calcium chloride admixtures.
5. Air-entraining Admixture: ASTM C260/C260M.
6. Water-reducing Admixture: ASTM C494/C494M, Type A or Type D.
7. Retarding Admixture: ASTM C494/C494M, Type B.
8. Accelerating Admixture: ASTM C494/C494M, Type C.
9. Do not use calcium chloride as an admixture.
10. High Range Water-reducing Admixture: ASTM C494/C494M, Type G.
11. Viscosity Modifying Admixture (VMA): ASTM C494/C494M, Type S.
12. Corrosion Inhibiting Admixtures: ASTM C1582/C1582M.

1. Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494, Type C.
2. Dosage rate 5 gallons per CY.

13. Antiwashout Admixture for Tremie Concrete:
    1. Specially developed to prevent cement washout of concrete placed under water.

C. Water and Ice: Mixing water for concrete and water used to make ice must be potable water, unless alternative sources of water are permitted.
1. Water from alternative sources must comply with requirements of ASTM C1602/C1602M, and concentration of chemicals in combined mixing water must be less than:
    1. Chloride Content: 1000 ppm for reinforced concrete, 500 ppm for prestressed concrete.
    2. Sulfate Content as SO_4: 3,000 ppm.
    3. Alkalis as (Na_2O + 0.658 K_2O): 600 ppm.
    4. Total Solids by Mass: Less than 50,000 ppm.

D. Ancillary Materials
1. Bonding Agent:
    1. Unless otherwise specified, in accordance with the following:
        a) ASTM C881/C881M, Type V.
        b) Two-component, moisture insensitive, 100 percent solids epoxy.
        c) Consult manufacturer for surface finish, pot life, set time, vertical or horizontal application, and forming restrictions.
2. Bond Breaker:
    1. Nonstaining type, providing positive bond prevention.
    2. Manufacturers and Products:
        a. Dayton Superior Corporation, Miamisburg, OH; Sure Lift J6WB.
        b. Nox Crete Products Group, Omaha, NE; Silcoseal Select.
3. Repair Material:
    1. In accordance with requirements of Section 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. General:

1. See supplement at end of this section for mix design requirements for each class of concrete used on Project.
2. Unless otherwise specified, prepare design mixtures for each type and strength of concrete, in accordance with requirements of ACI 301.
3. Unless specified otherwise, selection of constituent materials and products in mix design are optional.
4. Use water-reducing admixture or water-reducing admixture and high-range water-reducing admixture for the following:
    1. Concrete mixtures that will be pumped.
    2. Concrete mixtures with a water-cementitious materials ratio below 0.50.
    3. Concrete mixtures used in elements of a liquid-containment structure.
    4. Concrete mixtures used in columns, piers, pilasters, and walls.
    5. When needed to achieve fresh properties that facilitate handling, placing, and consolidating of concrete mixtures, and to achieve specified hardened properties.
    6. When anticipated high temperatures, low humidity, or other adverse placement conditions can adversely affect fresh properties of concrete.
5. Unless otherwise specified, desired fresh properties of concrete must be determined by Contractor and coordinated with concrete producer. Fresh properties of concrete must remain stable to satisfaction of Contractor, for duration of placement and consolidation, and must remain in conformance with requirements of Contract Documents.
6. Concrete producer is encouraged to employ environmentally sustainable concrete mix design technologies such as supplementary cementitious materials and aggregate packing.

B. Proportions:

1. Concrete mixtures must meet specified aesthetic, durability, and strength requirements.
2. Where fly ash is included in mix, minimum fly ash content shall be 15 percent of weight of total cementitious materials.
3. Where silica fume is included in mix, minimum silica fume content shall be 5 percent of weight of total cementitious materials.

C. Resistance to Alkali-Silica Reaction:

1. Unless otherwise specified, or unless members are designated as being dry in service and not in contact with ground, or assigned to Exposure Class W0, use one of the three following options for qualifying concrete mixtures to reduce potential of alkali-silica reaction.
    1. For each aggregate used in concrete, expansion result determined in accordance with ASTM C1293 must not exceed 0.04 percent at 1 year.
    2. For each aggregate used in concrete, expansion result of aggregate and cementitious materials combination determined in accordance with ASTM C1567 must not exceed 0.10 percent at age of 16 days. Submit supporting data for each aggregate showing expansion in excess of 0.10 percent at 16 days when tested in accordance with ASTM C1260.
    3. Alkali content in concrete (LBA), excluding that from supplementary cementitious materials and the pozzolans and slags in blended cements, must not exceed 4 lb/yd^3 for aggregates with expansions more than or equal to 0.04 percent and less than 0.12 percent or 3 lb/yd^3 for aggregates with expansions greater than or equal to 0.12 percent and less than 0.24 percent. Reactivity must be determined by testing in accordance with ASTM C1293. Alkali content must be calculated as follows:
        a. LBA = (cement content, lb/yd^3) × (equivalent alkali content of portland cement in percent/100 percent).
2. Option 1.c. shall not be used with natural pozzolan or fly ash that has a CaO content greater than 18 percent, or for aggregate with expansion at 1 year greater than or equal to 0.24 percent when tested in accordance with ASTM C1293.
3. Fly ash with an alkali content greater than 4.0 percent shall not be used in options 1.b. or 1.c.

D. Concrete Shrinkage Limits:
1. If shrinkage limits are specified, design mix for the following shrinkage limits and test in accordance with ASTM C157/C157M, with the following modifications:
    1. Prisms must be moist cured for 7 days prior to 28-day drying period.
    2. Comparator reading at end of 7-day moist cure must be used as initial length in length change calculation.
    3. Reported results must be average of three prisms.
    4. If shrinkage of a specimen departs from average of that test age by more than 0.004 percent, disregard results obtained from that specimen.

5. Only 4-inch prisms shall be used.

2. Results at end of 28-day drying period must not exceed 0.040 percent if 3-inch prisms are used, or exceed 0.035 percent if 4-inch prisms are used.

E. Slump:

1. Unless otherwise specified, select a target slump at the point of delivery for concrete mixtures used for Work. Selected target slump shall not exceed 9 inches.

2. Concrete shall not show visible signs of segregation.

3. Target slump indicated on submittal shall be used as basis for acceptance during the Project.

4. Determine slump by ASTM C143/C143M.

5. Slump tolerances shall be in accordance with ACI 117.

F. Size of Coarse Aggregate:

1. Unless otherwise specified, nominal maximum size of coarse aggregate shall not exceed:

1. Three-fourths of minimum clear spacing between reinforcement.

2. One-fifth of narrowest dimension between sides of forms.

3. One-third of thickness of slabs or toppings.

G. Combined Aggregate Gradation:

1. Combined Gradation Limits: Fine aggregate must be in range of 36 percent to 40 percent of total aggregate weight.

H. Combined Gradation Limits:

1. Limits shown are for coarse aggregates and fine aggregates mixed together (combined).

Sieve Sizes	Combined Gradation Percentage Passing		
	1-1/2" Max.	**1" Max.**	**3/4" Max.**
2"	- 100	-	-
1-1/2"	95 - 100	- 100	-
1"	65 - 85	90 - 100	- 100
3/4"	55 - 75	70 - 90	92 - 100
1/2"	-	-	68 - 86
3/8"	40 - 55	45 - 65	57 - 74

Sieve Sizes	Combined Gradation Percentage Passing		
	1-1/2" Max.	1" Max.	3/4" Max.
No. 4	30 - 45	31 - 47	38 - 57

Sieve Sizes	Combined Gradation Percentage Passing		
	1-1/2" Max.	1" Max.	3/4" Max.
No. 8	23 - 38	23 - 40	28 - 46
No. 16	16 - 30	17 - 35	20 - 36
No. 30	10 - 20	10 - 23	14 - 25
No. 50	4 - 10	2 - 10	5 - 14
No. 100	0 - 3	0 - 3	0 - 5
No. 200	0 - 2	0 - 2	0 - 2

I. Concrete Mixing

1. General: Unless otherwise specified, in accordance with ACI 301.

2. Temperature Limits:

1. Maintain concrete temperature below 90 degrees F at time of placement, or furnish test data or other proof that admixtures and mix ingredients do not produce flash set plastic shrinkage, or cracking as a result of heat of hydration. Cool ingredients before mixing to maintain fresh concrete temperatures as specified or less

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Source Quality Control Inspection: Engineer must have access to and have right to inspect batch plants, cement mills, and supply facilities of suppliers, manufacturers, and Subcontractors, providing products included in this section.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. General: Unless otherwise specified, in accordance with ACI 301.

B. Preparation: In accordance with ACI 301 and the following:

1. Provide at least one standby vibrator in operable condition at Site prior to placing concrete.

C. Inspection: Notify Engineer and Special Inspector at least 1 full working day in advance before starting to place concrete.

3.02 APPLICATION

A. Placement of Concrete

1. Unless otherwise specified, in accordance with ACI 301.

2. Placement frequency must be such that lift lines will not be visible in exposed concrete finishes.

3. Retempering: Not permitted for concrete where cement has partially hydrated.

4. Pumping of Concrete: Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to ensure completion of concrete placement without cold joints in case of primary placing equipment breakdown.

5. Construction and Expansion Joints

    1. For each individual placement, no construction or expansion joints shall be permitted. Each placement shall be poured in a continuous manner from start to finish, unless otherwise approved by the Engineer.

B. Curing: Unless otherwise specified, in accordance with ACI 301.

3.03 FIELD TESTING / QUALITY CONTROL

A. Repairing Concrete

1. General:

    1. The Contractor shall be responsible for repair of defective areas of concrete.

    2. Defective areas shall be repaired as directed by the Resident Engineer.

    3. Repair of underdeck concrete shall be as specified in Section 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete.

2. Exposed Metal Objects:

    1. Remove metal objects not intended to be exposed in as-built condition of structure including wire, nails, and bolts, by chipping back concrete to depth of 1 inch and then cutting or removing metal object.

    2. Repair area of chipped-out concrete as specified for defective areas.

3. Blockouts at Pipes or Other Penetrations: Where shown install in accordance with requirements of Drawings.

B. Field Quality Control

    1. General:

        a. For field quality control requirements for underdeck repairs, see Sections 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete and 03 37 13 – Shotcrete.

        b. Unless otherwise specified herein, refer to ACI 301.

c. Field concrete testing services shall be provided by DEP. Contractor shall cooperate in providing access to the Work for any testing and inspection as required.

d. DEP shall employ one or more agencies to provide tests for concrete work during construction, as specified herein.

e. Testing agencies shall confirm to the requirements of ASTM E329. Agencies shall be identified to building official, for building official's approval.

f. Agencies shall disclose to DEP and registered design professional in responsible charge possible conflicts of interest so that objectivity can be confirmed.

g. The Contractor shall provide electrical and water services to area of site for safe storage and curing of concrete test specimens prior to transport of test specimens to testing lab.

h. The Contractor shall provide storage facility for proper curing of concrete test specimens onsite for first 24 hours, and for additional time as may be required before transporting to test lab.

i. Unless otherwise specified, concrete will be sampled for making test specimens, from point of delivery.

j. Unless otherwise specified, sampled concrete used to mold strength test specimens (ASTM C31/C31M) will be tested for slump (ASTM C143/C143M) or slump flow (ASTM C1611/C1611M), air content (ASTM C231/ C231M), temperature (ASTM C1064/C1064M), and density (ASTM C138/ C138M).

k. Measured Air Content at Point of Delivery:

   a) When measured air content at point of delivery is greater than specified limit, a check test of air content will be performed immediately on a new sample from delivery unit. If check test fails, concrete has failed to meet requirements of Contract Documents.

   b) If measured air content is less than lower specified limit, adjustments will be permitted in accordance with ASTM C94/C94M, unless otherwise specified. If check test of adjusted mixture fails, concrete has failed to meet requirements of Contract Documents.

   c) Concrete that has failed to meet requirements of Contract Documents must be rejected.

l. If concrete is pumped, concrete will be sampled for air content testing at point of delivery and at point of placement.

a) For each concrete mixture that will be pumped, once two consecutive results of air content testing taken at the point of placement are within specified tolerances:

b) The average of the corresponding measured air content at point of delivery for the two consecutive test results, shall become the target air content.

c) Subsequent testing will be performed at point of placement based on the following criteria:

(1) Every 100 cubic yards of concrete placed by pumping.

(2) Every 4 hours minimum.

(3) When measured air content at point of delivery deviates from the target air content by an amount beyond the specified tolerance.

(4) When fresh characteristics of the concrete mixture at the point of placement is visibly different than what was observed when the two consecutive test results were measured.

(5) When required by Special Inspector or DEP.

m. Test specimens must be stored and cured in accordance with ASTM C31/C31M When fresh characteristics of the concrete mixture is visibly different at the point of placement is visibly different than what was observed when the two consecutive test results were measured

When fresh characteristics of the concrete mixture is visibly different at the point of placement is visibly different than what was observed when the two consecutive test results were measured.

n. Test specimens must be stored and cured in accordance with ASTM C31/C31M and tested in accordance with ASTM C39/C39M.

o. Frequency of testing may be changed at discretion of Special Inspector or DEP.

p. Evaluation and acceptance will be in accordance with ACI 301 and the Contract Documents.

2. Test specimens must be stored and cured in accordance with ASTM C31/C31M and tested in accordance with ASTM C39/C39M.

3. Frequency of testing may be changed at discretion of Special Inspector or DEP.

4. Evaluation and acceptance will be in accordance with ACI 301 and the Contract Documents.

C. Concrete Strength Test:

1. Unless otherwise specified, specimens will be made and tested as follows:

   a. One standard test specimen at age of 7 days for information.

   b. One standard test specimen at age of 14 days for information.

   c. A minimum of two standard test specimens at age of 28 days for acceptance.

   d. A minimum of one spare standard test specimen per sample.

2. Contractor shall provide for such additional testing of materials or concrete as may be required by their failure, as evidenced by test or inspection, to meet the requirements of this Section of the Specification.

3. Contractor shall provide for such additional testing and inspection services as may be required as a result of changes in materials or proportions requested by Contractor

4. Spare cylinder will be tested as directed by Engineer.

D. Hot and Cold Weather Procedures

1. The general requirements for hot and cold weather concreting, detailed in ACI 305R and ACI 306R, shall also apply to all work under this specification.

2. Cold weather is defined as a period when for three successive days the average daily outdoor temperature drops below 40° F. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight.

3. During periods of cold weather, protections must be taken in accordance with ACI 306R. Before performing any cold weather concreting, the contractor shall submit a plan as required by Section 1.08.B.5 of this specification.

4. No underwater concreting shall be performed if the water temperature drops below 35° F.

5. Maximum concrete temperature shall be limited to 90° F at the time of discharge.

E. Tolerances:

1. Concrete tolerances must comply with the more stringent of equipment manufacturers' tolerances and specified tolerances.

2. Formed Surfaces:
    1. Formed surface finishes must comply with specified requirements.
    2. Tolerances of formed surfaces must comply with specified requirements and with ACI 117 for cast-in-place concrete buildings.
3. Unformed Surfaces:
    1. Surface finishes must comply with specified requirements.
    2. Unless otherwise specified, tolerances for unformed surface must conform to requirements of ACI 117 for cast in place concrete buildings.
    3. Concrete slab tolerances must comply with specified requirements and with ACI 117 random traffic floor surface finish tolerances unless otherwise specified.
    4. Slab Elevation:
        a. Slabs must slope to drains.
        b. Top of concrete elevations must comply with specified requirements and ACI 117 for cast-in-place concrete buildings.
    5. Slab thickness tolerance must comply with specified requirements and ACI 117 for cast in place concrete buildings.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Protection of Insulated Work
    1. After curing as specified in Section 03 39 00 "Concrete Curing," and after applying final floor finish, cover slabs with plywood or particle board or plastic sheeting or other material to keep floor clean and protect it from material and damage as a result of other construction work.
    2. Repair areas damaged by construction, using specified repair materials and approved repair methods.

B. Supplements
    1. Requirements of concrete mix designs (CMD) following “End of Section,” are a part of this specification and supplement requirements of Part 1 through Part 3 of this section:
        a. CMD-1.

END OF SECTION

Concrete Mix Design
CMD-1

A. Mix Locations: Typical, unless otherwise specified.
B. Exposure Categories and Classifications: F3/S1/W2/C2 as defined in ACI 318-19.
C. Mix Properties:
    1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.40.
    2. Minimum concrete compressive strength (f'c) must be 5,000 psi at 28 days.
    3. Concrete mix must be designed to conform to shrinkage limits.
    4. Air-entraining admixtures are prohibited in concrete mixtures and total air content must not be greater than 3 percent, for the following:
        a. Slabs to receive a hard-troweled finish.
        b. Slabs to receive a dry shake floor hardener.
        c. Slabs to receive a topping placed monolithically as a two-course floor on top of plastic concrete.
    5. Unless otherwise specified, provide air content based on nominal maximum size of aggregate as follows:

Nominal Maximum Aggregate Size in. ‡	**Air Content (%)***
3/8	7.5
1/2	7.0
3/4	6.0
1	6.0
1-1/2	5.5
2§	5.0
3§	4.5

‡ See ASTM C33/C33M for tolerance on oversize for various nominal maximum size designations.
* Tolerance of air content is ±1-1/2 percent.
§ Air contents apply to total mixture. When testing concretes, however, aggregate particles larger than 1-1/2 inches are to be removed by sieving and air content will be measured on sieved fraction (tolerance on air content as delivered applies to this value). Air content of total mixture is computed from value measured on sieved fraction passing 1-1/2-inch sieve in accordance with ASTM C231/C231M.

    6. Limit supplementary cementitious materials as follows:

Limits on cementitious materials for concrete assigned to Exposure Class F3 ‡*	
Supplementary cementitious materials	**Maximum percent of total cementitious materials by mass**
Fly ash or natural pozzolans conforming to ASTM C618	25
Slag cement conforming to ASTM C989	50
Silica fume conforming to ASTM C1240	10
Total of fly ash or natural pozzolans and silica fume	35
Total of fly ash or natural pozzolans, slag cement, and silica fume	50

7. ‡ Supplementary cementitious materials, including fly ash and natural pozzolans, slag cement, and silica fume, used in the manufacture of ASTM C595 and C1157 blended cements shall be included in assessing compliance with these limits.
8. * The individual limits shall apply regardless of the number of cementitious materials in a concrete mixtures.

9. Provide cementitious materials in accordance with one of the following:
   a. ASTM C150/C150M Type II or Type V; inclusion of supplementary cementitious materials in design mix is optional.
   b. ASTM C150/C150M types other than Type II or Type V in accordance with the following:
      i. Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
   c. ASTM C595/C595M Types excluding Type IS (greater than 70), conforming to ASTM C595/C595M and having (MS) designation.
   d. ASTM C1157/C1157M having (MS) designation.
10. Limit water-soluble, chloride ion content in hardened concrete, percent by mass of cementitious materials to 0.15.
    a. Limits are stated in terms of water-soluble chloride ions (Cl^-) in percent by mass of cementitious materials.
11. Refer to PART 1 through PART 3 of this section for additional requirements.

SECTION 03 32 00 - JOINTS IN CONCRETE
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Work specified in this Section consists of providing all labor, materials, and incidentals necessary to furnish and install joints, joint materials, waterstops and embedded items as indicated on the Contract Drawings, specified herein and as needed for a complete installation.

B. Joints shall comply with the requirements of Section 03 10 00 - Concrete Forming and Accessories.

C. Types of joints in concrete shall be as follows:

1. Construction Joints - Joints between adjacent concrete placements continuously connected with reinforcement.

2. Control Joints - Joints formed in concrete to provide a weakened plane in the concrete section to control formation of shrinkage cracks.

3. Expansion Joints - Joints in concrete which allow thermal expansion and contraction of concrete. Reinforcement terminates within concrete on each side of joint.

D. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 10 00 - Concrete Forming and Accessories.

B. Section 03 31 29 - Marine Concrete.

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1. ASTM C 990 - Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

2. ASTM C 1016 - Test Method for Determination of Water Absorption of Sealant Backing (Joint Filler) Material.

3. ASTM D 545 - Test Methods for Preformed Expansion Joint Fillers for Concrete Construction (Nonextruding and Resilient Types).

4. ASTM D 994 - Preformed Expansion Joint Fillers for Concrete (Bituminous Type).

5. ASTM D 1190 - Concrete Joint Sealer, Hot-Applied Elastic Type.

6. ASTM D 1191 - Test Methods for Concrete Joint Sealers.

7. ASTM D 1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

8. ASTM D 1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

9. ASTM D 2835 - Lubricant for Installation of Preformed Compression Seals in Concrete Pavements.

10. ASTM D 5329 - Test Methods for Sealants and Fillers, Hot-Applied, For Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.

11. ASTM D 5973 - Elastomeric Strip Seals with Steel Locking Edge Rails Used in Expansion Joint Sealing.

12. ASTM D 5898 - Guide for Standard Details for Adhered Sheet Waterproofing.
13. ASTM E 1612 - Preformed Architectural Compression Seals for Buildings and Parking Structures.
14. ASTM E 1783 - Preformed Architectural Strip Seals for Buildings and Parking Structures.
15. ASTM F 1123 - Non-Metallic Expansion Joints.
16. ACI 318 - Building Code Requirements for Structural Concrete.
17. ISO 14025 - Environmental labels and declarations - Type III environmental declarations
18. New York City Building Code.
19. NYC Department of Transportation, Standard Highway Specifications.
20. U.S. Army Corps of Engineers Specifications for Polyvinyl Chloride Waterstops, CRD-C572.

1.05 DESCRIPTION

A. The Contractor shall install joint material per the construction schedule submitted to and approved by the Engineer in a sequence and manner that will not damage the Work.

1.06 QUALITY ASSURANCE

A. Reviews of Shop Drawings shall be obtained before custom fabrication is started and before delivery of materials to the project site.

B. Work of this Section shall be coordinated with the work of other trades so that construction is not delayed.

C. Joint installation procedures and health and safety of the work force shall be the responsibility of the Contractor. The requirements of authorities having jurisdiction shall be complied with.

D. The final responsibility for constructing a watertight condition at expansion joints and construction joints remains with the Contractor as part of the Work under this Contract. Errors of detailing and fabrication and for the correct fit of the work shall be the responsibility of the Contractor.

E. Defective Work, as determined by the Engineer, shall be remedied by cutting and rebuilding the concrete walls and slabs, replacing the waterstop assemblies or other methods as approved by the Engineer.

1.07 SUBMITTALS

A. Contractor shall submit Shop drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Information as shown on the Contract Drawings and at the site, where necessary.

2. Sizes, sections, reinforcement and dimension of units, the jointing, dowels, anchors, etc., and all other necessary details.

3. Installation of joints, including various connections, anchorage details, special jointing, the Contractor's proposed construction and control joints, and other accessories as required to complete the work.

4. Prior to installation, the Contractor shall submit layout drawings for approval. The drawings shall include elevations, sections, etc., and all details to show that a continuous watertight installation is provided.

B. Manufacturer's specifications and installation instructions for each type of required joint and accessory shall be submitted. These include expansion joint fillers, expansion joint sealers, waterstops, shapes of waterstops, chemical retarders, adhesives, sleeves, inserts, anchors, embedded items, and similar items.

C. The Contractor shall submit to the Engineer one sample of each type of waterstop. Each sample shall include a splice.

D. Method to be used to roughen construction joints and achieve bond including product identification as applicable.

E. Applicator's Qualifications.

F. Proof of satisfactory field service of sealants.

G. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in an undamaged condition and at such intervals as will avoid delay in the Work.

B. Materials shall be stored and protected in a clean, properly drained location and shall be kept off the ground under a weather-tight covering permitting good air circulation. Materials shall be stored on dry wood sleepers, pallets, platforms or other appropriate supports which have slope for positive drainage. Materials shall be protected from distortion, excessive stresses, corrosion and other damage. Materials shall not be stored on the structure in a manner that might cause distortion or damage to the supporting structure. The maximum uniform distributed storage load shall not exceed 20 pounds per square foot.

C. Materials shall be protected before, during and after installation to ensure acceptable finished Work. In-place materials and other Work in connection with the joint installations shall be protected.

D. Material shall be handled safely in a manner that will prevent distortion or other damage. Care shall be exercised at all times to avoid damage through careless handling during unloading, storing and installing.

E. In the event of damage to the Work, necessary repairs or replacements shall be performed until satisfactory work is met at no expense to the City.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Concrete Bonding Agent

1. The concrete bonding agent shall be:

a. Corr-Bond, as manufactured by Euclid Chemical, East Brunswick, NJ.

b. Armatec 110, as manufactured by Sika Chemical Company, Lyndhurst, NJ

c. Or approved equal

B. Expansion joint fillers (Type I) shall be:

1. Type FF-7 cross-linked, closed cell polyethylene, as manufactured by Progress Unlimited Inc., Lynbrook, NY.

2. Type W, cross-linked, closed cell polyethylene, as manufactured by Hydrozo/Jeene, Inc, Lincoln, NE.

3. Or approved equal

C. Joint Sealants:

1. Type A shall be
    a. Sikaflex-2C NS/SL as manufactured by Sika Corporation, Lyndhurst, NY.
    b. Sonolastic SL-1, as manufactured by Sonneborn/Master Business Solution, Parsippany, NJ.,
    c. Permapol RC-270 Resevoir Sealant, as manufactured by Products Research and Chemical Company, (now is Courtaulds, PLC,) London W1A2BB, England.
    d. Or approved equal.
2. Type B shall be
    a. Magnum NS-100, as manufactured by Tamms Industries, Kirkland, IL.
    b. Sikaflex 1A, Sika Corporation, Lyndhurst, NY.
    c. Or approved equal.
3. Type C shall be
    a. Sonolastic Two-part, as manufactured by Sonneborn/Master Business Solution, Parsippany, NJ.
    b. Hornflex-L, as manufactured by Tamms Industries, Kirkland, IL.
    c. Cormax PSC, as manufactured by DuPont, (Multiple locations in USA).
    d. Or approved equal.

D. PVC waterstops shall be:
1. Model 679 for construction joints and Model 738 for expansion joints, as manufactured by Greenstreak/Sika Corp USA, Lyndhurst, NJ.
2. Or approved equal.

E. Hydrophilic Rubber Waterstops shall be:
1. Duroseal Gasket, Type 2010, as manufactured by BBZ USA, Inc, St. Louis, MO
2. Adeka Ultraseal MC-2010M, as manufactured by Asahi Denka Kogyo KK, Japan
3. Or approved equal.

F. Hydrophilic Sealant shall be:
1. Duroseal Paste, by BBZ USA, Inc, St. Louis, MO.
2. Adeka Ultraseal P-201, by Asahi Denka Kogyo K.K, Japan.
3. Sika Swell S, by Sika Corporation, Lyndhurst, NJ.

4. Or approved equal.

G. Hydrophilic Injection Resin shall be:

1. Duroseal Inject 1K/2K, by BBZ, USA, Inc., St. Louis, MO.
2. Sika Injection 29 by Sika Corporation, Lyndhurst, NJ.
3. Or approved equal.

H. Injection Hose Waterstops shall be:

1. Fuko Injection System, as manufactured by BBZ USA Inc., St. Louis, MO.
2. Sika Swell Hose as manufactured by Sika Corporation, Lyndhurst, NJ.
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

1. Concrete Bonding Agent

a. The concrete bonding agent product and manufacturer shall be as specified in this Section.

b. Surface preparation, application and curing shall be performed in strict accordance with the manufacturer's directions.

B. Performed Expansion Joint Filler

1. Preformed expansion joint filler shall be nonextruding, and shall be of the following types:

a. Type I Sponge Rubber, conforming to ASTM D 1752, Type I.

b. Type II Cork, Conforming to ASTM Designation D 1752, Type II.

c. Type III Self-expanding cork, conforming to ASTM Designation D 1752, Type III.

d. Type IV Bituminous Fiber, conforming to ASTM Designation D 1751.

2. Expansion joint fillers (Type I) product and manufacturer shall be as specified in this Section.

3. Unless otherwise specified, Type II and Type III shall conform to the requirements of the Standard Highway Specifications of the NYC Department of Transportation..

4. Asphaltic blown joint filler for sealing joints over Type IV preformed joint filler shall comply with the requirements of Section 2.16 of the Standard Highway Specifications of the NYC Department of Transportation.

C. Joint Sealants

1. Type A: Multi-component, non-sag, low-modulus polyurethane rubber sealant meeting ASTM C 920, Type M, Grade NS, Class 25, use NT, M, A,

and O Capable of withstanding 50% in extension or compression shall be as specified in this Section

2. Type B: Single component polyurethane sealant meeting ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, A, and O, capable of withstanding 25% in extension or compression shall be as specified in this Section.

3. Type C: Multi-component chemical resistant polysulfide sealant conforming to ASTM C 920, Type M, Grade NS, Class 25 shall be as specified in this Section

D. Backer Rod

1. Backer rod shall be an extruded closed-cell polyethylene foam rod. The material shall be compatible with the sealant material used and shall have a tensile strength of not less than 40 psi and a compression deflection of approximately 25 percent at 8 psi. The rod shall be 1/8-inch larger in diameter than the joint width at joints less than 3/4-inch wide and 1/4-inch larger in diameter at joints 3/4-inch end wider.

E. PVC Waterstops

1. PVC waterstops shall be manufactured from virgin polyvinylchloride and shall meet or exceed all requirements set forth in the U.S. Army Corps of Engineers Specification CRD C 572.

2. All PVC waterstops shall be of polyvinylchloride extruded from an elastomeric plastic compound of which the basis resin shall be polyvinylchloride. The compound shall contain any additional resins, plasticizers, stabilizers or other materials needed to ensure qualities which will meet the requirements herein specified.

3. The required minimum physical characteristics for this material are:

   a. Tensile strength 1,750 psi

   b. Ultimate elongation not less than 280%.

4. No reclaimed PVC materials shall be used for manufacture of the waterstops. The Contractor shall furnish certification that the proposed waterstops meet the above requirements.

5. PVC waterstops for construction joints shall be flat ribbed type, 6 inches wide unless otherwise shown on the Contract Drawings, with a minimum thickness at any point of 3/8 inches.

6. PVC waterstops for expansion joints shall be ribbed with a center bulb, 9 inches wide with a minimum thickness at any point of 3/8 inches. The center bulb shall have an O.D. not less than 1-3/8 inches.

7. All PVC waterstops shall have an integral fastening system consisting of hog rings and grommets.

8. PVC waterstops product and manufacturer shall be as specified in this Section.

F. Hydrophilic Rubber Waterstop

1. Hydrophilic rubber waterstop materials shall be bentonite-free and shall expand by a minimum of 80 percent of dry volume in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast. For location, see the Contract Drawings.

2. The material shall be composed of resins and polymers which absorb water and cause an increase in volume in a completely reversible and repeatable process. The waterstop material shall be dimensionally stable after repeated wet-dry cycles with no deterioration of swelling potential.

3. Hydrophilic rubber waterstop shall be solid rectangular shape with minimum cross sectional dimensions of 3/8-inch by 3/4-inch.

4. Hydrophilic Rubber Waterstops product and manufacturer shall be as specified in this Section.

G. Hydrophilic Sealant

1. The Hydrophilic Sealants shall adhere firmly to concrete, metal and PVC in dry or damp conditions. When cured, it shall be elastic indefinitely.

2. Hydrophilic Sealants product and manufacturer shall be as specified in this Section.

H. Hydrophilic Injection Resin

1. Hydrophilic injection resin shall be acrylate-ester based. Its viscosity shall be less than 50 cps. It shall be water soluble in its uncured state, solvent free, and non-water reactive. In the cured state, it shall form a solid hydrophilic flexible material which is resistant to permanent water pressure and shall not attack bitumen, joint sealants or concrete.

2. Hydrophilic Injection Resin product and manufacturer shall be as specified in this Section.

I. Injection Hose Water Stop

1. Injection hose shall consist of a PVC or neoprene central core of sufficient strength to resist the weight of a minimum of 25 feet of fresh concrete placed upon it. Injection openings shall be provided closely spaced along the length of the hose and in a minimum of three (3) locations equally spaced around the perimeter of the hose. The openings shall be sealed by strips of closed cell foam of a consistency to act as one-way valves preventing entrance of cement paste while allowing free flow of injection material, pumped through the hose, into the concrete joint surface.

2. Injection hose system shall be appropriate for the injection of hydrophilic injection resin. The hose shall allow for vacuuming operations and repeated use. The construction of the hose shall permit free discharge of the specified

injected grout into the concrete without backwash, for the entire length of the hose.

3. Injection hose system shall be complete with hold-down clips, connection tubes, fittings and injection connections designed to be mounted flush with the concrete surface and sealed to allow for future injections. All components of the system shall be provided by the same manufacturer.

4. Injection Hose Waterstops product and manufacturer shall be as specified in this Section.

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. Field Measurements

1. Prior to commencement of the Work, existing dimensions, elevations, locations and conditions applicable to the work shall be field verified. Variances and discrepancies from the Contract Drawings and potential interferences shall be reported promptly to the Engineer.

2. Sufficient field measurements shall be taken prior to preparation of Shop Drawings and fabrication of construction materials, where possible, to ensure proper fitting of the work. However, job progress shall not be delayed. Allow for adjustments and fittings wherever the taking of field measurements before fabrication may not be possible or might delay the work.

3. Actual field-verified conditions may require modifications to the fabrication and/or erection details indicated on the Contract Drawings. The Work shall be performed to meet actual field conditions encountered.

B. Preparation

1. The Contractor shall examine the areas and conditions under which the Work of this Section is to be performed. Conditions detrimental to the proper and timely completion of the Work shall be corrected. Work shall not be proceeded until unsatisfactory conditions have been corrected.

2. All new placement of concrete shall be in accordance with Section 03 31 29 – Marine Concrete.

3. Concrete shall not be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.

4. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed by wire brushing, air or light sand blasting.

5. The joint shall be thoroughly clean and free from dirt and debris before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration. The sealant shall be neatly tooled into place and its finished surface shall present a clean and even appearance.

6. All joints shall be sealed as shown on the Contract Drawings.

C. Not Used

3.02 IMPLEMENTATION

A. Construction Joints

1. Construction joints shall be as shown on the Contract Drawings where structural integrity is affected, otherwise, Contractor shall submit description of the joint and its location to the Engineer for approval.

2. Unless noted otherwise on the Contract Drawings, construction joints shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point. In this case, the joints in the girders shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and the top of footings or floor slabs unless noted otherwise on the Contract Drawings. Beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.

3. Maximum distance between horizontal joints in slabs and vertical joints in walls shall be 45'-0" unless otherwise indicated on the Contract Drawings.

4. All corners shall be part of a continuous placement, and should a construction joint be required, the joint shall not be located closer than five feet from a corner.

5. Waterstop shall be provided at all joints in water retaining structures. Waterstop shall be provided at all joints below grade in walls or slabs which enclose an accessible area.

6. All reinforcing steel and welded wire fabric shall be continued across joints. Inclined dowels shall be provided as detailed or directed by the Engineer.

7. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed. Following methods are acceptable:

a. The use of an approved chemical retarder applied in accordance with the manufacturer's recommendations which delays but does not prevent the setting of the surface mortar. Retarded mortar shall be removed within 24 hours after placing to produce a clean exposed aggregate bonding surface.

b. By roughening the surface of the concrete in an approved manner which will expose the aggregate uniformly and will not leave laitance, loosened particles of aggregate or damaged concrete at the surface.

8. All construction joints shall be bonded by one of the following methods:

a. The use of an approved adhesive applied in accordance with the manufacturer's recommendations.

b. Use of Portland cement grout of similar proportions to the mortar in the concrete in an acceptable manner.

B. Control Joints

1. Location of control joints shall be as shown on the Contract Drawings.

2. Control joints shall be formed with control joint inserts.

3. Sawcutting of control joints in lieu of forming shall not be allowed unless otherwise noted on the Contract Drawings. Where sawcutting is allowed, joints shall be sawed as soon as the concrete can support foot traffic without leaving any impression, normally the same day as concrete is placed and in no case longer than 24 hours after concrete is placed.

4. Unless noted otherwise on the Contract Drawings, depth of control joints shall be 1-1/2 inches in reinforced concrete and 1/3 of concrete thickness in unreinforced concrete.

C. Expansion Joints

1. Size and location of expansion joints shall be as shown on the Contract Drawings.

2. A center-bulb type waterstop shall be provided at all expansion joints in water-retaining structures. A center-bulb type waterstop shall be provided at all expansion joints below grade in walls or slabs which enclose an accessible area. Waterstop shall be as shown on the Contract Drawings and specified herein.

3. Expansion joint filler for use in concrete pavements and structures shall be Types I, II, or III. Expansion joint filler-for use in sidewalk and curbing shall be Type IV.

4. Reinforcement or other embedded items bonded to the concrete (except dowels in floors bonded on only one side of joint) shall not be permitted to extend continuously through any expansion joint.

D. Installation of Joints and Joint Filter

1. Type B joint sealant shall be used in all expansion and control joints in concrete except Type A joint sealant shall be used in all concrete pavements and floors subject to heavy traffic and Type C joint sealant shall be used in

high corrosive areas unless otherwise specified or shown on the Contract Drawings.

2. Joint fillers and sealants shall be installed in accordance with manufacturer's recommended procedures and as shown on the Contract Drawings. Prior to sealant installation, the Contractor shall arrange to have a representative of the sealant manufacturer instruct the crew doing the work as to the proper methods of surface preparation, mixing and application of the sealant. The joint filler shall be furnished with a pressure sensitive adhesive or a separate adhesive as recommended by the manufacturer.

3. Joint filler that will be exposed after removal of forms shall be cut and trimmed to ensure a neat appearance and shall completely fill the joint except for the space required for the sealant. The filler shall be held securely in place and no concrete shall be allowed to enter the joint or the space for the sealant and destroy the proper functions of the joint.

4. A bond breaker of polyethylene film shall be used between filler and sealant. The joint shall be thoroughly clean and free from dirt and debris and shall receive a light sand blasting before the primer and the sealant are applied. Where the finished joint will be visible, masking of the adjoining surfaces shall be carried out to avoid their discoloration.

5. The primer and sealant used shall be supplied by the same manufacturer. Sealant shall not be placed without the use of a primer.

6. The sealant shall be neatly tooled into place and its finished surface shall present a clean and even appearance.

7. The depth of the sealant shall not exceed the width of the joint.

8. All sealants used in water retaining structures shall achieve final cure at least seven (7) days before the structure is filled with water.

E. PVC Waterstops

1. The design and location of PVC waterstops in construction joints and expansion joints shall be as specified herein and shown on the Contract Drawings. Splices in PVC waterstops shall be made, and molded pieces used, as recommended by the manufacturer.

2. Each piece of premolded PVC waterstop shall be of maximum practicable length in order that the number of end joints will be held to a minimum.

3. Joints shall develop effective watertightness fully equal to that of the continuous PVC waterstop material and shall permanently develop not less than 80 percent of the mechanical strength of the parent section and shall permanently retain its flexibility.

4. PVC waterstops shall be installed in the Work so that they are embedded to an equal depth in concrete on both sides of the joint in keyways as shown on the Contract Drawings and shall be kept free from oil, grease, mortar or other foreign matter. PVC waterstops shall be adequately secured against

movement during the pouring of concrete. Contractor shall submit methods of PVC waterstop installation to the Engineer for approval prior to placing the concrete. Concrete adjacent to PVC waterstops shall be placed in 12 inch lifts and power vibrated to prevent honeycombing, voids and separation of aggregates at the surfaces of concrete separation joints.

a. PVC waterstop fabrications for all changes of direction, intersections and transitions shall be made in the shop, leaving only straight butt joint splices for the field.

b. Butt joint splices of PVC waterstop runs shall be made by heat sealing the adjacent surfaces in accordance with the manufacturer's recommendations using a thermostatically controlled electric source of heat. At least three satisfactory field splices shall be made as samples on site. The Engineer may require tests on these splices by an approved laboratory, at the Contractor's expense, to certify the tensile strength of the joint. The strength attained shall be at least 80% of the unspliced material before any is used in the work.

F. Hydrophilic Waterstop

1. Hydrophilic rubber waterstop or sealant shall be installed in accordance with the manufacturer's instructions and recommendations, except as modified herein.

2. The manufacturer shall provide technical assistance in the field.

3. The waterstop or sealant shall be located as near as possible to the center of the joint and shall be continuous around the entire joint. The minimum distance from the edge of the waterstop to the face of the member shall be 3 inches.

4. Where a hydrophilic rubber waterstop is used in combination with PVC waterstop, the hydrophilic rubber waterstop shall overlap the PVC waterstop for a minimum of 6 inches. The contact surface between the hydrophilic rubber waterstop, and the PVC waterstop shall be filled with hydrophilic sealant.

5. The hydrophilic rubber waterstop shall be installed in a bed of hydrophilic sealant, before skinning and curing begins, so that any irregularities in the concrete surface are completely filled and the waterstop is bonded to the sealant. After the sealant has cured, concrete nails, with washers of a diameter equal to the waterstop width shall be placed to secure the waterstop to the concrete at a maximum spacing of 18 inches.

6. Prior to installation of hydrophilic sealant, the concrete surface shall be wire brushed or sand blasted to remove any laitance or other materials that may interfere with the bonding. Surfaces of metal or PVC to receive sealant shall be cleaned of paint and any material that may interfere with bond. When sealant alone is shown on the Contract Documents, it shall be placed in a built-up bead which has a triangle cross section with each side of the

triangle at least 3/4 inch in length, unless indicated otherwise. Concrete shall not be placed until the sealant has cured in accordance with the manufacturer's recommendations.

G. Injection Hose Waterstop

1. The injection hose shall be installed in maximum lengths of 40 feet and shall be located as shown on the Contract Drawings. The hose shall be clamped into position with anchor clips spaced approximately 6 to 10 inches apart.

2. The concrete surface shall be cleaned of stones and debris prior to installation of injection hose. The injection hose shall be installed in direct contact with the face of concrete at the construction joint to prevent floating of the hose in the freshly placed concrete.

3. Where injection hose is used in combination with PVC waterstop, the hose shall overlap the PVC waterstop for a minimum of 6 inches and shall be less than 2 inches away from the PVC.

4. The injection procedure shall be performed in strict conformance with the manufacturer's recommendations. The injection shall be made by an authorized applicator as recommended by the injection system supplier.

5. The injection system supplier or his approved representative shall provide the necessary supervision to satisfy the Engineer that the application conforms strictly to the manufacturer's recommendations.

6. The injector hose and opposite hose vent for each hose length shall be terminated in the injection boxes mounted on the dry side of the wall. At the end of the injection operation, the hose shall be cleaned in accordance with the procedure recommended by the manufacturer. The injection ends and the vents shall be plugged and the box covered leaving the system ready for reinjection in the event that the joint is leaking.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. PROTECTION

1. Joints and accessories shall be protected from damaging from traffic during the entire construction period. Waterstops provided for adjoining future structures shall be protected from corrosion as shown on the Contract Drawings.

END OF SECTION

SECTION 03 37 13 – SHOTCRETE
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This section specifies requirements for the repair of concrete using either the dry-mix or the wet-mix shotcrete process as an alternative supplement to Section 03 01 30.71 Rehabilitation of Cast-in-Place Concrete. The dry-mix process is the preferred method; however, the Contractor shall assume all responsibility for mixture proportioning, batching and mixing, shotcrete application, and curing to ensure that the finished shotcrete repair meets all of the performance requirements of this specification.

B. The Contractor shall comply with all provisions in this document unless otherwise modified in writing by the Engineer.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. See Section 1.02 of Specification 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete.

1.03 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 02 41 10 – Demolition and Removals

C. Section 03 31 29 – Marine Concrete

D. Section 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete

1.04 REFERENCES

A. The latest edition and addenda of the following publications in effect on the date of Contract Award are part of this Specification and, where referred to by title or basic designation only, are applicable to the extent indicated by the specific reference:

AMERICAN CONCRETE INSTITUTE (ACI)

A.	ACI 305R	-	Hot Weather Concreting
B.	ACI 306R	-	Cold Weather Concreting
C.	ACI 506R	-	Shotcrete - Guide
D.	ACI 506.2	-	Specification for Shotcrete
E.	ACI 506.4	-	Guide for Evaluation of Shotcrete
F.	ACI 506.6T	-	Visual Shotcrete Core Quality Evaluation Technote

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A.	ASTM C94	-	Standard Specification for Ready-Mixed Concrete
B.	ASTM A385	-	Practice for Providing High-Quality Zinc Coating (Hot Dip)
C.	ASTM A615	-	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
D.	ASTM A641	-	Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
E.	ASTM A706	-	Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement
F.	ASTM A767	-	Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
G.	ASTM A775	-	Specification for Epoxy-Coated Reinforcing Steel Bars
H.	ASTM C33	-	Specification for Concrete Aggregates
I.	ASTM C39	-	Test Method for Compressive Strength of Cylindrical Concrete Specimens

J.	ASTM C42	-	Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
K.	ASTM C150	-	Specification for Portland Cement
L.	ASTM C260	-	Specification for Air-Entraining Admixtures for Concrete
M.	ASTM C387	-	Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete
N.	ASTM C494	-	Specification for Chemical Admixtures for Concrete
O.	ASTM C595M	-	Specification for Blended Hydraulic Cements
P.	ASTM 618	-	Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
Q.	ASTM C642	-	Standard Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete
R.	ASTM C685	-	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
S.	ASTM C989	-	Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
T.	ASTM C1116	-	Standard Specification for Fiber Reinforced Concrete and Shotcrete
U.	ASTM C1140	-	Standard Practice for Preparing and Testing Specimens from Shotcrete Test Panels
V.	ASTM C1141	-	Standard Specification for Admixtures for Shotcrete
W.	ASTM C1202	-	Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
X.	ASTM C1385	-	Practice for Sampling Materials for Shotcrete
Y.	ASTM C1436	-	Standard Specification for Materials for Shotcrete
Z.	ASTM C1480	-	Standard Specification for Packaged, Pre-Blended, Dry, Combined Materials for Use in wet or Dry Shotcrete Application
AA.	ASTM C1604	-	Standard Test Method for Obtaining and Testing Drilled Cores of Shotcrete

STRUCTURAL STEEL PAINTINGS COUNCIL (SSPC)

A.	SSPC – SP6	-	Commercial Blast Cleaning
B.	SSPC – SP 13	-	Surface Preparation of Concrete

C. The Contractor shall conform to the requirements of the above standards, unless otherwise specified herein. In the event of a conflict between these specifications and the referenced standards, the more stringent requirement shall control.

1.05 DESCRIPTION

A. Contractor shall provide all labor, materials, tools, and equipment required for the completion of the following Work, as shown on the Contract Documents and specified herein:

1. Preparation and testing of prequalification test panels and a preconstruction trial to ensure that production shotcrete repair work is in compliance with the requirements of this specification.
2. Removal of all spalled, delaminated, deteriorated and damaged concrete as detailed in this specification and as directed by the Engineer.
3. Cleaning corrosion product from corroded in-place reinforcing steel, and where specified, removing and replacing excessively corroded reinforcing steel with new reinforcement.
4. Preparation of the concrete surfaces to receive shotcrete as required by this specification.
5. Installing all new reinforcing steel, welded wire mesh and anchors as detailed in this specification.
6. Supply, application, finishing, curing and protection of shotcrete.
7. Provision of a quality control program to ensure compliance of completed shotcrete repair work with the requirements of this specification.
8. Furnish all submittals required by this Section of the Specifications.
9. Coordinate all work with other trades.

1.06 QUALITY ASSURANCE

A. The Contractor shall be responsible for the quality of the shotcrete construction. Quality of shotcrete will be evaluated by the Engineer, based on conformance with the requirements of this Section.

B. Preparation and/or installation deficiencies shall be corrected or replaced by the Contractor at no additional charge to the Owner and to the satisfaction of the Engineer.

C. The Contractor shall implement a safety program that shall include, but not necessarily be limited to the following:

1. Ensuring the structural integrity of all elements during the repairs by shoring or other suitable means permitted in this specification.
2. Protecting all personnel and the traveling public from falling debris, blasting grits and high-pressure water jets during concrete removal processes.
3. Protecting all personnel and the traveling public from pneumatically applied shotcrete and rebound materials during the shotcrete application process.

4. Ensuring that all employees have training for materials handled on site and that Material Safety Data Sheets for all materials used are available on site for inspection and use.
5. Ensuring that all personnel hold appropriate certification and/or receive certified training and equipment for water safety issues relative to this project.
6. Ensuring compliance with all facility, state and Federal OSHA regulations.
7. Ensuring all personal protective equipment necessary for the safe execution of the works is available and/or provided.

D. The Contractor shall furnish proof that the shotcrete crew foreman holds a current ACI certification level of Shotcrete Nozzleman for the type of shotcrete process, dry-mix or wet-mix, and positions, vertical and overhead, to be used for this project. The Contractor shall also furnish proof that the shotcrete crew supervisor has at least 5 years of experience in shotcrete repair work on projects of similar size and character along with 5 references that were responsible for supervision of similar projects. Include name, address and telephone number of references who will testify to the successful completion of these projects by the shotcrete crew supervisor.

E. The Contractor shall furnish proof that all nozzlemen employed on this project hold a current ACI certification level of Shotcrete Nozzleman for the type of shotcrete process, dry-mix or wet-mix, and positions, vertical and overhead, to be used for this project. The Contractor shall also furnish proof that all nozzlemen employed on this project have successfully completed 3 projects of similar size and character along with 3 references of those responsible for supervision of these projects. The nozzlemen shall also pass a test, described in Section 3.04, demonstrating their competence.

1.07 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 00, Submittal Procedures.

B. Product Data:

1. Description of proposed admixtures and admixture dosages
2. Current mill reports for cement and all supplementary cementitious materials (SCM)
3. Aggregate testing and certifications issued in accordance with ASTM C33

C. Design Data:

1. Details of proposed shotcrete mixture(s) including shotcrete proportions and means of shotcrete supply.
   a. The preferred method of supplying the shotcrete shall be site-mixing of dry pre-packaged pre-blended material, the individual components of which meet the material requirements of this specification.
2. A method statement for the identification of defective concrete, breakout thereof, substrate preparation, and the procedures and time required for receiving the

approval of the Resident Engineer to record the dimensions of each repair and for proceeding with the repair application.

3. Results of the preconstruction testing program, as outlined in Section 3.04 of this specification, and a description of the proposed construction quality control testing program, including the frequency of specific tests, as outlined in Section 3.04 of this specification.

4. Proposed curing procedures and protection applied to shotcrete after placement.

5. Proposed scaffolding or other temporary support system for workers and inspectors.

6. Proposed containment measures to prevent rebound and other shotcrete material from entering the waterway.

7. Proposed falsework or temporary support system for all structure elements that undergo loss of strength or support during concrete removal operations.

   a. The Contractor shall use the services of a Professional Engineerfor structural design of such falsework or temporary support systems and shall provide documentation of such. The temporary propping of elements shall not result in load being applied to repaired areas. If this is required, an approved structural engineer shall be consulted to advise on the requirements of the repair process and where necessary, shall supervise and approve the repair method and execution.

   b. The Engineer shall be appropriately licensed in the state where the work is to occur and shall be experienced with this type of repair work, and the Contractor shall provide documentation of such.

D. Certifications

1. The Contractor shall furnish proof that the shotcrete crew foreman holds a current ACI certification level of Shotcrete Nozzleman for the type of shotcrete process, dry-mix or wet-mix, and positions, vertical and overhead, to be used for this project. The Contractor shall also furnish proof that the shotcrete crew supervisor has at least 5 years of experience in shotcrete repair work on projects of similar size and character along with 5 references that were responsible for supervision of similar projects. Include name, address and telephone number of references who will testify to the successful completion of these projects by the shotcrete crew supervisor.

2. The Contractor shall furnish proof that all nozzlemen employed on this project hold a current ACI certification level of Shotcrete Nozzleman for the type of shotcrete process, dry-mix or wet-mix, and positions, vertical and overhead, to be used for this project. The Contractor shall also furnish proof that all nozzlemen employed on this project have successfully completed 3 projects of similar size and character along with 3 references of those responsible for supervision of these projects. The nozzlemen shall also pass a test, described in Section 3.04, demonstrating their competence.

3. The Contractor shall furnish the qualifications of the work crew, including the supervisor, shotcrete nozzlemen, gunmen and blowpipe operators. Qualification documentation shall clearly establish the qualifications of the supervisor responsible for breaking out the concrete and preparing and/or re-instating rebar

4. Test records, showing source of all shotcrete materials and proof of their conformance to these project specifications, including:

   a. Cement: The Contractor shall provide the last 6 mill reports issued by the cement supplier, for the cement proposed for use on this project. Thereafter, the Contractor shall obtain and supply, as regularly as issued by the cement manufacturer, each additional mill report issued for the cement for the duration of the project.

   b. Supplementary cementing materials (fly ash, ground blast furnace slag, silica fume): For each supplementary material proposed for use on this project, The Contractor shall provide the last 6 mill reports issued by each supplier. Thereafter, the Contractor shall obtain and supply, as regularly as issued by the manufacturer, each additional mill report issued for each supplementary cementitious material for the duration of the project.

   c. Aggregates: The Contractor shall supply test results from a certified independent laboratory, demonstrating that the aggregates meet the requirements of this specification.

   d. Mix water: Contractor shall supply documentation for acceptance and approval by the Engineer establishing that all water used on this project meet all requirements of this specification.

   e. Chemical admixtures: Contractor shall supply documentation, for each admixture proposed for use, establishing conformance with all requirements of this specification.

   f. Reinforcement: Welded wire mesh and steel reinforcing bars.

   g. Dry Pre-Packaged Pre-Blended materials: Submittals shall show proof that the materials meet the performance requirements of Table 1a and Table 1b of this specification.

E. Quality Assurance Documents

   1. Cold and/or hot weather shotcreting procedures.

1.08 DELIVERY, STORAGE, AND HANDLING

A. All materials shall be delivered in original unopened and undamaged cartons or packing bearing the name of manufacturer.

B. Cementitious materials shall be stored in waterproof locations to prevent intrusion of moisture and other damage from the elements. Containers showing evidence of damage will be rejected.

C. Aggregates shall be stored in separate bins to prevent mixing with foreign particles.

D. Any materials that have hardened, partially set, become caked and/or been contaminated or deteriorated shall be rejected.

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. General

1. The mixed and placed shotcrete used for this project shall comply with the requirements of Tables 1A or 1B, depending on the type of concrete used for this project. All materials used in the shotcrete shall comply generally with the requirements of ASTM C 1436, and more specifically with the documents referenced in ASTM C 1436 for the particular type of material in question.

B. Pre-Packaged Pre-Blended Material

1. Pre-packaged pre-blended dry material shall conform to the requirements of ASTM C 1480.

C. Cement

1. Cement shall conform to the requirements of ASTM C 150 Type II and shall be approved by the Engineer.

2. Cement shall have maximum tri-calcium aluminate content (C3A) in accordance with the requirements of ACI 318 chapter 4, section 4.3. Exposure Class S1.

3. Cement shall have a maximum equivalent alkalis (Na2O + 0.658K2O) content of 0.6%.

D. Supplementary Cementing Materials

1. Fly ash shall conform to the requirements of ASTM C 618.

2. Granulated slag shall conform to the requirements of ASTM C 989, Grade 100 or 120, ground granulated blast furnace slag.

3. Silica fume shall conform to the requirements of ASTM C1240.

E. Water

1. All water used in shotcrete production, including water added in pre-moisturizer and at the shotcrete nozzle, shall comply with the requirements of ASTM 1602 and ACI 318 Section 3.4.

2. Similarly, all water used for high-pressure water blasting, Pre-dampening of concrete surfaces prior to application of shotcrete, in blowpipes for removal of rebound and overspray, and for shotcrete curing shall comply with the requirements of ASTM 1602 and ACI 318 Section 3.4, such that is of drinking water quality standard and is free of oil and chemical or organic impurities.

F. Aggregates

1. Aggregates shall conform to the requirements of ASTM C 33, except that the combined grading shall comply with the requirements of Table 1 in ASTM C 1436.

2. Aggregate reactivity to be in accordance with ASTM C 33 Section 12.1.11.

G. Admixtures

1. Where admixtures are proposed for use in the mixture, or added at the nozzle, full details of the materials shall be provided by the Contractor to the Engineer, with an explanation of the chemical composition and the function of the admixture, evidence of it's performance in similar repair projects, and an assessment of the compatibility of the admixture with the materials and other admixtures proposed for in this concrete, and an assessment of the possibility and effects of incorrect dosing, including overdosing of the admixture.'

2. Admixtures shall meet the requirements of ASTM C 1141.

3. ASTM C 1141 admixture classifications 4.1.1.4 and 4.1.2.4 (grade 4 metallic iron admixtures) shall be prohibited.

4. Admixtures containing chlorides shall be prohibited

H. Reinforcement

1. New or replacement reinforcing bars shall conform to ASTM A615, A706, A767, or A775.

2. Welded-wire mesh shall conform to ASTM A185 – uncoated.

I. Materials Handling and Storage

1. Portland cement and supplementary cementing materials shall be stored and protected from exposure to moisture and temperatures below 41 degrees F and above 88 degrees F.

2. All admixtures shall be maintained at temperatures 41 degrees F and below 88 degrees F at all times, and in compliance with the manufacturer's recommendations (which may be more onerous).

3. Aggregates used in site batching of dry-mix shotcrete shall be stockpiled and handled so as to prevent segregation and contamination and shall be maintained in a 3 to 7 percent moisture content range. If the wet-mix method of shotcreting is to be employed, aggregate shall be stockpiled and handled so as to prevent segregation and contamination and shall be tested as required, but no less than once per day, to determine percent moisture for use in mix design and calculation

of water cement ratio. Shelters or tarpaulins shall be used to cover the aggregate stockpiles from rain, sea spray, chlorides, desiccation, and contamination.

4. Pre-packaged products shall be stored to avoid contact with the ground and protected from moisture, direct sunlight, and freezing.

2.03 PROPORTIONING

A. Mixture Design

1. The Contractor shall assume all responsibility for mixture proportioning, batching, mixing, shotcrete application, and curing to ensure that the finished shotcrete repair meets all of the performance requirements of this specification and shall submit the proposed shotcrete mixture proportions to the Engineer for review and approval at least 30 working days prior to performing the preconstruction trial (test panels). As a minimum, for each shotcrete mixture design the following information shall be submitted:

a. An easily identifiable unique mix designation, number or code.

b. Batch quantities and sequence of fine aggregate, coarse aggregate, cement, supplementary cementing material, fibers, admixtures, and water, and expected water demand (to include all water from moisture in aggregates, and water added in pre-moisturizer and at nozzle) and all other shotcrete ingredients, based on saturated surface dry aggregates. In the case of wet-mix shotcrete, the weight of water added at the batch site, slump rack, and job site, shall also be included. In all cases, the water to cementitious ratio of the final mixture shall not be greater than 0.40.

c. Aggregate source, gradation, relative bulk density (specific gravity) and absorption factors.

2. Shotcrete shall be proportioned to meet the performance requirements detailed in Tables 1A or 1B of this specification.

3. The Contractor shall submit performance test data from previous experience, if available, along with the shotcrete mixture proportions for review by the Engineer.

B. Performance Requirements

1. Dry-Mix Shotcrete shall conform to the performance requirements in Table 1A.

Table 1A – Mix Properties and Performance Requirements of Dry-Mix Shotcrete

Performance Requirements and Test Description	Test Method	Age	Specified Requirement
Maximum water-cementitious materials ratio	-	-	0.40
Air Content – % as shot	ASTM C 231	-	5 +/- 1
Minimum compressive strength (psi)	ASTM C 42	28days	5,000 psi
Pull-off (bond strength) minimum	ASTM D 7234	28days	100 psi
Cement tri-calcium aluminate content (max)	ASTM C 150	-	10%
Cement equivalent alkalis ($Na_2O + 0.658K_2O$) content	ASTM C 150	-	0.60% (max)

Boiled absorption, % Maximum volume of permeable voids %	ASTM C 642	7days 7days	8 17
Maximum Final Set Time (hrs)	ASTM C 1398	-	3

2. Wet-Mix Shotcrete shall conform to the performance requirements in Table 1B.

TABLE 1B – Mix Properties and Performance Requirements of Wet-Mix Shotcrete

Performance Requirements and Test Description	Test Method	Age	Specified Requirement
Water-cementitious materials ratio (max)	-	-	0.40
Air Content – as shot %	ASTM C 231	-	5 ±1.5
Slump at discharge into pump (in.)	ASTM C 143	-	2.5 ± 0.5
Minimum compressive strength (psi)	ASTM C 42	28 days	5,000 psi
Pull-off (bond strength) minimum	ASTM D 7234	28 days	100 psi
Cement tri-calcium aluminate content (max)	ASTM C 150	-	10%
Cement equivalent alkalis ($Na_2O + 0.658K_2O$) content	ASTM C 150	-	0.60% (max)
Boiled absorption, % Maximum volume of permeable voids %	ASTM C 642	7 days 7 days	8 17
Maximum Final Set Time (hrs)	ASTM C 1398	-	3

*

3. The number of test specimens for each test listed, at each age shall be determined from the requirements of the test standard. Where no standard exists, or the number of test specimens is not specified, the number of test specimens the Contractor shall consult with the Engineer to determine the appropriate number of test specimens.

4. The air content shall be determined on shotcrete shot into an air pressure meter base.

5. The performance of the shotcrete mix will be evaluated based on the test panels and preconstruction trials.

2.04 DRY-MIX SHOTCRETE PRODUCTION

A. Dry-Mix Batching, Mixing and Supply

1. Dry-mix shotcrete shall be batched, mixed and supplied by one of the following methods:

   a. Pre-packaged material supplied in either small bags (65 lb typical) or large synthetic cloth bulk bin bags (3300 lb typical).

   b. Site batching, using either volume or mass batching subject to written approval by the Engineer of the proposed batching equipment.

2. The use of mobile volumetric batcher units shall be permitted provided such units are properly calibrated in accordance with ASTM C 685, and with approval of the Engineer. Calibration records shall be submitted to the Engineer of Record for approval. Calibration shall be conducted at least weekly.

3. The use of central or transit mix batched and transit mix supplied dry-mix shotcrete shall not be permitted unless the Contractor can supply documentation

to establish satisfactory conformance to all the project performance requirements, subject to approval by the Engineer.

4. All dry-mix shotcrete shall be shot within 45 minutes of the time that moisture (either from damp sand or from the pre-moisturizer) contacts the cementitious materials.

5. When using volume batching, proportions shall be verified using a mass batching check. Verification records shall be submitted to the Resident Engineer for approval. The minimum checking frequency shall be at the beginning of the work and at least once a week thereafter.

6. Pre-packaged shotcrete materials shall be produced in conformance with the requirements of ASTM C 1480. In particular, all aggregates shall be dried to a moisture content of less than 0.2 percent by mass, based on oven drying at 220 to 230 degrees F.

7. Pre-packaged shotcrete materials shall be protected from moisture during handling, transport and storage. Any bags with lumps of pre-hydrated shotcrete shall not be used on the project.

8. Pre-packaged shotcrete materials shall be maintained in a temperature range of 40 to 85 degrees F during storage and application. Frozen material shall not be used.

B. Dry-Mix Shotcrete Placing Equipment

1. Shotcrete batching, mixing and supply equipment shall be capable of combining the dry-mix shotcrete materials into a uniform mixture and discharging it without segregation.

2. Pre-packaged shotcrete materials shall be pre-dampened to provide consistent moisture content in the range of 3 to 5 percent by mass in a pre-dampener, prior to discharge into the shotcrete gun. Discharge of completely dry materials into the shotcrete gun shall not be permitted, unless satisfactory performance is demonstrated in the test panel.

3. Similarly, for site-mixed materials, if the moisture content in the sand is too low to provide a moisture content of the mixed shotcrete materials in the range of 3 to 5 percent, then the shotcrete shall be pre-dampened in a pre-dampener, prior to discharge into the shotcrete gun.

4. The mixing and pre-dampening units shall be capable of producing a shotcrete mixture with uniform and consistent moisture content such that the nozzleman does not need to adjust the water content at the nozzle water ring repetitiously.

5. The delivery equipment (gun) shall be capable of discharging a continuous, smooth stream of uniformly mixed material into the delivery hose.

6. The discharge nozzle shall be equipped with a manually operated water injection system (water ring) for directing an even distribution of water through the mixture. The water valve shall be capable of ready adjustment to vary the quantity of water and shall be convenient to the nozzleman.

7. The water pressure at the discharge nozzle shall be sufficiently greater than the operating air pressure so that the water is intimately mixed with the pre-dampened shotcrete materials. If the line water pressure is inadequate a water booster pump shall be introduced into the water line to provide a steady, non-pulsating water pressure. Water heaters shall be provided during cold weather if required to produce shotcrete at a suitable temperature. The Contractor shall demonstrate that the temperature of the water added has no significant adverse effect on the concerting operations including the spraying performance, setting time and amount of rebound.

8. The water ring shall be carefully monitored for any signs of blockage of individual water spray holes. If non-uniform wetting of discharged shotcrete becomes apparent, shooting shall be stopped, and the water ring cleaned, or other appropriate corrective actions taken.

9. The delivery equipment shall be thoroughly cleaned at the end of each shift. Any build-up of coatings in the delivery hose and nozzle liner shall be removed. The water ring and nozzle shall be regularly inspected and replaced as required.

C. Auxiliary Shotcrete Equipment

1. The Contractor shall supply a clean, dry air supply, capable of maintaining sufficient nozzle velocity for all parts of the work and simultaneous operation of a blowpipe and, if pneumatically operated, the pre-dampener.

2. The air supply system shall contain a moisture and oil trap to prevent contamination of the shotcrete.

3. Auxiliary shotcrete equipment such as delivery hose, water hose, water booster pumps, blowpipes, couplings, admixture dispensers and fiber feeders shall conform to the recommendations in Section 4.8 of ACI 506R.

2.05 WET-MIX SHOTCRETE PRODUCTION

A. Wet-Mix Batching, Mixing and Supply

1. Wet-mix shotcrete shall be batched, mixed and supplied by one of the following methods:

a. Central mixing with transit mix delivery.

b. Transit mixing and delivery.

c. Volumetric batching, mobile mixer unit.

d. Pre-packaged materials with water added at site.

2. Central Mixing and Supply

a. Aggregate, cement and supplementary cementitious material shall be mass batched in a central mix plant and delivered in a transit mixer in accordance with the requirements of ASTM C 94. The equipment shall be capable of batching to the accuracy specified in ASTM C 685.

b. Shotcrete materials shall be added in any sequence that provides uniform mixing and dispersion except that all water reducing admixtures and superplasticizers shall be in the mixer at the time of addition of supplementary cementitious materials.

c. Transit mixers shall be free of excessive accumulations of hardened shotcrete or concrete in the drum or on the blades. Blades shall be free of excessive wear. Transit delivery shall conform to the requirements of ASTM C 94, Section 10.

d. Site addition of high range water reducer directly to the transit mixture during the period of discharge shall be permitted in order to maintain workability (slump) of shotcrete within the specified range of 2.5 ± 1/2 in. Mixing shall continue for a minimum of five minutes at rated mixing speed after all additions of superplasticizer to the transit mixer.

e. All shotcrete shall be shot within 45 minutes after addition of mix water to the batch. Shotcrete batch size amounts shall be sufficiently small to comply with this restriction.

f. The Contractor shall supply a copy of every batch ticket to the Resident Engineer at the end of each day. The batch ticket shall clearly show the following:

1) Batch ticket number

2) Batch record number

3) Batch plant number

4) Batch plant location

5) Batch Time

6) Truck number

7) Batch weights (lbs) of all components, including batched water

8) Batch volumes (fluid ounces) of all admixtures

9) Aggregate free moistures (% of dry weight)

10) Aggregate absorption factors (% of dry weight) and SSD specific gravities

11) Batch operator signature

12) Signature of anyone authorizing addition of water after initial batching and a record of the amount of water added to the material, the volume or mass of the material the water was added to, such that the revised water/cement ratio can be calculated.

3. Transit Mixing and Supply

a. The same requirements shall apply as for central mixing except that all ingredients shall be added directly to the transit mixer, instead of the

central mixer. Transit mixers shall be charged to not more than 70 percent of their rated capacity, to enable efficient mixing action.

4. Volumetric Site Batching

   a. The mobile mixer unit for volumetric batching shall conform to the requirements of ASTM C 685. The equipment shall proportion materials to the tolerances specified in ASTM C 685.

   b. The equipment shall be capable of thoroughly mixing materials in sufficient quantity to maintain a continuous discharge of shotcrete material.

   c. The equipment shall be calibrated in accordance with the requirement of ASTM C 685 at the start of every shift or every 40 cubic yards of shotcrete batched, whichever is more frequent, using a mass batch check of the volumetric proportioning.

   d. Feed systems for all materials (cement, aggregates, and admixtures) shall be integrated so that if one feed stops, all stop.

   e. The equipment shall be cleaned thoroughly as often as necessary, but not less than once per shift to prevent accumulation of aged material.

   f. All wet-mix shotcrete shall be applied within 45 minutes of mixing. Material to which batch water has been added shall not be used in the work if it has not been applied within 45 minutes of batch water addition.

5. Pre-packaged Pre-blended materials Supply

   a. The use of dry pre-packaged pre-blended supply with water addition at the site is the preferred method of supplying the shotcrete. The Contractor shall demonstrate uniform mixing of the shotcrete and satisfactory conformance to all the proper performance requirements. From the same batch of materials, the Contractor shall perform daily checks on shotcrete slump, unit weight, and air content, and supply documentation of such to the Engineer.

B. Wet-Mix Shotcrete Placing Equipment

1. The shotcrete delivery equipment shall conform to the requirements of Sections 4.3, 4.6, and 4.7 of ACI 506R and shall be capable of delivering a steady stream of uniformly mixed material to the discharge nozzle at the proper velocity and rate of discharge.

2. The use of positive displacement pumps equipped with hydraulic or mechanically powered pistons (e.g., similar to conventional concrete piston pumps), with compressed air added at the discharge nozzle, is the preferred type of wet-mix shotcrete delivery system. Pneumatic feed guns, rotary type feed guns (similar to dry-mix guns) and peristaltic squeeze type pumps shall only be used if the Contractor can demonstrate that they produce shotcrete meeting all the performance requirements in this document.

3. The air ring at the nozzle shall be carefully monitored for any signs of blockage of individual air holes. If non-uniform discharge of shotcrete becomes apparent, shooting shall be stopped, and the air ring cleaned or other appropriate corrective actions taken.

4. The delivery equipment shall be thoroughly cleaned at the end of each shift. Any build-up of coatings in the delivery hose and nozzle liner shall be removed. The air ring and nozzle shall be regularly inspected and replaced as required.

C. Auxiliary Shotcrete Equipment

1. The Contractor shall supply a clean, dry air supply, capable of maintaining sufficient nozzle velocity for all parts of the work and simultaneous operation of a blowpipe.

2. The air supply system shall contain a moisture and oil trap to prevent contamination of the shotcrete.

3. Auxiliary shotcrete equipment such as delivery hose, water hose, water booster pumps, blowpipes, couplings, admixture dispensers and fiber feeders shall conform to the recommendations in Section 4.8 of ACI 506R.

2.06 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.07 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Concrete Removal and Preparation

1. The Contractor shall locate and remove all loose, spalled, deteriorated and delaminated concrete. Sounding (by hammer or other method accepted by the Engineer) shall be used to locate delaminated areas. Care shall be exercised not to damage areas of sound concrete or reinforcing steel during concrete removal operations especially on prestressed concrete planks. Unless specifically directed by the Engineer, depth of removal shall not exceed 6 inches. Concrete removal shall be in accordance with a sequence and extent approved by the Engineer.

2. Concrete removal shall be accomplished using one or more of the following methods, in conformance with Section 4.3 of NACE No. 6 / SSPC-13.

a. Chipping with hand picks, chisels or light-duty pneumatic or electric chipping hammers (not to exceed 15 lb).

b. Scarifiers, scabblers or other suitable mechanical means.

c. High-pressure water jetting.

d. Other methods proposed by the Contractor and approved by the Engineer.

3. If sound concrete is encountered before existing mild reinforcing steel is exposed, the surface shall be prepared and repaired without further removal of the concrete. When corroded mild reinforcing steel is exposed by more than 50% of cross-sectional area, concrete removal shall continue until there is a minimum 1-inch clearance around the exposed, corroded reinforcing bar. Care shall be taken to avoid damaging the bond to adjacent non-exposed reinforcing steel during concrete removal processes.

4. The perimeter of all areas where concrete is removed shall be tapered at an approximately 45-degree angle, except that the outer edges of all removed areas shall be saw cut to a minimum depth of 1 inch to prevent featheredging unless otherwise approved by the Engineer.

5. After all deteriorated concrete has been removed, the repair surface to receive shotcrete shall be cleaned and roughened in accordance with the requirements of Section 4.3 of NACE No. 6/SSPC-SP 13 determined as three peak to-valley measurements of 3/16 inches within 6 inches.

6. All fractured surface concrete and all traces of any unsound material or contaminants such as oil, grease, dirt, slurry, or any materials which could interfere with the bond of freshly placed shotcrete shall be removed. Cleaned areas shall have shotcrete applied within 48 hours or shall be re-blasted.

7. Per ACI 506R, adequate pre-wetting of the concrete substrate should be done before shotcreting. Concrete substrates should be in a saturated surface-dry (SSD) condition immediately before shotcrete application for maximum adhesion

8. All material removed shall become the property of the Contractor and shall be disposed of in accordance with all Owner, local, state, and federal requirements.

9. No repair material shall be applied until the Resident Engineer has inspected and approved the extent of breakout and quality of substrate preparation and the Contractor has agreed with the measurement as per Section 13.1.

B. Reinforcement

1. All corroded reinforcing steel exposed during concrete removal shall have corrosion products removed in accordance with the Steel Structures Painting Council document SSPC - SP6. The exposed reinforcing steel surface shall be cleaned to remove all dust and loose particles.

2. Mild reinforcing steel displaying deep pitting or loss of more than 25 percent of cross-sectional shall be removed and replaced. The Contractor shall inform the Resident Engineer of the condition of the steel exposed within the breakout and shall approve the removal of existing bars, and replacement, prior to the Contractor carrying out these works.

3. In cases of isolated pitting and as directed by the Engineer, the existing reinforcing steel need not be cut, but shall be reinforced by addition of appropriately placed reinforcing bar of suitable length.

4. The minimum lap splice length of all replacement and new reinforcing steel, if required, shall be as specified by ACI 318. Such bars shall be placed in accordance with the recommendations of ACI 506R, Section 3.1. In particular, bars shall not be bundled in lapped splices, but shall be placed such that the minimum spacing around each bar is three times the maximum aggregate size or 1 inch, whichever is larger, to allow for proper encapsulation with shotcrete.

5. Intersecting reinforcing bars shall be tightly secured to each other using 1/16 inch or heavier gauge tie wire, adequately supported to minimize vibration during shotcrete placement.

6. As an alternative to lapped splices, replacement reinforcing steel, where required, may be mechanically spliced to existing reinforcing, subject to verification and approval by the Engineer.

C. Anchors

1. Anchors, shall be hooked, seated expansion anchors and spaced a maximum of 12 inches apart in both directions of repair.

2. Anchorage shall be in accordance with the guidelines of ACI 506R, Section 3.1.

D. Alignment Control and Cover

1. Alignment control shall be implemented to establish control over line and grade and ensure that the minimum specified shotcrete thickness and cover to reinforcing steel are maintained.

2. The proposed means of alignment control shall be submitted to the Engineer for review and approval.

3. When shooting wires (also called ground wires) are used, they shall consist of a high-strength steel wire (piano wire) kept taut during application of shotcrete. Shooting wires shall be removed after completion of shotcrete application and screeding operations.

4. Guide strips and forms shall be of such dimensions and installation configuration that they do not impede the ability of the nozzleman to produce uniform, dense, properly consolidated shotcrete. In particular, installations that are conducive to the formation of sand pockets and voids shall not be used.

5. When depth gauges are used for alignment control, they shall be installed at a spacing not exceeding 48 inches on a grid pattern. Depth gauges shall be cut back to 3/4 inches below the finished surface to prevent the gauge from becoming a moisture conduit.

6. All repaired members shall be restored as close as practicable to their original dimensions, including chamfered, if detailed. A minimum of 3 inches shotcrete cover shall be provided over reinforcing steel exposed during repair, even if extending past the line and level requirements.

3.02 IMPLEMENTATION

A. Shotcrete Application

1. The Contractor shall not commence application of the shotcrete until all areas prepared for shotcrete repair have been reviewed and approved by the Resident Engineer prior to application of any shotcrete.

2. Shotcrete shall be applied in accordance with good practice as detailed in Section 3.4 of ACI 506R. Wherever possible, shotcrete shall be applied to the full thickness in a single layer.

3. The concrete substrate shall be saturated the day before shotcreting and then re-wetted prior to shooting. At least one hour prior to application of shotcrete, all surfaces to be shotcreted shall be flushed with water of drinking quality standard. Wetted surfaces shall be allowed to dry back to a saturated-surface dry condition prior to application of shotcrete. If necessary, a blowpipe shall be used to facilitate removal of surface water. Only oil-free compressed air shall be used in the blowpipe. In the event a work stoppage longer than two hours takes place on any shotcrete layer prior to the time it has been built up to required thickness, the surface shall be re-wetted prior to continuing. No shotcrete shall be applied to a dry surface or to a surface with free surface water.

4. The nozzleman shall apply the minimum number of layers required to build up the full thickness of shotcrete without sagging, separation or sloughing.

5. When using multiple-layer shotcrete construction, the first layer shall be prepared before application of a subsequent layer by brooming the stiffening layer with a stiff bristle broom to remove all loose material, rebound, overspray or glaze, prior to the shotcrete attaining initial set. If the shotcrete has set, surface preparation shall be delayed at least 24 hours, at which time the surface shall be prepared by sandblasting or high-pressure water blasting to remove all loose material, rebound, hardened overspray, glaze, or other material that prevents adequate bond.

6. When successive layers of shotcrete are required to build up the full shotcrete thickness, the first layer shall be prevented from drying out by fogging or wetting. The use of curing compound shall not be permitted. The first layer of shotcrete shall be free of surface water and in a saturated-surface dry condition at the time of application of the next shotcrete layer.

7. Care shall be exercised to protect adjacent surfaces from build-up of rebound and overspray. Rebound shall not be permitted in the completed work. Hardened rebound and hardened overspray shall be removed prior to application of additional shotcrete.

8. The Contractor shall provide scaffolding or other temporary support system (e.g., manlifts, suspended work platform, etc.) at each repair location unless otherwise approved by the Engineer. Plans for the proposed temporary support system shall be provided to the Engineer for review and approval prior to its installation. No holes shall be drilled into the superstructure to accommodate the support system. All anchorages placed in the substructure shall be removed when the platform is removed and the substructure repaired at no additional cost.

9. Sufficient lighting and ventilation shall be installed to provide the nozzleman and helpers with a clear, unhindered view of the shooting area. Work shall be suspended, and corrective measures adopted if, in the opinion of the Resident Engineer, visibility is unsuitable for the safe application of quality shotcrete.

10. Shotcrete nozzling shall follow acceptable shooting practice, as detailed in Section 3.4 of ACI 506R.

11. The nozzle shall be generally operated at a distance of 1/2 to 1-1/2 yards from the receiving surface and shall be oriented at right angles to the receiving surface, except as required to fill comers, cover edges and encase large diameter reinforcing steel.

12. The combination of air pressure at the nozzle, moisture content of the shotcrete and distance of the nozzle from the receiving surface shall be optimized to achieve maximum compaction of the shotcrete.

13. Care shall be taken while encasing reinforcing steel and mesh to keep the front face of the reinforcement clean during shooting operations, so that shotcrete builds up from behind, to encase the reinforcement and prevent voids and sand pockets from forming.

14. Accumulations of rebound and overspray shall be continuously removed by the blowpipe operator in advance of the deposition of new shotcrete. Rebound material shall not be reused.

15. Shotcrete shall not be applied during periods of rain or high wind that could interfere with the shotcrete stream unless suitable protective covers, enclosures or wind breaks are installed.

16. Shotcrete shall be applied to provide a minimum cover of 3 inches to reinforcement, using shooting wires, depth gauges, guide strips, forms or other suitable devices that do not entrap rebound. A positive means of checking the total thickness of the applied shotcrete shall be provided by the use of shooting wires, which shall be removed prior to the final finish coat.

17. Application of 3/16 inches to 1 inch thick final layer of plain 3/16 inches maximum size aggregate flash coat of shotcrete shall be permitted over the top of 3/8 inches maximum aggregate size shotcrete or fiber reinforced shotcrete.

B. Shotcrete Finishing

1. A natural gun finish shall be the type of finish for the repaired sections of the underdeck. The Contractor shall finish the entire un-repaired surface in accordance with NACE no.6/ SSPC-SS13.

2. Where finishing is required, shotcrete shall be cut back to line and grade using trowels, cutting rods, screeds or other suitable devices. The shotcrete shall be allowed to stiffen sufficiently before cutting and trimming to prevent the formation of tears, cracks and delaminations. Shooting wires shall be removed on completion of cutting and trimming.

3. All shotcrete and overspray shall be trimmed back from adjacent non-prepared concrete surfaces. The edges of all shotcrete repairs shall have a minimum square saw-cut edge 1 inch deep and shotcrete shall be finished up to this edge. Featheredging of shotcrete (including flash coats) shall be prohibited.

3.03 CURING AND PROTECTION

A. Curing

1. On completion of finishing, shotcrete shall immediately be prevented from drying out by fogging or other approved method as proposed by the Contractor.

2. Once shotcrete has attained final set, it shall be kept continuously moist for a minimum period of 7 days. Moist curing shall be accomplished using one or more of the following procedures:

   a. Wrapping the elements in wet burlap that has been presoaked in water for 24 hours prior to installation; wrapping the wet burlap in plastic sheet is useful for retarding the rate of drying of the burlap.

   b. Installation of sprinklers, soaker hoses or other devices that keep the shotcrete repairs continuously wet. The use of intermittent wetting procedures that allow the shotcrete to undergo wetting and drying during the curing period shall be prohibited.

   c. Contractor proposed alternative.

3. Contractor shall submit proposed curing method for approval.

B. Hot and Cold Weather Protection

1. The general requirements for hot and cold weather concreting, detailed in ACI 305R and ACI 306R, shall also apply to shotcrete remedial work except the maximum temperature of the shotcrete shall not exceed 95° F (35° C).

2. If the prevailing ambient conditions (relative humidity, wind speed, air temperature and direct exposure to sunlight) are such that the shotcrete develops plastic shrinkage and/or early drying shrinkage cracking, shotcrete application shall be suspended. The Contractor shall either reschedule the work to a time when more favorable ambient conditions prevail or adopt corrective measures to protect the work such that the cracking does not occur.

3. Shotcrete application shall be suspended if the ambient temperature rises above 85° F, unless the Contractor adopts special hot weather shotcreting procedures, which are approved by the Engineer.

4. Shotcrete application shall be suspended if the ambient temperature drops below 40° F, unless the Contractor adopts special cold weather shotcreting procedures, which are approved by the Engineer, including a means of maintaining the ambient air temperature. The use of un-vented heaters, which give rise to carbonation, shall be prohibited.

5. Cold weather is defined as a period when for three successive days the average daily outdoor temperature drops below 40° F. The average daily temperature is

the average of the highest and lowest temperature during the period from midnight to midnight. During periods of cold weather, cold weather precautions and protections must be undertaken in accordance with ACI 306R and ACI 506R

6. During periods of cold weather, shotcreting may only proceed if the concrete substrate to which the shotcrete is applied is free of frost and is above 40° F.

7. Before placing shotcrete under cold weather conditions, a plan, as required by 1.07.E.1 of this specification, shall be submitted to the Engineer outlining procedures for surface preparation, shotcrete placement, curing and protection. No cold weather shotcreting may commence until this plan has been approved by the Engineer.

8. The temperature of applied shotcrete shall be preferably in the range of 50 to 68 degrees F but not outside the range of 40 to 95 degrees F. When ambient temperature is below 50° F, the temperature of the shotcrete mix as placed shall not exceed the ambient temperature by more than 20 degrees.

3.04 FIELD TESTING / QUALITY CONTROL

A. Quality Assurance

1. The Contractor shall submit a quality assurance / quality control plan for review and approval by the Engineer. The quality plan shall include measures for the implementation of a program for in-place evaluation and acceptance or rejection, where test results indicate shotcrete non-conforming to the project specifications. It shall also include measures for the implementation of a program of remedial works by the Contractor, where indicated as being necessary from the results of the quality assurance program.

2. The Contractor shall submit documentation for the proposed materials, supply, equipment and crew for review and approval by the Engineer. In particular, all shotcrete nozzlemen proposed for use on the project shall be evaluated in the preconstruction testing program; only nozzlemen approved in writing by the Engineer shall be used on the project.

3. The Contractor shall obtain Engineer examination approval for all areas prepared for shotcrete, including installation of anchors, reinforcement, and devices to control line and grade, prior to application of any shotcrete.

B. Quality Control Testing

1. The Resident Engineer shall establish and maintain a quality control program for the shotcrete work to assure compliance with the specification requirements. Such a program shall include, but not be limited to the following:

a. Maintenance of test records for all quality control operations.

b. For site-batched materials, regular monitoring of aggregate gradation and moisture content; one/ moisture content check shall be made at the start-up of each shotcrete operation and with any changes in aggregate moisture content.

c. For volume-batched shotcrete, mass batch checks of moisture content of aggregates and mixture proportions at least once weekly.

d. Physical testing for the hardened shotcrete performance parameters during construction.

2. The Contractor shall provide the necessary testing services and certifications required for the prequalification test panels described below. The use of testing services shall in no way relieve the Contractor of the responsibility for full compliance with the Contract Documents.

a. Testing services, required to be provided by the Contractor, shall be performed by a licensed concrete testing agency approved by the Engineer. Test reports, including results and interpretation of results, and certification of conformance with specified requirements, shall be transmitted directly from the testing agency to the Engineer.

b. Testing agencies shall conform to the requirements of ASTM E329.

c. Contractor shall provide for such additional testing and inspection services as may be required as a result of changes in materials or proportions requested by the contractor.

d. Contractor shall provide for such additional testing of materials or shotcrete as may be required by their failure, as evidenced by test or inspection, to meet the requirements of this section of the specification.

C. Prequalification Test Panels

1. The Contractor shall prepare prequalification test panels to enable the Engineer to evaluate conformance of the proposed materials, shotcrete mixture, equipment and crew to the project specifications. Acceptance of the test panel results by the Engineer is required prior to performing a preconstruction trial. Performance of any work detailed in this specification may proceed only with the satisfactory completion and approval of the preconstruction trial results.

2. The test panels shall be used to pre-qualify the nozzlemen proposed for use on the project. Nozzlemen who have not been pre-qualified shall not be permitted to apply shotcrete on the project.

3. The test panels shall duplicate, as precisely as possible, actual working conditions, configuration, reinforcement, and shooting position.

a. The trial shall involve a workmanship demonstration in accordance with Section 1.5 of ACI 506.2. The trial shall be evaluated by core grading in accordance with ACI 506.6T and the requirements specified in section 3.2.C.8 of this specification.

b. The surface of panels shall be finished in the same manner and method as required for the actual work so that the surface for pull-off testing (ASTM C1583/1583M) is representative of in-situ shotcrete.

4. Test panels shall be prepared, cured, and tested in accordance with ACI 506.2

a. For each prospective nozzleman, two test panels shall be prepared for each proposed mixture, one with reinforcement for grading of the cores and one without, so that core samples may be obtained in accordance with the guidance of ASTM C1604.

b. Test panels shall have minimum dimensions of 30 inches x 30 inches x 6 inches deep.

c. Reinforcement shall be #11 rebar 9-inches on center with a back side and side clearance of 2-inches from the form.

d. Pull-off testing for shotcrete shall be conducted in accordance with the direction of ASTM C1583/C1583M.

5. Three test specimens shall be extracted at each test age from the shotcrete test panel for testing for the performance parameters specified in Tables 1A and 1B.

a. The panels shall be cored or cut to provide three compression test specimens. Compressive strength test specimens shall be 3 inch diameter cores with length/diameter ratios preferably 2:1 and not less than 1:1. Compressive strength tests shall be conducted in accordance with ASTM C 42. Measured compressive strengths shall be corrected to equivalent 2:1 (length: diameter) cores, using the core correction factors given in ASTM C 42.

6. The quality of the cores extracted from the test panel with reinforcement and test panel shall be evaluated by the Engineer. When a prequalification test panel is rejected, the nozzleman shall be permitted to shoot two additional test panels. If either of the additional test panels is also rejected, the nozzleman shall not be permitted to shoot on the project until he has successfully completed an appropriate training program and passed a preconstruction trial test panel.

7. If the test panel specimens fail to meet the project performance requirements, then the Contractor shall make the necessary adjustments in shotcrete materials, mixture design or application, and re-shoot test panels. No work shall commence on the project until the test panel performance testing requirements have been met.

8. Core Grading

a. Cores for grading shall be taken at locations of intersecting reinforcement, as directed by the Engineer. Cores from any one panel shall have a mean grade of 2.0 or less as determined from three core samples. Panels are unacceptable if any of the cores have a grade of 4 or 5 as described in the following section.

b. Grade 1: Shotcrete specimens are solid; there are no laminations, sandy areas or voids. Small air voids with a maximum diameter of 1/8 inches, and maximum length of 1/4 – in. are normal and acceptable. Sand pockets or voids behind continuous reinforcing steel are unacceptable. The surface against the form or bond plane shall be sound, without a sandy texture or voids.

c. Grade 2: Shotcrete specimens shall have no more than two laminations or sandy areas with dimensions not to exceed 1/8 inches thick by 1 inch long. The height, width and depth of voids shall not exceed 3/8 inches. Porous areas behind reinforcing steel shall not exceed 1/2 inch any direction except along the length of the reinforcing steel. The surface against the form or bond plane shall be sound with full paste, without a sandy texture or voids.

d. Grade 3: Shotcrete specimens shall have no more than two laminations or sandy areas with dimensions exceeding 3/16 inches thick by 1-1/4 inches long, or one major void, sand pocket, or lamination containing loosely bonded sand not to exceed 5/8 inches thick and 1-1/4 inches width. The surface against the form or bond plane may be sandy with voids containing overspray to a depth of 5/64 inches.

e. Grade 4 core: The core shall meet in general the requirements of Grade 3 cores, but may have two major flaws such as described for Grade 3 or may have one flaw with a maximum dimension of 1 inch perpendicular to the face of the core with a maximum width of 1-1/2 inches. The end of the core shot against the form may be sandy with voids containing overspray to a depth of 1/8 inches.

f. Grade 5 core: A core that does not meet the criteria of core grade 1 through 4, by being of poorer quality, shall be classified as Grade 5.

D. Construction Testing

1. The Contractor shall be responsible for the quality of the concrete and grout and concrete construction. Quality of concrete and grout will be evaluated by the Resident Engineer and Engineer, based on conformance with the requirements of this Section.

2. The Contractor shall provide labor and means for obtaining all samples of concrete required for tests and for curing and protecting concrete panels at the construction site.

3. The Resident Engineer shall be responsible for the hiring of a certified lab to test all samples.

4. One construction test panel shall be shot by each nozzleman for each 50 cubic yards of shotcrete production and at least once per day of shooting. The panels shall be shot in the same position as the repair work being done.

5. Test panels shall be produced in accordance with the requirements of ASTM C 1140.

a. They shall be constructed of wood and sealed plywood, with 45-degree sloped edge forms, to permit escape of rebound.

b. Construction test panels shall be stored, handled and cured in the same manner prescribed for preconstruction test panels. Similarly, test

specimens shall be prepared in the same manner prescribed for preconstruction test specimens.

6. The panels shall be cored or cut to provide three compression test specimens as described below.

   a. Compressive strength test specimens shall be 3 inch diameter cores with length/diameter ratios preferably 2:1 and not less than 1:1. Compressive strength tests shall be conducted in accordance with ASTM C 42. Measured compressive strengths shall be corrected to equivalent 2:1 (length: diameter) cores, using the core correction factors given in ASTM C 42.

7. The mean compressive strength for a set of three cores shall equal or exceed 5000 psi, as specified in Tables 1A and 1B.

8. Specimens for boiled absorption shall be obtained and tested in accordance with the ASTM C 642, at 7 days of age.

3.05 SAFETY AND CLEANUP

A. Preparation

1. The Contractor shall submit details of a safety program to the Engineer prior to commencement of any work, to ensure that the structural integrity of all elements are protected during concrete and reinforcing steel removal operations by shoring or other suitable means; and that all personnel are protected from falling debris, blasting grits and high-pressure water jets during concrete removal processes.

2. The Contractor shall dispose of all debris, blasting grits, hydro-demolition and water jetting slurry in accordance with all Owner, local, state, and Federal laws, rules and regulations.

B. Shotcrete Application Safety

1. The Contractor shall submit details of a safety program to the Resident Engineer and implement the safety program to protect all personnel and surrounding property from pneumatically applied shotcrete overspray and rebound materials during the shotcrete application process, using shrouds, screens or other appropriate measures.

2. The contract shall require and verify that personnel working near the shotcrete operation, including nozzleman, nozzleman's helpers, supervisor and inspectors, shall wear appropriate protective equipment. Such equipment shall include, but not be limited to safety helmet, safety boots, gloves, appropriate clothing, safety eye glasses with side enclosures and dust masks.

3. Nozzleman's helper shall keep a supply of water, cloth or towel and back-up safety glasses available for nozzleman, so satisfactory vision can be maintained at all times during shooting operations. The Contractor shall provide sufficient lighting to enable the nozzleman to have a clear view of the work.

4. The Contractor shall ensure that eyebaths and wash facilities are readily available in the immediate vicinity of the shotcrete application. Shotcrete crew shall apply appropriate skin protection and adopt work hygiene to protect against cement or accelerator alkali burn.

3.06 ACCEPTANCE AND REPAIR

A. Shotcrete Acceptance

1. The Resident Engineer shall have authority to accept or reject the shotcrete work. Shotcrete that does not conform to the project specifications may be rejected during either the shotcrete application process or based on tests on the test panels or completed work.

2. Deficiencies observed during the shotcrete application process, such as, but not limited to the following items shall constitute cause for rejection of the plastic shotcrete. If plastic shotcrete is rejected the Contractor shall stop the work and take all measures necessary to correct deficiencies.

   a. Failure to properly control and remove build-up of overspray and rebound.

   b. Incomplete encasement of or incomplete consolidation around reinforcing steel, mesh or anchors.

   c. Incorporation of sand lenses, excessive voids, delaminations, sags, rebound, and sloughing.

   d. Failure to apply shotcrete to the required line and grade and tolerance

3. The Contractor shall, whenever possible, perform remedial work to correct deficiencies while the shotcrete is still plastic.

4. The Resident Engineer shall examine the completed shotcrete work. The hardened shotcrete shall be examined for any evidence of cracking, tears, featheredging, sloughs or other deficiencies. Sounding or other non-destructive evaluation (NDE) methods shall be used to check for delaminations at 28 days, or less when approved by the Engineer in writing. Non-conforming shotcrete is any shotcrete that lacks uniformity; exhibits segregation, honeycombing, or delaminations; has suffered excessive cracking; was not prepared or applied in compliance with these specifications; fails to meet the specified requirements in Table 1a or 1b; or fails to meet the core grading requirements.

5. lf the results of compliance tests from shotcrete construction test panels, or assessment of the plastic and hardened shotcrete indicate non-conformance of the shotcrete to the project specifications, the Contractor shall drill at least three cores from the repaired member. The cores shall penetrate into the existing concrete a minimum of 2-1/2 inches. The number and location of the cores shall be at the discretion of the Engineer. These cores shall be core graded in accordance with ACI 506.2 and tested for compressive strength, boiled absorption, volume of permeable voids, and rapid chloride permeability, if applicable. The shotcrete shall be accepted if the mean core grade is 2 or less and no individual core grade

is 4 or 5, and the test results meet the specified requirements for Boiled Absorption, Volume of Permeable Voids, and Electrical Resistivity, if applicable, in Tables 1a and 1b and the following compressive strength criteria. The mean compressive strength of a set of three cores shall equal or exceed 0.85 f'c with no individual core less than 0.75 f'c.

6. The Contractor shall repair or remove and replace, at no cost to the Owner, shotcrete that is cracked or otherwise determined by the Resident Engineer or the Engineer to be defective or non-conforming to the project specifications based on evaluation of cores from the finished shotcrete. Repairs of non-conforming shotcrete are subject to the same testing, evaluation, and acceptance criteria as the original repair shotcrete.

B. Shotcrete Repair

1. Shotcrete that is identified as being non-conforming while still plastic shall be removed, subject to acceptable disposal of the removed shotcrete and slurry in accordance with Owner, local, state, and /or federal statutes.

2. Hardened shotcrete that is identified as being non-conforming shall be removed using the same basic procedures used for removal of deteriorated concrete. Care shall be taken to avoid damage to reinforcing steel, mesh or anchors. Any embedment damaged during the shotcrete removal process shall be replaced at no cost to the Owner.

3. The Contractor shall not commence placement of repair shotcrete unless repair areas have been inspected and approved by the Resident Engineer. Repair shotcrete shall be placed, finished, cured, and protected in the same manner as that specified for shotcrete work.

4. The Contractor shall bear the costs for all repair and tests for non-conforming shotcrete.

3.07 STARTUP / DEMONSTRATION

A. Not Used

3.08 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 03 60 00 - GROUTING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all materials, labor, and equipment required to provide all grout used in concrete work and as bearing surfaces for base plates as specified herein and shown on the Contract Drawings.

B. The following index of this Section is presented for convenience:

C.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 01 30.71 - Rehabilitation of Cast-in-Place Concrete

B. Section 03 31 29 - Marine Concrete.

1.04 REFERENCES

A. Definitions

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards

1.	ASTM C109	-	Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm Cube Specimens).
2.	ASTM C531	-	Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts and Monolithic Surfacings.
3.	ASTM C579	-	Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacings.
4.	ASTM C939	-	Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
5.	ASTM C1107 (Nonshrink).	-	Packaged Dry, Hydraulic Cement Grout
6.	CRD-C 621 Grout.	-	Corps of Engineers Specification for Non-shrink
7.	ISO 14025	-	Environmental labels and declarations - Type III environmental declarations

1.05 DESCRIPTION

A. Services of Manufacturer’s Representative

1. The Contractor shall provide the services of a qualified manufacturer's technical representative who shall instruct the Contractor's personnel in the mixing, proper use and application of the non-shrink grout and epoxy grout.

2. The manufacturer's representative shall provide written certification that materials have been mixed and applied properly and surfaces to receive these products have been prepared properly, all in conformance with manufacturer's requirements.

3. The on-site time required for the manufacturer's representative to achieve a successful installation shall be at the expense of the Contractor. The manufacturer's representative shall sign in and out at the office of the Resident Engineer and provide written verification of the areas he has approved on each day he is at the project.

4. Refer to Section 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete for grout types not mentioned in this Section.

B. Grout Uses

1. The different types of grout shall be used for the applications stated below unless noted otherwise specified herein or on the Contract Drawings. Where grout is called for in this Section or on the Contract Drawings which does not fall under any of the applications stated below, non-shrink grout shall be used.

   a. Cement grout (dry-pack) shall be used as grout topping between the grout fill in caisson/jacket annulus and the cap above, and to fill caisson concrete spalls prior to repairing steel caisson shell holes.

   b. Non-shrink grout shall be used for grouting beneath the bollard base and repair of joints on the deck slabs and other small spall repairs.

   c. Epoxy grout shall be used for bonding new concrete to hardened concrete.

2. Concrete surfaces to receive cement grout shall be as specified in Section 03 31 29 – Marine Concrete, and shall be cleaned of all dirt, grease and oil-like films.

   a. Existing concrete surfaces shall likewise be cleaned of all similar contamination and debris, for protection of cement grout shall be as specified in Section 03 31 29 – Marine Concrete.

   b. Curing and protection of cement grout shall be as specified in Section 03 31 29 – Marine Concrete.

3. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

1.06 QUALITY ASSURANCE

A. Testing Agency:

1. Testing of materials and of resulting grout for compliance with the technical requirements of the specification will be performed by QA/QC consultant employed and paid by the City.

   a. The Contractor shall be charged by the City for the cost of any additional tests and investigation on work performed which does not meet the specifications.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Shop drawings shall include, but not be limited to:

1. Material certifications and technical data sheets.
2. Samples of all materials to be used.

B. The Contractor shall also submit the following:

1. Certified test results verifying the compressive strength, shrinkage and expansion requirements specified herein.
2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

C. Sustainability Submittals:

1. Environmental Product Declarations
   a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.
2. Envision Submittals
   a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor’s approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor’s New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Epoxy grout:

1. Sikadur 32 Hi-Mod as manufactured by Sika Corporation, Lyndhurst, NJ.

2. Euco #452 as manufactured by Euclid Chemical, East Brunswick, NJ.
3. Duralcrete LV as manufactured by Tamms Industries, Kirkland, IL.
4. Or approved equal.

B. Non-shrink grout shall be:

1. Euco N-S as manufactured by Euclid Chemical Company, East Brunswick, NJ.
2. Masterflow 713 as manufactured by Master Builders Solutions, Shakopee, MN.
3. Sikagrout 212 as manufactured by Sika Corporation, Lyndhurst, NJ.
4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Cement Grout

1. Cement grout shall be composed of Portland cement, sand and water. The sand to be used shall be selected to suit the spacing for placement. Where sand is not usable, the grout shall be composed of cement and water only.
2. Gradation of sand and mix proportioning shall be in accordance with the following table for grouts using natural sands and having a minimum 28-day compressive strength of 5,000 psi. For higher strength grouts or those using manufactured sands, strength shall be established by trial mixes.

a. Gradation for Natural Sand:

Sieve Size	Spaces less than one (1) inch	Spaces one (1) inch or more
Passing 3/8		100
Passing 4	100	95-100
Passing 8	95-100	80-100
Passing 16	70-100	50-85
Passing 30	40-75	25-60
Passing 50	10-35	10-30
Passing 100	2-15	2-10
Passing 200	--	--

b. Mix Proportioning:

By Weight	Non-Air Entrained Grouts (Maximum 4 Percent Entrapped Air)		Air Entrained Grouts (Air 8 Percent to 10 Percent)	
	Spaces less than one (1) inch	Spaces one (1) inch or more	Spaces less than one (1) inch	Spaces one (1) inch or more
Cement (bags)	10.8	10.5	11.3	11.0
Sand (lb)	2150	2240	1930	1990
Maximum water (gals)	59.5	57.8	57.5	55.8
Maximum water (gals per bag)	5.5	5.5	5.1	5.1

By Volume	Non-Air Entrained Grouts (Maximum 4 Percent Entrapped Air)		Air Entrained Grouts (Air 8 Percent to 10 Percent)	
	Spaces less than one (1) inch	Spaces one (1) inch or more	Spaces less than one (1) inch	Spaces one (1) inch or more
Cement	1	1	1	1
Sand (dry rodded)	1.85	2.10	1.6	1.7
Sand (damp & loose)	2.30	2.35	2.0	2.1
Maximum water (gals per bag)	5.5	5.5	5.1	5.1

3. Water shall be kept to a minimum, the amounts noted in the preceding table are the maximum for grout. Proportioning by volume shall be limited to small quantities mixed at the job site.

4. White Portland cement shall be mixed with the Portland cement as required to match the color of adjacent concrete.

B. Non-Shrink Grout

1. The grout material shall be an approved ready to use mixture requiring only water for use at the job site. The compressive strength of 2-inch cubes shall be 3,000 psi at 7 days.
2. Non-shrink grout shall conform to CRD-C 621 and ASTM C1107, Grade B or C when tested at a maximum fluid consistency of 30 seconds per ASTM C939 at temperature extremes of 45 degrees Fahrenheit and 90 degrees Fahrenheit and an extended working time of 15 minutes.
3. Non-shrink grout product and manufacturer shall be as specified in this Section.
4. Non-shrink grouts depending on oxidation to limit shrinkage and containing additives such as iron or steel particles shall not be used.

C. Epoxy Grout

1. Epoxy grout shall be modified as required for each particular application with aggregate per manufacturer's instructions.
2. Epoxy grout product and manufacturer shall be as specified in this Section.

D. Dry Pack

1. Dry pack (to be packed or tamped in place) shall be made at no slump consistency.
2. When mixing the batch, only enough water shall be added to the dry materials to produce a rather stiff mixture, then additions of water may be made in small increments until the desired consistency is obtained.

E. Curing Materials

1. Curing materials for cement grout shall be as specified in Section 03 31 29 – Marine Concrete and as recommended by the manufacturer for prepackaged grouts.

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 IMPLEMENTATION

A. Installation

1. Prior to grout placement, remove all loose concrete and exposed aggregate, dirt, oil, grease, and other bond-inhibiting materials by mechanical means. Prior to pouring grout, the surface must be roughened to promote mechanical adhesion and should be brough to a Saturated Surface Dry (SSD0 condition. Where instructed by the Engineer, apply concrete bonding agent to existing concrete surfaces prior to placing the grout.
2. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency shall be such that the grout is plastic and moldable but will not flow.
3. Measurements for cement grout shall be made accurately by weight or by volume using containers. All measurements shall be made in a manner satisfactory to the Engineer. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.
4. Grout shall be placed quickly and continuously, shall completely fill the space to be grouted, be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped.
5. For grouting beneath base plates, grout shall be poured from one side only and shall flow across to the open side to avoid air-entrapment.
6. The use of pneumatic pressure or dry-packed grouting requires approval of the Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Tests:

1. Compression test specimens will be taken during construction from the first placement of each type of grout and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications.
2. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days, 28 days and any additional time period as appropriate.
3. Compression tests and fabrication of specimens for epoxy grout shall be performed as specified in ASTM C579, Method B, at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days and any other time period as appropriate.

B. All grout which has already been placed and which fails to meet the requirements of this Section is subject to removal and replacement by the Contractor at no additional cost to the City.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 03 60 10 – EPOXY GROUT ENCASEMENT FOR CAISSONS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies requirements for installing epoxy grout encasement on steel caissons by direct pumping.

B. The Contractor shall provide all labor, materials, tools, and equipment required for the completion of the following Work, as shown on the Contract Documents and specified herein:

1. Surface preparation for caissons to be encased.
2. Furnish, transport, and place fiber reinforced polymer (FRP) forms with pump ports as shown on the Contract Documents.
3. Furnish, transport, place, and consolidate all epoxy grout.
4. Hand pack underwater epoxy paste at top of the encasement under pile cap.
5. Remove all abandoned wales, supports, formwork, and miscellaneous debris as required for installation of repairs.
6. Install all embedded elements.
7. Prepare fabrication and placement shop drawings listed below.
8. Prepare design drawings for formwork, shores, and bracing as specified herein.
9. Design, furnish fabricate, install and remove, when called for, all formwork, shores, and bracing.
10. Furnish all submittals required by this Section of the Specifications.
11. Coordinate all work with other trades.

C. The following index of this Section is presented for convenience:

D.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Requirements from the following sections also apply to this Section:

1. Section 03 06 00 – Grouting
2. Section 05 05 23.01 – Welding
3. Section 05 12 00 – Structural Steel Framing
4. Section 31 25 10 – Dust, Soil Erosion and Sediment Control

1.04 REFERENCES

A. No definition of additional terms is required for this Section. The latest edition and addenda of the following publications in effect on the date of Contract Award are part of this Specification and, where referred to by title or basic designation only, are applicable to the extent indicated by the specific reference:

AMERICAN CONCRETE INSTITUTE (ACI)

A. ACI 347R - Guide to Formwork for Concrete
B. ACI 563 - Specification for Repair of Concrete in Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A. ASTM C307 - Standard Test Methods for Tensile Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings
B. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concrete

C. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

D. ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

E. ASTM D638 - Standard Test Method for Tensile Properties of Plastics

F. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electric Insulating Materials

G. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor

H. ASTM E329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

I. The Contractor shall conform to the requirements of the above standards, unless otherwise specified herein. In the event of a conflict between these specifications and the referenced standards, the more stringent requirement shall control.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. The Contractor shall be responsible for the quality of the epoxy grout and construction. Quality of epoxy grout will be evaluated by the Engineer based on conformance with requirements of this Section.

B. The Contractor shall provide labor and means for obtaining all samples of epoxy required for tests and for curing and protecting the samples at the construction site.

C. Manufacturer's Representation: The epoxy grout system manufacturer shall have a knowledgeable technical representation available for site assistance to the Contractor during material application procedures.

1. Contractor shall make arrangements with the epoxy grout manufacturer to have manufacturer's personnel provide initial product and installation training, pre-installation meetings and be on-site during the first week of FRP form installation and epoxy grout pumping in order to oversee mixing and pouring operations, provide input, and be available to help troubleshoot any issues that may arise during initial grouting operations.

1.07 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 00 – Submittal Procedures.

B. Details shall be carried out in accordance as shown on plans and in accordance with the manufacturer's recommendations.

C. Product Data:

1. Description, proportioning, and catalog cuts of proposed epoxy grout.
2. Manufacturer's instructions for prosed epoxy grout.
3. Epoxy paste for sealing the tops of the encasements and the forms.
4. Epoxy adhesive for FRP form tongue and groove bonding and sealing.
5. FRP Formwork catalog cuts.
6. Formwork spacers.
7. Pump ports.
8. Quick connection adapter for end of pump hose and pumping ports.

D. Shop Drawings

1. Formwork with pumping ports, spacers, splices, and seal details and elevations.
2. Embedded items and other attachment system.

E. Design Data

1. Product technical data
    a. FRP Formwork
    b. Pumpable epoxy grout
    c. Pumping system for long-distance (up to 700 ft) pumping operation

F. Certifications

1. Sand and Aggregate used in epoxy grout, if any.
2. Epoxy grout
3. Epoxy grout pumping equipment and methods
4. Epoxy grout encapsulation placement schedule
5. FRP formwork
6. Encapsulation topping procedures

G. Quality Assurance

1. Work Plan detailing proposed encasement procedures including method for sealing bottom of the formwork, method for placing spacers and other hardware, method for mixing and pumping epoxy grout, and proposed method of sealing and resealing of pipeline and pump ports.
2. Details of standby facilities for epoxy grout production and placement.
3. Name and address of all testing agencies and testing technicians.
4. Name and address of epoxy grout manufacturer's representative.
5. Cold and/or hot weather procedures.

H. All test reports from epoxy strength testing as required in Part 3 of this specification

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Epoxy Grout

1. Epoxy grout shall be a 100% solids, premeasured, pre-packaged pumpable, moisture insensitive, three component system comprised of a resin, hardener, and aggregate. The manufacturers shall provide technical services throughout project including product and installation training, pre-installation meetings and be present during initial installation of the grout and aggregate. The epoxy grout, shall be provided by the one of the following manufacturers, or engineer of record approved equal:

a. Denso North America Inc. – SeaShield 550 Epoxy Grout

b. Simpson Strong Tie – FX-70-6MP Multi-Purpose Marine Epoxy Grout

c. Five Star Marine – Pile Jacket Epoxy Grout LPL

d. Sika Corporation – Sikadur 35, Hi-Mod LV LPL

2. The following minimum properties shall be attained by the epoxy grout.

a. Compressive Strength (7 days): 7,500 psi (ASTM C579)

b. Tensile Strength (7 days): 1,800 psi (ASTM C307)

c. Linear Shrinkage (14 days): <0.06% (ASTM C531)

B. Sand and Aggregates

1. Sand and aggregate shall be pre-packaged and provided by the same manufacturer as the epoxy grout system. The aggregate shall be as recommended and certified by the epoxy grout manufacturer.

C. Epoxy Paste and Formwork Seam Boding Adhesive

1. Epoxy Paste

a. The epoxy paste used to top off the epoxy grout encasement, and on the underside face of the extension and for sealing the form shall be a non-sag V.O.C. compliant 100% solids two component epoxy compound compromised of a resin and hardener, capable or being applied and curing underwater.

2. FRP Formwork Seam Bonding Adhesive

a. The epoxy adhesive used to bond the two ends of the FRP formwork together at the tongue and groove seam shall be a 100% solids, non-sag, moisture insensitive two component epoxy compound meets the requirements of ASTM C 881 Types I and IV, Class B and C, Grade 3, as recommended by the FRP formwork manufacturer.

D. FRP Formwork

1. General

a. FRP Formwork shall conform to the recommendations of ACI 347R. Forms shall be a nominal 1/8 in. (+ or – manufacturing tolerances) thick, unless otherwise noted in the Contract Documents, translucent rigid fiberglass reinforced plastic (FRP) designed to confine the epoxy grout and shape it to the required dimensions. FRP form shall have a roughened interior texture that provides minimum pull-off strength of 400 psi. The manufacturer shall provide technical services throughout project including installation training, pre-installation meetings and be present during initial installation of FRP forms. The form shall have the following minimum strength properties:

1. Flexural Strength: 25,000 psi (ASTM D790)
2. Tensile Strength: 15,000 psi (ASTM D638)
3. Barcol Hardness: 45 (ASTM D2583)
4. UV resistance: No Chipping, flaking or peeling at 500 hours Ultra-Violet (UV) Accelerated Weathering Test

b. Forms shall be UV resistant and have sufficient strength to withstand the pressure resulting from all environmental forces prior to the placement of epoxy grout as well as forces exerted during the placement of epoxy grout and shall have sufficient rigidity to maintain specified tolerances. Earth cuts shall not be used as forms for vertical surfaces unless indicated on the Contract Documents.

c. Shop drawings of all formwork shall be submitted. These submittals shall include: material type and strength of formwork, method of sealing formwork in order to prevent leakage of epoxy grout, type and locations of all pumping ports and vents, all supports and the location of shoring and reshoring, and method of splicing sections of formwork together.

d. All spacers, straps, and ties shall be non-metallic and non-corrosive. Spacers shall be adjustable from outside the formwork and secured so as not to move out of position during the placement of grout.

2. Design and Installation

a. Design, engineering, and construction of formwork shall be the responsibility of Contractor. Approval of formwork shop drawings by the Engineer is for overall conception, and shall not relieve Contractor from its responsibility for final safety and conformance with specified requirements.

b. Contract drawings of formwork show one pump port placed near the bottom of the form. This is for visual representation only. The final design, overall number of pump ports and elevation of these pump ports is the responsibility of the contractor.

c. All pump ports shall have a watertight method of closure so that after the tube is removed from the port no water shall enter the port. Pump ports must be on alternating sides of the formwork with spacing no more than 5 feet along the FRP form to avoid air entrapment inside the formwork during epoxy pumping.

d. Forms shall be a rigid translucent material so that the grout level inside the form is visible when looking at the outside face of the form. Form facing materials shall be nonreactive with the epoxy grout.

e. Inside of forms shall a roughened interior texture that provides minimum pull-off strength of 400 psi.

f. Forms shall be sufficiently tight to prevent the loss of any material during the pumping and curing processes. The means and methods of maintaining the intended form shape and seal shall be the sole responsibility of the contractor.

g. Positive means of adjustment (strapping) shall be provided and all settlement shall be taken up during placement operations. Forms shall be securely braced against lateral deflections.

h. Formwork shall be so anchored to shores or other supporting surfaces or members so that upward or lateral movement of any part of the formwork system, during grout placement, will be prevented.

i. Tongue and groove type connection details between formwork pieces shall be submitted. Minimum overlap at formwork joints shall be 6 inches. Minimum length of formworks sections shall be 15 ft and no more than 3 formwork splices shall be permitted per caisson length.

j. Formwork shall be embedded minimum 3 ft into mudline. Mudline shall be restored after completion of the encasement and acceptance of the work by the Engineer.

k. Contractor must provide method to seal the bottom of the encasement during pumping. Mudline shall not be used as formwork to seal the bottom of the encasement unless a plug is poured separately and allowed to cure prior to pouring the full encasement.

3. Tolerances

a. Formwork shall be constructed so that grout surfaces will conform to the tolerance limits recommended in ACI 347R.

4. Preparation of Form Surfaces

a. All surfaces of forms and embedded materials shall cleaned of any debris and of all other foreign material, before grout is placed.

E. Joints and Embedded Items

1. Construction and Expansion Joints

a. No construction or expansion joints shall be permitted. Each grout encasement shall be placed in a continuous manner from start to finish.

b. A single horizontal construction joint is permitted at the bottom of the encasement for the placement of a plug to prevent flow out of the form.

2. Other Embedded Items

a. All inserts, anchors, dowels and other embedded items, including those required for adjoining work, or for its support, shall be in place prior to placement of grout. Anchor dowels and other items of miscellaneous metal shall be installed, by Contractor, in accordance with manufacturer's recommendations and procedures.

b. All Work required before epoxy grout is placed shall be verified prior to placement of the formwork and epoxy grout; refer to Section 3.01- Examination/ Preparation, herein.

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. Storage and Handling

1. General

a. All epoxy grout components shall be stored in a dry place away from direct sunlight, flame, or other hazards and within the temperature ranges specified by the manufacturer.

b. All epoxy grout components shall be at the manufacturers recommended temperature prior to utilizing for production.

c. Contractor shall follow Material Safety Data Sheet (MSDS) warnings and instructions.

d. All material shall be clearly labeled and properly sealed when they arrive on site. Ensure that all materials have not reached their shelf life prior to use.

B. Preparation

1. Steel Caisson Surface

a. All caissons scheduled to receive epoxy grout encasements shall be cleaned using a power washer or other mechanical means to remove all marine growth, contaminants, and any soft surface layers on the caisson. Any protrusions greater than ¼" from the steel shell surface that may interfere with the proper placement of the encasement shall be removed.

b. Caissons with steel shell punctures shall be repaired per the Contract Documents prior to encasement.

c. In areas where the underdeck membrane is to be installed around a caisson that is to be encased, the underdeck membrane shall be installed prior to the caisson encasement. The caisson encasement shall overlap with the underdeck membrane, creating a continuous seal from the caisson to the underdeck.

d. All prepared caissons shall be approved by the Engineer prior to the placement of any formwork.

e. The elapsed time between the cleaning of a caisson and the installation of the epoxy grout encasement shall not exceed 48 hours, unless otherwise approved by the Engineer. If this time frame is exceeded contractor shall reclean the steel shell prior to placement of any epoxy grout.

f. Caissons that utilize a plug as the bottom of formwork are still subject to the 48 hour cleaning window stated above. If the time between cleaning the caisson, pouring the plug, and pouring the full

encasement exceeds 48 hours, the caisson will require re-cleaning and re-approval by the Engineer prior to pouring.

g. Contractor shall remove any debris or marine growth that has accumulated inside the formwork just prior to placement of the epoxy grout, regardless of the time elapsed between cleaning and placement of the epoxy grout.

2. FRP Forms

a. FRP forms shall be sized adequately, be grout tight, and provide a still water environment in the space to be filled with epoxy grout. Contractor shall monitor the placement of the epoxy grout continuously and caulk any joints or leaks which show evidence of loss of epoxy grout.

b. Form coating shall not be used.

c. Non-corrosive adjustable spacers shall be installed prior to installation of the formwork and spaced to ensure that the indicated spacing between all elements is maintained at all times. The annulus between the caisson and form shall be as shown on the drawings.

3. Standby Facilities

a. To ensure continuous grout placement, prior arrangements shall be made to have alternate equipment on standby. All standby facilities shall be subject to the same requirements as applicable to the primary facilities and shall be approved by the Engineer.

4. Tube Details

a. The word "tube" in this Section shall refer to the pipe line through which the epoxy grout shall be pumped.

1. Tubes shall be watertight. Tubes may be steel pipe, not aluminum, and shall be minimum one-quarter inch wall thickness (or stronger, if the depth of placement requires). Flexible pipelines may be any material having the strength to resist the incident pumping pressure and all environmental forces.

2. All tubes shall have a means to seal the open end so that when the tube is relocated from one pump port to another and no water shall flow into the open end of the tube. Use of a Go-Devil or Pig will not be permitted for restarting an interrupted placement operation.

3. The end of all tubes shall have a quick connect type fitting that shall fit securely and be easily installed on and removed from the pumping ports of the form. This quick connect fitting shall be water tight.

4. Diameter of tube shall be sufficient to permit unimpeded, smooth flow of epoxy grout through the tube into final position.
5. The Engineer may require a demonstration of these requirements and shall be provided with a safe means of inspecting assembled tubes for watertightness prior to grout placement.

5. Mixing and Pumping Equipment
   a. Pumping epoxy grout as far as 700 ft may be required due to distance of caissons to facility perimeter. Contractor's proposed Means and Methods Statement shall take long-distance pumping condition in to account.
   b. Mixing and pumping equipment shall be as recommended by the epoxy grout manufacturer and approved by the Engineer. Pumping procedures shall conform to requirements of the manufacturer.
   c. Provide an adequate number of clean mixers, tools, equipment and material for uninterrupted placement of the grout.
   d. Mixers shall be maintained in satisfactory operating condition; drums shall be kept free of hardened grout. Any mixer that produces unsatisfactory epoxy grout shall be promptly removed from service and shall remain out of service until it is satisfactorily repaired.
   e. Any oil or rust inhibitors on portions of the equipment that will come into contact with the epoxy grout shall be removed. Materials used to lubricate the portions of the equipment that will come into contact with the epoxy grout shall not have any detrimental effects on the properties of the grout.
6. Embedded Elements
   a. All dowels, anchoring systems, and other elements which will be embedded within the encasement shall be cleaned of all debris, marine growth, loose rust and oily deposits.
   b. Embedded elements, existing or new, shall not affect the proper installation of the formwork nor prevent the specified annulus between the caisson and form to be achieved.
7. Turbidity Control
   a. The Contractor shall take necessary measures for turbidity control during execution of the Work. Refer to Section 31 25 10 – Dust, Soil Erosion and Sediment Control for turbidity control requirements.

3.02 IMPLEMENTATION

A. Mixing
   1. General

a. The proportion of the components to be mixed shall be as recommended by the manufacturer to achieve an epoxy grout capable of being pumped into a wet or dry annular void between the formwork and caisson.

b. Contractor shall follow all manufacturer recommendations for mixing of the epoxy grout.

c. Do not mix more material than can be placed within the working time (pot life) of the epoxy grout.

B. Application

1. General

a. Each epoxy grout encasement shall be placed in a continuous manner from start to finish over the full length of the FRP form. Horizontal construction joints are not permitted, except when a plug is to be provided at the bottom of the encasement. Epoxy grout placement shall begin through the pump port at the lowest elevation.

b. Contractor shall monitor the connection of the tube to the pump port for the duration of pumping operations. The mouth of the tube shall, at all times, remain securely connected to the pump port so as to exert the necessary resistance on the pump to prevent vacuum build-up from causing blockage in the pipeline.

2. Grout shall be placed using the direct pumping method and shall not be permitted to fall through the water column. Tremie applications will not be permitted. Pumping at each elevation shall continue until the grout has reached the level of the next highest pumping port.

3. During transition of the tube from one pump port to another, no water shall be permitted to enter the tube and no grout shall leak from the pump ports.

4. If a blockage or loss of seal occurs, grout placement shall cease immediately; the tube shall be detached from pump port, the blockage cleared, the tube recharged and reattached to pump port. If it is feasible to clear the blockage without removing the tube, that may be permitted if approved by the Engineer.

5. The tube and all pumping equipment shall be secured from access by all persons not involved in the works.

6. Laitance Removal:

a. Allow grout to overtop form until all water and laitance has been removed from the inside of the form. Overtopped grout shall, as practicably possible, be collected and disposed of properly.

7. The allowable lapse of time between mixing and placing of epoxy grout shall be in accordance with the pot life indicated by the manufacturer. The

Engineer, at their discretion, may reject any mixed epoxy grout that has not been placed within the time limit.

8. The Contractor shall provide means necessary to adequately address and clean up any unintended discharge of materials. Rejected and excess material shall be removed from the project site.

9. Weather Conditions:

   a. Epoxy grout shall not be placed when the water or air temperature is outside of the range recommended by the manufacturer, unless appropriate temperature control measures are in place and placement of the grout at such conditions is approved by the epoxy grout manufacturer and Engineer. A cold and/or hot weather epoxy grouting plan in accordance with manufacturer recommendations must be submitted for approval by the Engineer prior to placement under any weather conditions outside of what is recommended by the manufacturer.

   b. No placement of material will be permitted if the water temperature falls below 40 deg F.

10. After the epoxy grout has cured for a minimum of one day, Contractor shall come back to repair and provide any necessary topping off of the caisson repairs so that the epoxy is level with the top of formwork. Then the exposed top of encasement and bottom of concrete extension shall be finished with the epoxy paste as indicated on the drawings.

C. Curing

1. General

   a. Epoxy grout and epoxy paste shall be cured in accordance with the manufacturer's recommendations.

3.03 FIELD TESTING / QUALITY CONTROL

A. Inspection and Testing

1. Inspection

   a. Contractor shall provide the Engineer with a list of caissons scheduled to be repaired a minimum of 10 working days prior to executing the Work so that all necessary inspections by the Engineer can be scheduled and completed.

   b. The installation of the epoxy grout encasement will be inspected as the Work progresses. Contractor shall cooperate with Owner by providing access to the Work for any inspection as required by the Engineer. At a minimum, the Contractor shall expect the following construction inspections:

      1. Surface preparation, steel caisson shell hole repair, proper mudline excavation, and embedment of caisson bottom shall be

inspected and approved by the Engineer prior to installation of formwork. The encasement length will also be verified at this time.

2. Joints between FRP formwork sections.

3. Installed epoxy grout encasements and epoxy paste top off shall be inspected and approved by the Engineer. The encasement length will also be verified at this time.

c. Acceptance of encasements shall be contingent on meeting all of the requirements of the Contract Documents as indicated by the results of all testing, inspection, and other quality assurance procedures required by Owner.

d. Failure to detect any defective Work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate Owner for final acceptance.

e. Approval, by Engineer, of any remedial measures shall not be construed to mean approval of the results of such remedies. Modifications resulting from any remedial measures performed shall be subject to the approval of Engineer.

f. Tolerances specified herein for the construction and placement of formwork are individual maximums and shall not be construed to permit the accumulation of any group of tolerances that will infringe on any of the specified maximums. The Work shall meet all tolerance requirements.

2. Testing and Test Reports

a. Testing agencies shall conform to the requirements of ASTM E329.

b. Encasements will be tested and inspected as the Work progresses. Failure to detect any defective Work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate Owner for final acceptance.

c. The Contractor shall provide all necessary testing services for qualification of proposed materials, procedures, and mix designs.

d. Testing services for the evaluation of the epoxy grout produced shall be provided by the Owner and be performed by a testing agency approved by Engineer. Test reports, including results and interpretation of results, and certification of conformance with specified requirements, shall be transmitted directly from testing agency to the Owner.

e. Testing services, required to be provided by Contractor, shall be performed by a testing agency approved by Owner. Test reports, including results and interpretation of results, and certification of

conformance with specified requirements, shall be transmitted directly from testing agency to Owner.

f. Field testing services shall be provided by the Owner. Contractor shall cooperate with the Owner in providing access to the Work for any testing and inspection as required by the Owner.

3. Testing Services

a. Epoxy Grout Strength Testing

1. At least 30 days prior to start of placement works, the Contractor shall provide test reports from each material supplier certifying that the epoxy grout material meets all the requirements of the Specification. Test data shall be submitted for each individual batch of material.

2. Testing of field cured cubes to verify epoxy grout compressive and tensile strength shall be performed as follows:

1) Contractor shall provide all epoxy grout required for testing purposes and shall provide and maintain adequate facilities for storing and curing concrete test specimens, on the site, as required this specification.

2) The Contractor shall secure two, three cubed, specimens for testing, which shall be molded, cured, and tested in accordance with ASTM C579. Brass molds with cover plates shall be utilized.

3) Specimens shall be cured under the same condition as the epoxy grout encasement. For encasements located below the tidal zone, the cubes shall be cured while submerged in water.

4) A minimum of two brass gang forms, three cubed, specimens for testing shall be taken for each new batch of material components on site.

b. If the results of the testing indicate that the epoxy grout already placed does not conform to the specified requirements, the Engineer will provide direction to the contractor. Any resolution and remediation will be at the cost of the Contractor.

c. The Contractor shall provide, at his own cost, for such additional testing and inspection services as may be required as a result of changes in materials or proportions requested by Contractor.

d. Contractor shall provide for such additional testing of grout as may be required by their failure, as evidenced by test or inspection, to meet the requirements of this Section of the Specification.

3.04 STARTUP / DEMONSTRATION

A. Repairs

1. General

a. Repairs to the Work, if necessary, shall be made at no additional cost to the Owner, after the Work has been inspected. The cost of additional inspection(s) shall also be provided by the Contractor.

b. Contractor shall provide all necessary materials, labor, and procedures to perform the repairs. All repair procedures shall be submitted and approved by the Engineer.

c. Testing services for all repairs, as required to be provided by the Contractor, shall be performed by a testing agency approved by the Owner. Test reports, including results and interpretation of results, and certification of conformance with specified requirements, shall be transmitted directly from testing agency to the Owner.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This Section furnishes requirements for all steel materials which are to be galvanized as shown on the Contract Drawings and as specified in 09 91 00 Painting. Provide protective coatings over galvanized surfaces per 09 91 00 Painting, specific structures include ice breakers and fendering system.

B. Where hot dip galvanizing process cannot be used for certain fabrications, e.g. enclosed tube steel, thermal zinc metalizing spray may be used in accordance with this specification if approved by Engineer. If zinc metalizing spray is selected, there shall be no extra cost passed onto the Owner for this option.

C. All galvanizing shall be done by the hot-dip process.

D. The following index of this Section is presented for convenience:

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F. Attachments

1. Table 1 Schedule of Hot-Dip Galvanizing Requirements

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 09 91 00 – Painting

1.04 REFERENCES

A. Acronyms

1. American Galvanizers Association (AGA)

B. Reference Standards:

1.	ASTM A53	-	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
2.	ASTM A90	-	Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
3.	ASTM A123	-	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
4.	ASTM A143	-	Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
5.	ASTM A153	-	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
6.	ASTM A239	-	Test Method for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles by the Preece Test (Copper Sulfate Dip)
7.	ASTM A384	-	Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies
8.	ASTM A385	-	Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
9.	ASTM A653	-	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

10. ASTM A780 - Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
11. ASTM A924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
12. ASTM B6 - Specification for Zinc
13. ASTM B833 - Standard Specification for Zinc and Zinc Alloy Wire for Thermal Spraying (Metallizing) for the Corrosion Protection of Steel
14. ASTM C633 - Standard Test Method for Adhesion or Cohesion Strength of Thermal Spray Coatings
15. ASTM E536 - Test Methods for Chemical Analysis of Zinc and Zinc Alloys
16. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated
17. ISO 9001 - Quality Management Systems – Requirements
18. ISO 12944 - Paints and Varnishes – Corrosion Protection of Steel Structures by Protective Paint Systems
19. ISO 2063 - Thermal Spraying – Zinc, Aluminum and their Alloys
20. SSPC SP-5 - White Metal Blast Cleaning

1.05 DESCRIPTION

A. Tests

1. General: Samples of galvanized articles shall be taken as specified in the appropriate ASTMs listed in Table 1. Galvanized articles shall be tested to determine the following qualities of the coating:
    a. Thickness of coating
    b. Adherence
    c. Uniformity
2. Thickness of the zinc coating may be tested either by the weighing or stripping methods in conformity with the requirements set forth in Table 1.
3. Adherence of zinc coating shall be tested by the method indicated in the appropriate ASTMs listed in Table 1. Adhesion of thermal sprayed zinc shall be tested per ASTM C633.
4. Uniformity:
    a. Galvanized articles will be subjected to visual examination to determine uniformity of work.

b. In the event the Engineer determines that such examination is not conclusive, the article shall be given the Preece test in conformity with ASTM A239.

1.06 QUALITY ASSURANCE

A. Qualifications

1. Galvanizing shall be done in a plant having sufficient facilities to produce the quality of coatings herein specified and ample capacity for the volume of work required, with an experience record of minimum 10 continuous years up to contract date.

2. The plant shall follow the quality assurance procedures detailed in its Quality Manual, developed in compliance with model Quality Assurance Manual of AGA.

3. ISO 9001 Quality Management System certification for Hot Dip Galvanizing.

4. DEP QA will inspect during the galvanizing process of icebreakers and fender mounting panels.

1.07 SUBMITTALS

A. The Contractor shall submit the following for approval by the Engineer. The submittals shall include, but not be limited to:

1. The galvanizer's certification that the galvanized articles were manufactured, sampled, tested and inspected in accordance with the applicable standards specified herein and that the articles meet these requirements.

2. A report of all quality assurance test results.

3. Copies of galvanizer's current ISO 9001 certificate and its comprehensive Quality Manual.

4. Copies of galvanizer's staff Master Galvanizer certificates issued by AGA. Zinc wire alloy product data sheet.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling

1. Galvanized articles shall be shipped and handled in a manner which will avoid damage to the zinc coating.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Zinc used for galvanizing shall conform to ASTM B6, and shall be at least equal to the grade designated as Prime Western.

B. Maximum amount of aluminum added to a galvanizing bath shall not exceed 0.01 percent.

C. Zinc wire used for thermal metalized spray shall be 99.9 percent pure zinc alloy per ASTM B833.

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. Preparation of Materials

1. Structural steel products shall be safeguarded against embrittlement in accordance with ASTM A143.

2. Casting surfaces to be galvanized shall be sand blasted or ground smooth. When a smooth cast is required, castings shall be tumbled and all high spots ground flush. Castings shall be normalized to prevent cracking. Malleable iron shall be safeguarded against embrittlement by pre-annealing.

3. Steel work shall be pre-cleaned utilizing a caustic bath, acid pickle and flux or shall be blast cleaned and fluxed to obtain an acceptable surface for quality hot dip galvanizing.

4. Steel assemblies shall be fully welded prior to hot dip galvanizing or zinc thermal spray. Welding after galvanizing or field welds shall not be performed unless approved by engineer. Preparation for zinc thermal spray shall be in accordance with SSPC SP-5 White Metal Blast.

3.02 IMPLEMENTATION

A. Hot-Dip Galvanizing Requirements

1. The Work shall conform to the requirements in Table 1 - Schedule of Hot-Dip Galvanizing Requirements.

2. Quality of Coating:

   a. The zinc coating shall meet the standards set forth in Table 1, ASTM A385. The coating shall adhere firmly to the surface of the base metal, be continuous, uniform in thickness, and of the quality of finish specified.

   b. All rejected materials shall be stripped and re-galvanized before resubmitting for inspection and test.

B. Repair of Galvanized Coating

1. Galvanized coatings that are abraded or damaged shall be repaired in accordance with ASTM A780 repair method a1 or a3. Repair methods in accordance with method a2 are not acceptable unless approved by engineer.

2. The extent of the area to be repaired and the method of repair to be used shall be approved by the Engineer.

C. Thermal applied zinc metalized coating:

1. Shall be a minimum of 8 mils,

2. Shall have a minimum bond strength of 1000 pounds per square inch

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

ATTACHMENT 1 - SECTION 05 05 13.01 – GALVANIZING
CONTRACT NR-107

TABLE 1 - SCHEDULE OF HOT-DIP GALVANIZING REQUIREMENTS							
CLASS OF WORK	ZINC		TEST OF ZINC COATING				COATING THICKNESS
	Slab and Chemical Analysis	Coating	Thickness By Weight	Thickness By Stripping	Adherence	Uniformity	Oz. Per Sq. Ft. Minimum
IRON & STEEL STRUCTURAL 1. Rolled, pressed and forged, shapes, castings, plates, bars and strips 2. Gratings, iron and steel	B6, E536	A123	A123	A90, G164-M92	A123	A123, A239	Table 1, A123
SHEETS 3. Iron and steel	B6, E536	A653	A653, A924	A90, A924	A653	A239	Table 1, A653
HARDWARE • Castings of malleable iron and steel • Rolled, pressed, forged articles • Threaded fasteners • Very small work: rivets, nails, tacks, pins, small bolts and screws, stove bolts • Turnbuckles and similar work • Chain	B6, E536	A153	A153	A90,	A153	A153, A239	Table 1, A153
PIPE	B6, E536	A53	--	A90	A53	--	1.8 oz. per sq. ft
ELECTRICAL CONDUIT (Rigid Steel)	Shall comply with ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.						

Notes Applicable to Table1:

1. Prefixes A, B and E identify ASTM Specifications; prefix G identifies CSA Standard.
2. Galvanized articles shall not be subject to wiping or scraping processes which may reduce the thickness of zinc coating.
3. Small hardware items shall be centrifuged to remove excess bath metal.

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials and equipment required to perform all structural welding as specified herein, and as indicated on the Contract Drawings. The Work shall include, but not limited to, the following items:

1. Procedure specifications.
2. Procedure qualifications.
3. Welder, welding operator and tacker qualifications.
4. Inspection.
5. Testing and repairing of defective welds.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 12 00 - Structural Steel Framing

B. Section 05 50 00 - Metal Fabrications

1.04 REFERENCES

A. Definitions

1. Definitions of welding terms shall be in accordance with ANSI/AWS A3.0.

B. Reference Standards:

1. AISC 360 - Specification for Structural Steel Buildings
2. AISC 370 - Specification for Structural Steel Buildings
3. ANSI/AWS A2.4 - Standard Symbols for Welding, Brazing and Nondestructive Examination
4. ANSI/AWS A3.0 - Standard Welding Terms and Definitions
5. ANSI/AWS D1.1 - Structural Welding Code - Steel
6. ANSI/AWS D1.4 - Structural Welding Code - Reinforcing Steel
7. ANSI/AWS D1.6 - Structural Welding Code – Stainless Steel
8. AWS Z49.1 - Safety in Welding and Cutting and Allied Processes
9. American Institute of Steel Construction (AISC)
10. American Welding Society (AWS)
11. New York City Building Code (NYCBC)

1.05 DESCRIPTION

A. All welding shall be performed in accordance with ANSI/AWS D1.1, ANSI/AWS D1.4, and ANSI/AWS D1.6. No welding shall be performed when the base metal temperature is lower than 32 degrees Fahrenheit.

B. Welding shall not be started until welding procedures, welders, welding operators and tackers have been qualified and copies of all records and reports submitted and approved by the Engineer.

C. The Contractor shall be responsible for the quality of welding and shall maintain records of the test results obtained from the welding procedure, welder, welding operator and tackers performance qualifications.

D. Each weld shown or indicated on the Contract Drawings shall be made as specified on the approved procedure specifications provided to cover each type of weld.

Welding of any special steel shall conform to the written instructions of the steel manufacturer.

E. Test specimens shall be prepared by the Contractor for each type of welded joint as designated in Article 1.08, Welding Procedure Qualifications. Destructive tests of specimens for procedure and welder qualifications shall be conducted in accordance with ANSI/AWS D1.1, Section 4, Qualifications, and the requirements specified herein. For stainless steel test specimens, ANSI/AWS D1.6 shall be followed.

F. Symbols

1. Symbols on the Contract Drawings, shop drawings and erection drawings shall be in accordance with ANSI/AWS A2.4.

G. Safety Precautions

1. Safety precautions during welding shall conform to AWS Z49.1.

H. Welding Requirements

1. Contract Drawings will include the following information:

a. Size, length, type and location of welds.

b. Location of welds for which non-destructive testing is required. When location of non-destructive testing is not shown, it will be indicated by the Engineer in the field.

2. Workmanship and techniques for welded construction shall conform to the requirements of ANSI/AWS D1.1 and AISC 360 for steel and ANSI/AWS D1.6 and AISC 370 for stainless steel. When AWS and AISC-are in conflict, the requirements of AWS codes shall govern.

3. Welding of steel reinforcing bars shall conform to the requirements of ANSI/AWS D1.4 and the Contract Documents. Welds shall develop a minimum of 85,000 psi tensile strength. Bars to be welded shall be cut by means of an oxyacetylene torch or by sawing. Ends shall be free of dirt, oxide scale, oil, grease, or other foreign matter. Sheared ends of bars shall be trimmed back at least 1/2-inch by sawing or flame cutting. Preheat and interpass temperature shall conform to ANSI/AWS D1.4. Bars having a carbon equivalent content in excess of 0.50 percent shall not be welded.

4. Where dissimilar strengths of steel are welded together, the procedure used shall be the same as the one used for the lower strength steel.

5. All groove welds shall be 100 percent complete penetration welds as defined in ANSI/AWS D1.1, D1.6, or shown in ANSI/AWS D1.4 for reinforcing steel, regardless of whether a backup plate is shown or whether the supplementary backing weld or melt-through symbol is included, in each groove-weld symbol shown unless partial penetration is included in the weld symbol.

6. Upon completion of welding, all weld splatter, flux, slag and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance with uniform weld contours and dimensions. All sharp corners of material which is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

I. Standard of Acceptance

1. Dimensional tolerances for welded construction, details of welds, and quality of welds shall be in accordance with the applicable requirements of ANSI/AWS D1.1, ANSI/AWS D1.4, ANSI/AWS D1.6, and the Contract Drawings.

2. The welding shall be subject to inspection and tests in the shop and at the Project Site. Inspection and tests in the shop will not relieve the Contractor of the responsibility to furnish weldments of satisfactory quality.

3. All welding exhibiting any cracks, either in the weld metal or the parent metal, will be rejected.

4. Incomplete fusion or lack of penetration will not be allowed, and the weld will be rejected.

5. Welds are acceptable if inspection indicates conformance within the following limitations:

   a. Undercut shall not be more than 1/32-inch deep.

   b. Convexity or reinforcement of a weld face shall not exceed the limits shown in ANSI/AWS D1.1, Section 3, and ANSI/AWS D1.6, Section 6 and 7, and there shall be no overlap.

   c. Slag inclusions, porosity, and other fusion defects less than 1/16-inch in greatest dimension will be allowed if well dispersed and the sum of the greatest dimensions in any linear inch of welded joint does not exceed 3/8-inch.

   d. Slag inclusions, porosity, and other fusion defects 1/16-inch or larger in greatest dimension will be allowed providing such defects do not exceed the limits specified in ANSI/AWS D1.1 and ANSI/AWS D1.6.

6. When materials or workmanship do not conform to the acceptance requirements, the Engineer reserves the right to reject material or workmanship or both at any time before final acceptance of the structure containing the weldment.

J. Corrections and Repairs

1. General: In lieu of rejection of an entire piece or member containing welding which is unsatisfactory or which indicates inferior workmanship, the corrective measures listed hereinafter may be permitted by the Engineer. The Engineer's specific approval must be obtained before making each

correction. Corrective measures shall be made at the Contractor's expense and to the satisfaction of the Engineer and/or to the satisfaction of an independent testing lab.

2. Defective or unsound welds or base metal shall be corrected either by removing and replacing the entire welds, or as follows:

   a. Excessive convexity and overlap shall be reduced by removal of excess weld metal.

   b. Any concavity of weld, crater, undersize welds or undercutting shall be corrected by cleaning and depositing additional weld metal.

   c. Excessive weld porosity, slag, inclusions or incomplete fusion shall be repaired by removing defective portions and rewelding.

   d. Cracks in weld or base metal shall be repaired by removing crack throughout its length, including sound weld metal 2 inches beyond each end of the crack and rewelding.

3. The removal of defective weld metal or portions of the base metal shall be done by chipping, grinding, oxygen cutting, oxygen gouging, or air carbon-arc and in such a manner that the remaining weld metal or base metal is not nicked or undercut. Defective portions of the weld shall be removed without removal of the base metal.

4. Additional weld metal shall be deposited using an electrode smaller than that used for making the original weld, and not more than 5/32-inch diameter. The surface shall be cleaned thoroughly before welding.

5. Caulking of welds shall not be permitted.

6. Improperly fitted parts may be cut apart and rewelded. Members distorted by welding shall be straightened by mechanical means or by carefully supervised application of a limited amount of localized heat.

   a. The temperature of heated areas shall not exceed 1,200 degrees Fahrenheit (a dull red color). Temperature shall be carefully measured with temperature indicating crayons during the heating operation.

   b. Parts to be heated for straightening shall be substantially free of stress and from external forces, except those stresses resulting from mechanical means used in conjunction with the application of heat.

7. No peening shall be done on the root or surface layers of a weld. Peening of intermediate weld layers may be used only if authorized by the Engineer and directed by him. Care shall be exercised to prevent overpeening which may cause overlapping, scaling, cracking, flaking, or excessive cold working of weld and base metal.

1.06 QUALITY ASSURANCE

A. Welding Procedure Qualifications

1. General: Except for prequalified or previously qualified procedures, the Contractor shall qualify the welding procedure specifications for any welding procedure performed in the fabrication of weldments. Qualifications of welding procedures shall conform to ANSI/AWS D1.1, ANSI/AWS D1.4, and ANSI/AWS D1.6.

2. Welding procedure specification and the results of the procedure qualification test for each type of welding, which requires procedure qualifications, shall be submitted for approval. Approval of any procedure, however, will not relieve the Contractor of the sole responsibility for producing a finished structure meeting all the requirements of these Specifications. This information shall be submitted on the forms in ANSI/AWS D1.1, D1.4, and D1.6.

    a. Procedures, when qualified, become the welding procedure specifications and are to be followed in making welds on the subject materials and provide a means of assuring reproducible results and quality control.

    b. Separate procedure specifications shall be prepared for each type of weld.

    c. Welding procedure specifications shall be individually identified and shall be referenced on the Shop Drawings and erection drawings, or shall be suitably keyed to the Contract Drawings.

3. Previous Qualifications: Welding procedures previously qualified by test may be acceptable for this Contract without requalification if the following conditions are met:

    a. Testing was performed by an approved testing laboratory.

    b. The qualified welding procedure conforms to the requirements of this Section and is applicable to welding conditions encountered under this Contract.

    c. The welder, welding operator and tacker qualification tests conform to the requirements of this Section and are applicable to welding conditions encountered under this Contract.

4. Prequalified Procedures: Welding procedures which are considered prequalified as specified in ANSI/AWS D1.1, ANSI/AWS D1.4, and ANSI/AWS D1.6, will be accepted without further qualification.

    a. The Contractor shall submit for approval a listing and an annotated drawing to indicate the joints not prequalified.

    b. Procedure qualification shall be required for the joints not prequalified.

5. Retests: If welding procedure fails to meet the requirements of ANSI/AWS D1.1, ANSI/AWS D1.4, or ANSI/AWS D1.6, the procedure specification shall be revised and requalified.

a. At the Contractor's option, with the Engineer's approval, welding procedure may be retested in accordance with the standards.

b. If the welding procedure is qualified through retesting, all test results, including those of test welds that failed to meet the requirements, shall be submitted with the welding procedure.

B. Welder, Welding Operator and Tacker Qualification

1. General Information: Each welder, welding operator and tacker assigned to work on this Contract shall be certified in conformance with ANSI/AWS D1.1, D1.4, and D1.6. Welders shall also be New York City certified, and all welding shall be done in conformity with the NYCBC.

2. Certificates: Before assigning any welder, welding operator or tacker to work under this Contract, the Contractor shall submit to the Engineer the names of the welders, welding operators and tackers to be employed and certification that each individual is qualified as specified.

a. The certification shall state the type of welding and positions for which the welder, welding operator or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests.

b. The certification shall be kept on file at the job Site by the Contractor. The certification shall be kept current for the duration of the Contract.

3. Identification of Welds: The Contractor shall assign each welder, welding operator or tacker an identifying number, letter or symbol which shall be used to identify all welds made by that person. For identification, the welder, welding operator or tacker shall apply the assigned symbol adjacent to the weld by means of a rubber stamp, felt tipped marker with waterproof ink or other methods that do not cause an indentation in the metal. Identification with die stamps or electric etches shall not be allowed.

4. Record of Welds: The Contractor shall maintain a record of all welders, welding operators and tackers employed on the Contract showing the date and results of tests and the identification mark assigned to each person. These records shall be certified by the Contractor and copies of the records shall be furnished to the Engineer.

5. Previous Qualifications: At the discretion of the Engineer, welders, welding operators and tackers qualified by test within the previous 6 months may be accepted for this Contract without requalification if all of the following conditions are met:

a. Copies of the welding procedure specifications, the procedure qualification test records, and the welder, welding operator, and tacker qualification test records are submitted and approved in accordance with the requirements shown on the Contract Drawings.

b. Testing was performed by an approved testing laboratory.

c. The previously-qualified welding procedure conforms to the requirements of this Section and is applicable to welding conditions encountered under this Contract.

d. The welder, welding operator and tacker qualification tests conform to the requirements of this Section and are applicable to welding conditions encountered under this Contract.

6. Renewal of Qualifications: Requalification of a welder or welding operator shall be required under any of the following conditions:

a. It has been more than 6 months since the welder or welding operator has used the specific welding process for which the welder or welding operator is qualified.

b. There is specific reason to question the welder or welding operator's ability to make welds that meet the requirements of these Specifications.

c. The welder or welding operator was qualified by an employer other than those firms performing Work under this Contract, and a qualification test has not been taken within the past 12 months. Records showing periods of employment, name of employer where welder, or welding operator, was last employed, and the process for which qualified shall be submitted as evidence of conformance.

d. A tacker who passes the qualification test shall be considered eligible to perform tack welding indefinitely in the positions and with the processes for which he is qualified, unless there is some specific reason to question the tacker's ability. In such a case, the tacker shall be required to pass the prescribed tack welding test.

1.07 SUBMITTALS

A. The Contractor shall prepare and submit Shop Drawings for approval of the Engineer. Submittals shall include, but not be limited to, the following:

1. Erection drawings, and catalog data on welding equipment and materials.

2. Welding procedure specifications.

3. Welding procedure qualifications and test records.

4. Welder, welding operator and tacker qualifications and test records.

5. Records of tests and inspections of installed welds.

6. Testing or inspection agency selection.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. All welding equipment, electrodes, welding wire and fluxes shall be capable of producing satisfactory welds when used by a qualified welder or welding operator performing qualified welding procedures.

B. All welding equipment and materials shall comply with the applicable requirements of ANSI/AWS D1.1, ANSI/AWS D1.4, and ANSI/AWS D1.6.

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 APPLICATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Supervision

1. All shop and field welding shall be under the immediate supervision of a representative of a standard testing agency or an approved inspection agency reporting directly to, and under the control of, the Department of Environmental Protection.

2. Procedures and techniques for inspection shall be in accordance with the applicable requirements of ANSI/AWS D1.1, ANSI/AWS D1.4, and ANSI/AWS D1.6. The Contractor shall submit the name of such agency to the Commissioner for approval before starting Work.

3. The costs of all welding inspections and tests shall be borne by the Contractor.

B. Inspection and Tests

1. The Engineer will make periodic checks of each welder to determine that welds are being made as specified in the approved procedure specifications. Welding speed may be estimated.

2. All welds will receive 100 percent visual inspection to determine weld size and profile, surface cracks, overlap, and undercut.

3. Welds shall receive non-destructive testing as required in Section 05 12 00 - Structural Steel Framing.

4. The Engineer reserves the right to perform any additional test on any weld, including liquid penetrant, magnetic particle, radiographic, and ultrasonic. The costs of such testing will be borne by the Contractor if unsatisfactory welds are discovered, or by the City if the welds are satisfactory.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 05 05 23.02 - MISCELLANEOUS METAL FASTENINGS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all materials, labor, and equipment required to provide all metal fastening in accordance with the Contract Drawings and as specified herein.

B. The following index of this Section is presented for convenience:

C.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

Section 05 05 13.01	-	Galvanizing
Section 05 05 23.01	-	Welding
Section 05 12 00	-	Structural Steel Framing

1.04 REFERENCES

A. ASTM International (ASTM)

ASTM A36	-	Carbon Structural Steel
ASTM A193	-	Standard Specification for Alloy Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
ASTM A240	-	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and General Applications
ASTM A307	-	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A489	-	Carbon Steel Lifting Eyes
ASTM A563	-	Carbon and Alloy Steel Nuts
ASTM B348	-	Titanium and Titanium Alloy Bars and Billets.
ASTM D1785	-	Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120
ASTM E488	-	Standard Testing Method for Strength of Anchors in Concrete Elements
ASTM E1109	-	Test Method for Strength of Power-Actuated Fasteners Installed in Structural Members
ASTM E1512	-	Test Method for Testing Bond Performance of Bonded Anchors
ASTM F436	-	Specification for Hardened Steel Washers Inch and Metric Dimensions
ASTM F467	-	Nonferrous Nuts for General Use
ASTM F593	-	Stainless Steel Bolts; Hex Cap Screws, and Studs
ASTM F594	-	Stainless Steel Nuts
ASTM F1554	-	Specification for Anchor Bolts, Steel, 36, 55 and 105 ksi Inch and Metric Dimensions
ASTM F3125	-	Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated 120 ksi and 150 ksi, Minimum Tensile Strength Inch and Metric Dimensions

B. American Concrete Institute (ACI)

ACI 355.2	-	Qualification of Post-Installed Mechanical Anchors in Concrete
ACI 355.4	-	Qualification of Post-Installed Adhesive Anchors in Concrete

C. International Code Council – Evaluation Service (ICC-ES)

ICC-ES AC01	-	Acceptance Criteria for Expansion Anchors in Masonry Elements
ICC-ES AC58	-	Acceptance Criteria for Adhesive Anchors in Masonry Elements
ICC-ES AC60	-	Acceptance Criteria for Anchors in Unreinforced Masonry Elements
ICC-ES AC70	-	Acceptance Criteria for Fasteners Power-Driven into Concrete, Steel and Masonry Elements
ICC-ES AC106	-	Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements
ICC-ES AC193	-	Acceptance Criteria for Mechanical Anchors in Concrete Elements
ICC-ES AC308	-	Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

D. American Welding Society (AWS)

AWS D1.1	-	Structural Welding Code - Steel
AWS D1.2	-	Structural Welding Code - Aluminum
AWS D 1.6	-	Structural Welding Code – Stainless Steel

E. American Society of Mechanical Engineers (ASME)

ASME B 18.2.1	-	Square, Hex Bolts, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head and Lag Screws (Inch Series)
ASME B 18.2.2	-	Square and Hex Nuts (Inch Series)
ASME B 18. 22.1	-	Plain Washers

F. New York City Building Code (NYCBC)

G. NYC Buildings Bulletin 2009-019

H. American Institute of Steel Construction (AISC)

Steel Construction Manual

AISC 303 - Code of Standard Practice for Steel Buildings and Bridges

AISC 360 - Specification for Structural Steel Buildings

RSCS Specification for Structural Joints Using High-Strength Bolts

I. Aluminum Association

Specifications for Aluminum Structures

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Fasteners not manufactured in the United States shall be tested and certification provided with respect to specified quality and strength standards. Certifications of origin shall be submitted for all U.S. fasteners supplied on the project. Fasteners to be tested shall be randomly selected by the Engineer in the field.

B. All welding shall be performed by welders certified in accordance with AWS. Certifications of field welders shall be submitted prior to performing any field welds as per Section 05 05 23.01 – Welding. Welding shall comply with, but not limited to the following:

1. AWS D1.1 for Steel
2. AWS D1.2 for Aluminum
3. AWS D1.6 for Stainless Steel

Inadequate welds shall be corrected or redone and retested to the satisfaction of the Engineer, at no additional cost to the City.

C. Fasteners and concrete anchors will be inspected in accordance with the Inspection Article in Part 3.

D. Manufacturer’s load tables and certified performance tests for titanium bolts shall be provided.

E. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.
2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.
3. The Contract shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.
4. Quality Assurance inspections shall include (but are not limited to) the following activities:

a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

b. Test 2 fastener samples per lot of 100 for material conformance.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for approval by the Engineer. Submittals shall include, but not be limited, to the following:

Shop Drawings providing the manufacturer, fastener type, certification of the fastener's material and capacity and product data such as:

a. Product information

b. Technical information

c. Manufacturer’s Installation Instructions (MPII)

d. ICC-ES Evaluation Report

e. Copy of valid AWS certification for each person who is to perform field welding

f. Certified weld inspection reports, when required

g. Adhesive Anchors

h. For all adhesive anchors, submit anchor sizes and location plan

i. Testing methods, procedures and equipment

j. In the event that any adhesive anchors fail field testing, submit a detailed procedure for the removal and replacement of those anchors

1.08 DELIVERY, STORAGE, AND HANDLING

A. Materials stored outdoors shall be supported above ground surfaces and protected with approved effective and durable covers.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Expansion anchors shall be:

1. Power-Stud+SD1 as manufactured by DeWalt, Brewster, NY;

2. Kwik Bolt 3 (KB3) expansion anchor as manufactured by Hilti, Plano, TX;
3. Strong-Bolt 2 Wedge Anchor as manufactured by Simpson Strong-Tie, Pleasanton, CA;
4. Or approved equal.

B. Screw anchors shall be:

1. Type 316L stainless steel KH-EZ screw anchor as manufactured by Hilti, Plano, TX;
2. Type 316L stainless steel Wedge-Bolt screw anchor as manufactured by DeWalt, Brewster, NY;
3. Type 316L stainless steel Titen-HD screw anchor as manufactured by Simpson Strong-Tie, Pleasanton, CA;
4. Or approved equal.

C. Sleeve or drop-in anchors shall be as manufactured by:

1. Hilti Inc., Plano, TX;
2. DeWalt, Brewster, NY;
3. Simpson Strong-Tie, Pleasanton, CA;Or approved equal.

D. Adhesive Anchors

1. Epoxy adhesive anchor system shall be:
   a. Pure 110+ as manufactured by DeWalt, Brewster, NY;
   b. HIT-RE 500-V3 as manufactured by Hilti, Plano, TX;
   c. Or approved equal.
2. Vinylester adhesive anchor system shall be:
   d. AC200+ as manufactured by DeWalt, Brewster, NY;
   e. HIT HY-200 as manufactured by Hilti, Plano, TX;
   f. A7+ as manufactured by ITW Ramset/Redhead, Glendale Height, IL;
   g. AT-XP as manufactured by Simpson Strong-Tie, Pleasnaton, CA;
   h. Or approved equal.

E. Masonry Anchors

1. The adhesive system shall be as manufactured by:
   a. Hit HY-70 by Hilti Inc., Plano, TX;
   b. AC100+ Gold by DeWalt, Brewster, NY;

c. AT (acrylic) or SET (epoxy) by Simpson Strong-Tie, Pleasanton, CA;

d. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Anchor Bolts

1. Anchor bolts for miscellaneous framing and architectural elements attachments shall conform to ASTM A36 or ASTM A307 Grade A except where stainless steel or other approved anchor bolts are shown on the Contract Drawings. Anchor bolts shall be of the size and configuration shown on the Contract Drawings and shall be supplied with hexagonal nuts meeting the requirements of ASTM A563 Grade A.

2. Anchor bolts for equipment attachment shall be of stainless steel Type 316L with nitronic 60 stainless steel nuts and locknuts.

3. All underwater anchor bolts shall be Type 316L stainless steel with nitronic 60 stainless steel nuts.

4. Where anchor bolts are used to anchor galvanized steel or are otherwise specified to be galvanized, they shall be hot-dip galvanized in accordance with ASTM A307 and Section 05 05 13.01 - Galvanizing.

5. Pipe sleeves around anchor bolts shall be of the size and configuration shown on the Contract Drawings.

6. Material for anchor bolts submerged in salt water or corrosive liquids for which stainless steel Type 316L is not suitable shall be as indicated in the Contract.

B. Bolts

1. Bolts, nuts and washers for miscellaneous framing and for attachment of architectural elements shall conform to Section 05 12 00 - Structural Steel Framing.

2. Where bolts are used to connect galvanized steel or are otherwise specified to be galvanized, bolts, nuts, and washers shall be hot-dip galvanized in accordance with Section 05 05 13.01 - Galvanizing.

C. Stainless Steel Bolts

1. Stainless steel bolts shall conform to ASTM F593. All underwater fasteners shall be Type 316L stainless steel. Unless otherwise specified, fasteners for aluminum members shall be Type 316L stainless steel. Fasteners for stainless steel members shall be of matching grade.

2. Stainless steel bolts shall have hexagonal heads with a raised letter or symbol on the bolts indicating the manufacturer, and be supplied with

hexagonal nuts meeting the requirements of ASTM F594. Nuts shall be of the same alloy as the bolts and shall have a raised letter or symbol indicating the manufacturer.

3. Nuts for stainless steel bolts for elements which are indicated on the Contract Drawings to be removable shall be made of nitronic 60 alloy.

4. Material for bolts submerged in salt water or corrosive liquids for which stainless steel Type 316L is not suitable shall be as indicated in the Contract.

D. Post-Installed Anchors

1. Concrete anchors shall be one of the types listed below as indicated on the Contract Drawings. Unless otherwise noted, all concrete anchors which are submerged, or which are subject to vibration from equipment such as pumps and generators, shall be injected, adhesive anchors. The determination of anchors equivalent to those listed below shall be based on test data performed by a commercial testing laboratory.

   a. Mechanical Anchors

      1) Expansion anchors shall be wedge, sleeve, or drop-in mechanical anchors.

      2) Screw anchors shall be one-piece threaded anchor with a finished hexagonal head.

   b. Adhesive anchors shall be two part injection type.

   c. Where anchor type is not indicated on the Contract Drawings, the wedge expansion anchor shall be used.

2. Expansion anchors shall be fully threaded, medium duty, Type 316L stainless steel anchors. Shall be sized and embedded to depths as shown on the Contract Drawings. If embedment depth is not given, the standard embedment depth as recommended by the manufacturer shall be used.

   d. Manufacturer for Expansion anchor shall be as specified in this Section.

3. Screw anchors shall be a one piece, heavy duty anchor with a finished hexagonal head. Screw anchors shall be sized and embedded to depths as shown on the Contract Drawings. If embedment depth is not given, the standard embedment depth as recommended by the manufacturer shall be used.

   e. Manufacturer for screw anchor shall be as specified in this Section.

4. Adhesive anchors shall consist of Grade 60 reinforcing steel ASTM A 615, or Type 316L stainless steel ASTM F593 or Grade B7 high strength carbon ASTM A193 threaded rods or bolts anchored with a two-part injection type adhesive system into hardened concrete or grout-filled

masonry. The adhesive system shall use a two-component adhesive mix and shall be injected with a static mixing nozzle following manufacturer's instructions. The anchor diameter, type, and embedment depth shall be as shown on the Contract Drawings.

f. The embedment depth of the rod/bolt shall provide a minimum allowable bond strength that is equal to the allowable tensile capacity of the rod/bolt (see Table 1) unless noted otherwise on the Contract Drawings.

g. Manufacturer for Epoxy adhesive and Vinylester adhesive anchor systems and shall be as specified in this Section.

h. Adhesive anchoring system shall have an ICC-ES Evaluation Service Report issued in accordance with AC308.

i. Adhesive for the anchors must qualify under ACI 355.4.

Table 1
Allowable Tensile Capacity (Kips) for Standard Manufacturer Embedment

Size	Concrete Anchors Wedge Type	CONCRETE ANCHORS WITH INJECTION ADHESIVE SYSTEM
3/8"	1.3	2.1
1/2"	2.4	3.8
5/8"	3.3	5.9
3/4"	4.8	8.4
7/8"	5.6	11.0
1"	7.1	15.0

E. Masonry Anchors

1. Masonry anchors shall be injection adhesive anchors with screen tube for fastening to hollow block, clay tiles and brick with holes (see Table 2).

2. Manufacturer for adhesive system shall be as specified in this Section.

3. Masonry anchors shall be of stainless steel type 316L unless noted otherwise. Masonry anchors for stainless steel attachments shall be of the matching grade.

Table 2 Allowable Tensile Masonry (lbs) in Hollow Concrete Block	
Size	MASONRY ANCHORS WITH INJECTION ADHESIVE SYSTEM
1/4"	55
5/16"	370
3/8"	525
1/2"	525

F. Electrodes for Welding

1. Electrodes for welding carbon steel shall comply with Section 05 12 00 - Structural Steel Framing.
2. Electrodes for welding aluminum shall comply with the Aluminum Association Specifications and AWS D1.2.
3. Electrodes for welding stainless steel and other metals shall comply with AWS A5.4.

G. Eye Bolts

1. Eyebolts shall be of the size indicated on the Contract Drawings and s hall conform to ASTM A489 unless noted otherwise.
2. Carbon steel eyebolts shall be galvanized in accordance with Section 05 05 13.01 - Galvanizing.

H. Titanium Bolts and Anchors

1. Titanium bolts, washers, nuts and anchors shall be provided in, over, and adjacent to containment areas for ferric chloride and sodium hypochlorite, unless indicated otherwise on the Contract Drawings.
2. Bolts and anchors shall be of the size indicated on the Contract Drawings. Bolts, anchors washers and nuts and shall conform to ASTM B 348, Grade 2.
3. Minimum mechanical and physical properties:
   a. Tensile Strength 50,000 psi
   b. Yield Strength 40,000 psi
   c. Elongation in 4" dia. 20%
   d. Modulus of Elasticity 14.9×10^6 psi

I. Expansion Bolts in Structural Steel Connections

Expansion bolts for connecting to hollow section steel or where access is restricted (blind-bolts) shall be Type 316L stainless steel with a hex head such as specified in this Section.

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. The Contractor shall field verify all dimensions and condition of the materials to be connected, review the Drawings and report any discrepancies to the Engineer for clarification prior to starting fabrication.

3.02 INSTALLATION

A. Anchor Bolts and Concrete Anchors:

1. Anchor bolts shall be installed in accordance with AISC "Code of Standard Practice" by setting in concrete while it is being placed and positioned by means of a rigidly held template.
2. The installation of concrete anchors shall be done in strict conformance with the manufacturer's field demonstration and recommendations.
3. The holes drilled for adhesive anchors shall be cleaned by use of a fiber bristle brush and dry compressed air. The anchors shall be supported in the correct position until the adhesive sets and gains enough strength to prevent any dislocation. Adhesive anchors shall not be tightened or loaded until the adhesive has fully cured as recommended by the manufacturer.
4. No concrete anchor shall be installed before base concrete has attained specified 28-day strength.
5. Concrete anchors shall not be used in place of anchor bolts without Engineer's approval.

B. Bolts:

1. All steel bolts shall be installed in conformance with Section 05 12 00 - Structural Steel Framing.
2. Unless otherwise specified, where aluminum and steel members are connected together they shall be fastened with Type 316L stainless steel bolts and isolated with micarta, nylon, rubber, or approved equal.

C. Concrete Inserts: Provide concrete inserts where shown on the Contract Drawings. Inserts shall be firmly held in position in the forms and sealed from intrusion of concrete mortar during concrete placement.

D. Titanium Bolts

1. All bolts shall be installed in conformance with the manufacturer's recommendations.

2. Titanium anchors shall be installed in accordance with AISC "Code of Standard Practice" by setting in concrete while it is being placed and positioned by means of a rigidly held plate.

E. Adhesive Anchors

1. Concrete is to be a minimum of 21 days old at time of anchor installation.

2. Work shall be performed by certified ACI/CRSI Adhesive Anchor Installers under continuous special inspection.

3. Shall be installed in accordance with Manufacturer's Published Installation Instructions (MPII), the applicable ICC-ES ESR and in accordance with NYC Buildings Bulletin 2009-019.

4. Adhesive anchoring installation shall be subject to special inspection requirements of NYCBC section BC 1704.32.

5. Adhesive anchor shall be identified by labels on the packaging including manufacturer's name, product designation and the requirements specified in ICC-ES AC308, Annex A.

F. Welding

1. Welding shall comply with the requirements of Sections 05 12 00 - Structural Steel Framing and 05 05 23.01 - Welding.

3.03 FIELD TESTING / QUALITY CONTROL

A. Inspection

1. Inspection for high strength bolted connections shall conform to the requirements of Section 05 12 00 - Structural Steel Framing.

2. At least 25 percent of the concrete anchors required to be installed shall be proof tested to 1.33 times the allowable load specified by the manufacturer of the system.

3. Welding inspection shall be done in accordance with the requirements of Sections 05 12 00 - Structural Steel Framing and 05 05 23.01 - Welding.

4. Inspection of titanium bolted connections shall conform to the requirements of AISC "Code of Standard Practice."

Adhesive Anchors: Adhesive anchoring installation shall be subject to special inspection requirements of NYCBC section BC 1704.32.

B. Testing of Adhesive Anchors

Field testing:

a. Testing to be performed by a NYC Buildings Department approved special inspection agency to perform field testing of the installed anchors in accordance with NYCBC BC 1704.32 and ICC-ES ESR and the applicable sections of ASTM E488 in the presence of the Engineer.

b. Anchors that are to be tested according to the following criteria:

Pull-out testing:

a. A total of 15% of the adhesive anchors designated for testing are to be tested and no more than one (1) bolt is to be tested per connection.

b. The Engineer will randomly choose the anchors to be tested.

c. Testing of the adhesive anchors shall not begin until all the anchors are installed.

d. If only one anchor fails, all the adhesive anchors will be accepted. If a second anchor fails, an additional 5% of the anchors shall be tested. If more than 20% of the total anchors tested fail, all the anchors shall be removed and replaced.

Removal and replacement of failed test anchors:

a. Remove all anchors that fail the field test without damage to the surrounding concrete.

b. Redrill holes to remove adhesive bonding material residue and clean in accordance with MPII.

c. Reinstall new anchors that are the same size as the removed anchors and install the new anchors in the same exact location as the removed anchor. Do not reuse the failed anchors, they shall be discarded.

d. Assign reinstalled anchors into batches only containing reinstalled anchors of the same diameter, embedment length and adhesive bonding material system, and field test in accordance with the above sections.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all equipment, materials, and services for the fabrication, delivery, unloading, handling, storing, and erection of all structural steel Work as shown on the Contract Drawings and called for herein.

B. Unless otherwise shown, specified or required, design, workmanship and erection shall conform to or exceed the applicable requirements of the documents listed hereinafter in Article "References" included in this Section to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Requirements from the following sections also apply to this Section:

1. Section 05 05 13.01 - Galvanizing
2. Section 05 05 23.01 - Welding
3. Section 05 05 23.02 - Miscellaneous Metal Fastenings
4. Section 09 91 00 - Painting

1.04 REFERENCES

A. Definition:

1. Environmental Product Declaration - A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

B. Reference Standards:

1. ASTM:

a. ASTM A6 - General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling

b. ASTM A36 - Carbon Structural Steel

c. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

d. ASTM A193 - Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

e. ASTM A194 - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service

f. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

g. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

h. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

i. ASTM A563 - Carbon and Alloy Steel Nuts

j. ASTM A572 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel

k. ASTM A588 - High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4-Inches Thick

l. ASTM A7099 – Standard Specification for Structural Steel for Bridges

m. ASTM A992 - Standard Specification for Steel for Structural Shapes for Use in Building Framing

n. ASTM F436 - Hardened Steel Washers, Inch and Metric Dimensions

o. ASTM F594 - Stainless Steel Nuts

p. ASTM F3125 - High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi & 150 ksi Minimum Tensile Strength, Inch and Metric Dimensions

2. ANSI B18.2.1 - Square and Hex Bolts and Screws-Inch Series.

3. ANSI B18.22.1 - Plain Washers

4. ANSI/ASME B18.2.2 - Square and Hex Nuts (Inch Series)

5. American Welding Society (AWS):

a. AWS A5.1- Carbon Steel Covered Arc-Welding Electrodes

b. AWS A5.5- Low-Alloy Steel Covered Arc-Welding Electrodes

c. AWS A5.9- Corrosion-Resisting Chromium and Chromium-Nickel Steel Bare and Composite Metal Cored and Stranded Arc Welding Electrodes and Welding Rods

d. AWS A5.17 - Carbon Steel Electrodes and Fluxes for Submerged-Arc Welding

e. AWS A5.18 - Filler Metals for Gas Shielded Arc Welding, Carbon Steel

f. AWS A5.23 - Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

g. AWS D1.1- Structural Welding Code

h. AWS QC1 - Qualification and Certification of Welding Inspectors

6. New York City Building Code (NYCBC)

7. New York City Department of Buildings (NYCDOB)

8. American Institute of Steel Construction (AISC):

a. Steel Construction Manual

b. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges

c. AISC 360 - Specification for Structural Steel Buildings

d. RSCS Specifications for Structural Joints Using High-Strength Bolts

e. Design Guide 24 - Hollow Structural Sections

9. Steel Structures Painting Council (SSPC)

10. ISO 14025 - Environmental labels and declarations - Type III environmental declarations

1.05 DESCRIPTION

A. Definition

1. Structural Steel: The term structural steel shall be as defined in the Codes of Standard Practice for Steel Buildings and Bridges of the AISC. Included as structural steel shall be all stiffeners, plates, sag rods and other miscellaneous metal required for a complete installation.

1.06 QUALITY ASSURANCE

A. All fabrication and erection shall be performed by AISC Quality Certified Companies.

B. Shop inspections may be made by the City representatives. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication Work so that inspection may be provided. The Contractor shall furnish all facilities for the inspection of materials and workmanship in the shop, and the inspectors shall be allowed free access to the necessary parts of the works.

1. Inspectors shall have the authority to reject any materials or work which does not meet the requirements of these Specifications.

2. Inspection at the shop is intended as a means of facilitating the work and avoiding errors, but is expressly understood that it will in no way relieve the Contractor from his responsibility for furnishing proper materials or workmanship under this Specification.

C. All welding shall be performed by certified welders under the immediate supervision of a representative of a standard testing agency or a special inspection agency reporting directly to and under the control of the City and meeting the requirements of Section 05 05 23.01 – Welding.

D. The Contractor shall submit the name of such testing agency to the Commissioner for approval before starting Work.

1. All shop and field welds in structural steel shall be visually inspected by an AWS qualified welding inspector. The Contractor shall furnish a letter of certification for each welded connection stating that these requirements have been met.

2. The costs of all welding supervision and inspections shall be borne by the Contractor. The Contractor shall engage inspectors to inspect welded connections and to perform tests and prepare test reports.

3. Nondestructive testing such as radiographic testing or ultrasonic testing, when required, shall be as specified by the Engineer and performed in accordance with the applicable AWS or ASME code. Frequency of such testing shall also be as specified by the Engineer and indicated on the Contract Drawings.

4. Welds that are required by the Engineer and/or inspectors to be corrected shall be corrected or redone and retested as directed, at the Contractor's expense and to the satisfaction of the Engineer and/or an acceptable independent testing lab.

E. The Contractor shall engage an independent testing and inspection agency to inspect high-strength bolted connections. The agency shall report directly and be under the control of the City. The costs of all high-strength bolt inspections shall be borne by the Contractor.

1. Rejected bolts shall be either replaced or retightened as required. In cases of disputed bolt installation, the bolts in question shall be checked by a calibrated wrench certified by an independent testing laboratory. The certification shall be at the Contractor's expense.

F. The Contractor shall be solely responsible for the correctness of all shop and field fabrication and fit.

1.07 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. Layout drawings indicating all materials, structural shapes, sizes, and dimensions.
2. Beam and column schedules.
3. Detail drawings indicating connection and anchoring details.
4. Anchor bolts and setting plans.
5. Erection drawings

B. No fabrication shall be started until Shop Drawings have been approved in writing by the Engineer.

C. The Contractor shall also submit the following:

1. Certified mill test reports
2. Affidavit of compliance with grade specified
3. Certified weld inspection reports
4. Certification for bolts
5. Paint certification
6. Quality certifications for fabricators and erectors.

D. The Contractor shall furnish samples for testing, if required by the Contract.

E. Sustainability Submittals:

1. Environmental Product Declarations

a. The Contractor shall provide product-specific type III Environmental Product Declaration (EPD) conforming to ISO 14025, 14044.

2. Envision Submittals

a. The Contractor shall report information pertaining to the sustainable procurement, regional sourcing, and/or recycled content of new materials to be procured during the Work, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall coordinate with its vendor on sustainable product requirements as stipulated by the Contractor's approved New Materials Sustainable Implementation Plan, in accordance with Section 01 35 63 – Sustainability Certification Project Requirements. The Contractor shall submit vendor shop drawings for review by the Engineer that clearly illustrate the vendor is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Structural members shall be loaded in such a manner that they may be transported and unloaded without being over-stressed, deformed or otherwise damaged.

B. Structural steel members and packaged materials shall be protected from corrosion and deterioration. Material shall be stored in a dry area.

C. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with approved effective and durable covers.

D. Materials shall not be placed on the structure in a manner that might cause distortion or damage to the members or the supporting structures. The Contractor shall repair or replace damaged materials or structures as directed by the Engineer.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Structural Steel

1. The fabricator shall provide an affidavit stating that the structural steel furnished meets the requirements of the grade specified. All unidentified

steel will be rejected and shall be removed from the site and replaced by the Contractor, at no additional cost to the City.

2. Structural steel for W shapes shall conform to ASTM A992 unless otherwise indicated.

3. Structural steel for S, M, and HP shapes and channels shall conform to ASTM A572 Grade 50 unless otherwise indicated.

4. Structural steel for angles and plates shall conform to ASTM A36 unless otherwise indicated.

5. Certified mill test reports or certified reports of tests made by the fabricator or a testing laboratory for structural steel in accordance with ASTM A6 and the governing specification shall constitute evidence of conformity with the ASTM Specification.

6. Steel pipe shall be ASTM A53, Type E or S, Grade B.

7. Structural tubing shall be ASTM A500, Grade B. All members shall be furnished full length without splices unless otherwise noted or accepted by the Engineer.

8. Low alloy, high strength, high corrosion resistant steel shall conform to ASTM A 588.

9. High strength Columbium-Vanadium structural steel shall conform to ASTM A 572, Grade 50.

B. Bolts

1. High strength bolts shall conform to ASTM F3125. Other bolts shall conform to ASTM A307. Unless otherwise indicated, all bolts shall be ASTM F3125.

2. Galvanized high strength bolts shall conform to ASTM F3125, Type 1, nuts shall conform to ASTM A563. Galvanizing shall be by the hot-dip process and in accordance with Section 05 05 13.01 - Galvanizing.

   a. Nuts shall meet the requirements of either ASTM A563 for Grade DH, or ASTM A194 for Grade 2H.

   b. Flat circular washers and square or rectangular beveled washers shall conform to the requirements of ASTM F436.

   c. Bolt dimensions shall conform to the requirements for regular semi-finished hexagon bolts, ANSI B18.2.1., unless otherwise specified.

   d. Nut dimensions shall conform to requirements for heavy hexagon semi-finished nuts ANSI/ASME B18.2.2. Washers shall be flat and smooth and their dimensions shall conform to the requirements for heavy plain washers, ANSI B18.22.1.

3. Bolts used to connect dissimilar metals or located in a corrosive atmosphere, as indicated on the Contract Drawings or specified herein, shall be Type 316 stainless steel conforming to ASTM A193 and A194.

4. Bolts not manufactured in the United States shall be tested and certification provided with respect to specified and required quality and strength standards. Certification of origin shall be provided for all United States fasteners. Bolts to be tested will be randomly selected in the field by the Engineer.

C. Anchor Bolts

1. Anchor bolts for structural steel shall be of the size and configuration shown on the Contract Drawings and shall conform to ASTM F1554 unless shown or noted otherwise on the Contract Drawings.

D. Welding Electrodes

1. Welding electrodes for manual shielded metal arc welding shall conform to ANSI/AWS A5.1. Carbon steel electrodes and granular flux for the submerged-arc welding process shall conform to ANSI/AWS A5.17 and low-alloy steel electrodes and fluxes for submerged arc-welding shall conform to ANSI/AWS A5.23 as required for the conditions of actual use.

2. Welding electrodes for ASTM A36 steel shall comply with ANSI/AWS A5.1 (minimum tensile strength of 72,000 psi) and shall be E70XX.

3. Welding electrodes for ASTM A588, ASTM A572, and ASTM A992 steel shall comply with ANSI/AWS A5.17 (tensile strength range of 70,000 psi to 95,000 psi) or ANSI/AWS A5.23 wire and flux, and shall be F7XX-EXXX or F7XX-EXX-XX.

4. Gas-welding electrodes for steel shall comply with ANSI/AWS A5.18 (minimum yield strength of 60,000 psi).

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication shall be in accordance with the AISC Code of Standard Practice for Steel Buildings and Bridges.

B. Anchor Bolts:

1. All anchor bolts for structural steel erection and other incidental items of the structural steel required to be built into concrete shall be properly set and securely held in position in the forms before the concrete is placed.

2. Anchor bolts and setting plans for steel columns shall be provided at the site, marked or tagged for ready identification.

3. Anchor bolts shall be accurately set to template and at elevation to provide suitable projection above concrete and/or grout as specified in AISC Code of Practice. Anchor bolts shall be set perpendicular to the theoretical bearing surface.

4. All holes in structural steel members required for anchors, anchor bolts, bolt holes, connection angles, supports and braces for stair stringers, equipment apparatus, sag rods, or other members noted on the Contract Drawings shall be provided by the fabricator and detailed on the shop drawings.

5. Where misalignment between anchor bolts and bolt holes in steel members is encountered, the Engineer shall be immediately notified. The Contractor shall submit a method to remedy the misalignment for review by the Engineer.

C. All materials shall be properly worked and match-marked for field assembly. Where finishing is required, assembly shall be completed including bolting and welding of units before start of finishing operations.

D. Connections:

1. Unless noted otherwise on the Contract Drawings, all beam connections shall be designed for reaction values indicated on the Contract Drawings. Wherever beam reaction values or connection details are not shown, the connection shall be designed to support half the total uniform load capacity tabulated in the AISC tables for allowable loads for laterally supported beams for the given shape, span, and steel specified for the beam in question.

2. Unless noted otherwise on the Contract Drawings, all beam connections designed by the fabricator shall conform to tables for Framed Beam Connections in AISC Manual of Steel Construction.

3. Except where otherwise noted on the Contract Drawings or in this Specification, all shop connections shall be welded.

E. Where shop assembly of field connections is shown, specified or required, the unmatched holes shall be reamed and the pieces matchmarked before disassembly. The interchange of matching parts will not be permitted.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurement

1. 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.

2. The Contractor shall review the Contract Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

3.02 IMPLEMENTATION

A. Erection

1. The erection of all structural steel shall conform to the applicable requirements of the Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings of the AISC.

   a. All temporary bracing, guys and bolts as may be necessary to ensure the safety of the structure until the permanent connections have been made shall be provided by the Contractor.

   b. High strength steel bolts shall conform to the AISC Specifications for Structural Joints Using High-Strength Bolts.

2. All field connections shall be accurately fitted up before being bolted. Drifting shall be only such as will bring the parts into position and shall not be sufficient to enlarge the holes or to distort the metal. All unfair holes shall be drilled or reamed.

3. High Strength Steel Bolts

   a. The furnishing and installation of high-strength bolts, washers and nuts shall be in conformity with:

      1) Relevant sections of the NYCBC.

      2) Latest issue of Rules Relating to High-Strength Bolts by the NYCDOB.

   b. All bolted connections shall use high strength bolts in bearing-type connections according to the AISC Specification for Structural Joints Using High-Strength Bolts.

   c. Where indicated, high strength bolts in slip-critical connections shall be used according to AISC Specification for Structural Joints Using High-Strength Bolts. The Engineer shall approve the procedure for calibration of wrenches and installation of bolts and, in general, shall satisfy himself that all requirements of the Specifications for Structural Joints Using High-Strength Bolts are met.

4. Cutting and Burning: The use of a gas cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. Its use may be permitted on minor members if the member is not under stress, and only after the written approval of the Engineer has been obtained.

   a. No cutting of structural steel members in the field will be allowed except by written approval of the Engineer.

   b. All cutting shall be done with an oxyacetylene torch in conformity with the NYCBC and AWS.

5. Grouting of Base Plates and Bearing Plates: All loose column base plates and billets shall be accurately set to the designated levels on steel wedges or angle screeds in preparation for grouting under this Section. Leveling plates grouted in place shall be installed under all structural steel columns.

   a. Prior to the placement of non-shrink grout beneath base and bearing plates, the bottom surface of the plates shall be cleaned of all foreign materials, and concrete and masonry bearing surface shall also be cleaned of all foreign materials and roughened to improve bonding.

   b. Anchor bolts shall be tightened after the supported members have been positioned and plumbed and the non-shrink grout has attained its specified strength.

   c. Baseplates shall be grouted with non-shrink grout to assure full uniform bearing. Grouting shall be done prior to placing loads on the structure.

6. Welding:

   a. Welding, where required, shall be performed in accordance with the requirements of:

      1) Section 05 05 23.01 – Welding.

      2) AWS D1.1 Structural Welding Code.

      3) Relevant sections of the NYCBC when applicable.

   b. In assembly and during welding the component parts of built-up Work shall be held in place by sufficient clamps, temporary bolts or other adequate means to keep parts in proper position. Where temporary bolts are used, to hold the parts together in steel plates or similar work, the temporary bolts shall be removed and the holes shall be filled with welding material where practical. Otherwise, the nuts shall be tightened and the bolt threads outside the unit shall be burned and the bolt peened to prevent the nut from loosening.

7. Misfits at Bolted Connections:

   a. Where misfits in erection bolting are encountered, the Engineer shall be immediately notified. The Contractor shall submit a method to remedy the misfit for review by the Engineer. The Engineer will determine whether the remedy is acceptable or if the member must be refabricated.

   b. Incorrectly sized or misaligned holes in members shall not be enlarged by burning or by the use of drift pins. The Contractor shall notify the Engineer immediately and shall submit a proposed method of remedy for review by the Engineer.

B. Frame Assembly

1. Structural frames shall be set accurately to the lines and elevations indicated on the Contract Drawings. The various members shall be aligned and adjusted to form a part of a complete frame or structure before being permanently fastened. Bearing surfaces and other surfaces which will be in permanent contact shall be cleaned before assembly. Necessary adjustments to compensate for discrepancies in elevations and alignments shall be performed.
2. Individual members of the structure shall be leveled and plumbed within AISC tolerances. The Contractor shall provide and install all temporary bracing required until structure is complete.

C. Painting

1. General Requirements:
   a. All Structural steel work shall first be galvanized in accordance with Section 05 13.01 - Galvanizing and then be painted in accordance with Section 09 91 00 – Painting, unless otherwise noted in the Contract Documents. All painting performed at the fabricator's shop shall be subject to inspection by the Engineer, and all parts of the work shall be made accessible to the Engineer.
   b. All structural steel work specified to be painted shall be sand blasted or wheel abraded by the fabricator, of loose mill scale, loose rust, weld slag or flux deposit, dirt and other foreign matter to satisfy the following specifications of the SSPC:
      1) SSPC SP-6, Commercial Blast Cleaning, for all steel except steel subject to immersion.
      2) SSPC SP-10, Near-White Blast Cleaning, for steels subject to immersion.
   c. Cleaned steels shall be primed within 6 hours after cleaning to prevent formation of new rust.
2. Field Welds: Surfaces within 2 inches of any field weld location shall be free of materials that would prevent proper welding or produce objectionable fumes while welding is being done.
3. Defective Work: The Contractor shall correct such work as found to be defective under this Article of the Sections.

D. Galvanizing

1. All steel noted to be galvanized on the Contract Drawings or specified herein shall be galvanized in accordance with Section 05 05 13.01 - Galvanizing.
2. All bolts and anchor bolts connecting galvanized steel members shall be galvanized.
3. Shop paint primer shall be omitted from steel to be galvanized.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 05 50 00 - METAL FABRICATIONS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish all labor, materials and equipment required to fabricate and install all 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, including stainless steel safety ladders.

B. 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. Unless otherwise shown, specified or required, design, workmanship and erection shall conform to or exceed the applicable requirements of the documents listed hereinafter in Article 1.04 to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

D. The following index of this Section is presented for convenience:

E.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A.	Section 03 60 00	-	Grouting
B.	Section 05 05 13.01	-	Galvanizing
C.	Section 05 05 23.01	-	Welding
D.	Section 05 05 23.02	-	Miscellaneous Metal Fastenings
E.	Section 05 12 00	-	Structural Steel Framing
F.	Section 09 91 00	-	Painting

1.04 REFERENCES

A.	ASTM A36	-	Structural Steel
B.	ASTM A48	-	Gray Iron Castings
C.	ASTM A240	-	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
D.	ASTM A276	-	Stainless and Heat-Resisting Steel Bars and Shapes
E.	ASTM A312	-	Standard Specification for Seamless and Welded Austenitic Stainless-Steel Pipes
F.	ASTM A480	-	General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plates, Sheet and Strips
G.	ASTM A563	-	Standard Specification for Carbon and Alloy Steel Nuts
H.	ASTM A572	-	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
I.	ASTM A666	-	Austenitic Stainless Steel, Sheet, Strip Plate and Flat Bar
J.	ASTM B209	-	Aluminum and Aluminum-Alloy Sheet and Plate
K.	ASTM B221	-	Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
L.	ASTM B308	-	Aluminum-Alloy 6061-T6 Standard Structural Profiles
M.	ASTM F436	-	Hardened Steel Washers
N.	ASTM F593	-	Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
O.	ASTM F1554	-	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

P. ANSI/ASSP Z359.16-2016 - Safety Requirements for Climbing Ladder Fall Arrest Systems

Q. ANSI/AWS D1.1 - Structural Welding Code - Steel

R. ANSI/AWS D1.2 - Structural Welding Code - Aluminum

S. ANSI/AWS D1.6 - Structural Welding Code - Stainless Steel

T. New York City Building Code (NYCBC)

U. American Institute of Steel Construction (AISC)

V. AISC Manual of Steel Construction

W. AISC Specification for Design and Fabrication of Structural Steel for Buildings Including the Commentary

X. Occupational Safety and Health Administration (OSHA), U.S. Department of Labor

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Shop inspections may be made by the City's representatives. The Contractor shall give ample notice to the Engineer prior to the beginning of any fabrication Work so that inspection may be provided. The Contractor shall furnish all facilities for the inspection of materials and workmanship in the shop, and the inspectors shall be allowed free access to the necessary parts of the works.

B. Inspectors shall have the authority to reject any materials or Work which does not meet the requirements of these Specifications.

C. Inspection at the shop is intended as a means of facilitating the Work and avoiding errors but is expressly understood that it will in no way relieve the Contractor from his responsibility for furnishing proper materials or workmanship under this Section.

D. Design of Members and Connections:

1. All details shown are typical; similar details shall apply to similar conditions, unless otherwise shown or specified. Dimensions shall be verified at the Site without causing delay in the Work.

2. Each fabricator shall be responsible for the structural design of miscellaneous metal work within the requirements established by these Specifications.

E. Complete design calculation and Shop Drawings shall be prepared, signed and stamped with the seal of a Professional Engineer, licensed to practice in the State of New York with a minimum of 10 years of experience and recognized as an expert in the required work unless the design and details have been shown on the Contract Drawings.

F. Shop Assembly: Items in the shop shall be preassembled to the greatest extent possible, so as to minimize field splicing and assembly of units at the Site. Units shall be disassembled only to the extent necessary for shipping and handling limitations. Units shall be clearly marked for reassembly and coordinated installation.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and other materials for the approval by the Engineer. Shop Drawings shall include, but not be limited to, the following:

1. Layout drawings shall indicate all structural shapes, sizes, dimensions, and welding details.

2. Certifications, schedules, design calculations, detailed drawings, plans, elevations, all material specifications, and details of sections and connections.

3. Detail drawings shall indicate jointing and anchoring details.

4. Anchor bolts and setting plans.

5. Safety ladders.

6. Erection drawings.

B. No fabrication shall be started until Shop Drawings have been approved by the Engineer.

C. The following shall also be submitted:

1. Manufacturer’s specifications, load table, installation instructions, setting drawings and templates for location and installation of miscellaneous metal items, appurtenances and anchorage devices.

2. Welded certifications and certified weld inspection reports.

D. Representative samples of bolts, anchors and inserts shall be submitted as requested by the Engineer. The Engineer's review shall be for type and finish only. Compliance with all other requirements shall be the exclusive responsibility of the Contractor.

1. Record Drawings: During progress of the Work, an up to date set of drawings showing field and Shop Drawing modifications shall be kept. Immediately upon completion of Work, Record Drawings showing the actual in-place installation of all Work constructed and/or installed under this Section shall be submitted to the Engineer. Drawings shall include all necessary plans, sections and details, with all reference dimensions and elevations required for complete Record Drawings of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Metal fabrications shall be handled in such a manner that they may be transported and unloaded without being over-stressed, deformed or otherwise damaged.

B. Metal fabrications and packaged materials shall be protected from corrosion and deterioration and shall be stored in a dry area. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with effective and durable covers approved by the Engineer.

C. Metal fabrications shall not be placed in or on a structure in a manner that might cause distortion or damage to the fabrication. The Contractor shall repair or replace damaged metal fabrications or materials as directed by the Engineer.

D. Materials shall be delivered to the Site at such intervals to insure uninterrupted progress of the Work. Anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry shall be delivered, in ample time not to delay that Work.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Materials

1. Structural steel shapes shall be fabricated in accordance with the details shown on the Contract Drawings and shall conform to the requirements of Section 05 12 00 - Structural Steel Framing and ASTM A572 Grade 50 unless otherwise indicated. Steel designated to be galvanized shall be galvanized in accordance with the requirements of Section 05 05 13.01 – Galvanizing. Steel designated to be painted shall be shop painted in accordance with Section 09 91 00 - Painting.

2. Aluminum shapes and plate shall be 6061-T6 aluminum alloy with mill finishes 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.

3. Stainless steel shapes and plate shall be Type 316L stainless steel for bolted and welded constructions as detailed on the Contract Drawings, unless otherwise noted. Shapes shall conform to ASTM A276. Stainless steel plates shall conform to ASTM A480 and ASTM A666. Stainless steel welding shall confirm to AWS D1.6.

4. Stainless steel debris fence shall be Type 316L stainless steel for welded construction as detailed on the Contract Drawings unless otherwise noted. Shapes shall conform to ASTM A276. Stainless steel bolts shall be Type 316L and shall conform to ASTM F593. Stainless steel welding shall conform to AWS D1.6.

5. Bolting hardware shall be as specified in Section 05 05 23.02 - Miscellaneous Metal Fastenings.

6. Concrete anchors shall be as specified in Section 05 05 23.02 - Miscellaneous Metal Fastenings.

B. Standard Access Stairs and Platforms

1. Standard access stairs and platforms have galvanized steel or aluminum structural members, aluminum stair treads, and aluminum platform gratings as specified herein unless shown otherwise on the Contract Drawings.

2. Structural steel sections shall conform to ASTM A572 and all work shall conform to the AISC Manual of Steel Construction.

3. Stainless steel ladders and associated handrails shall be as shown on Contract Drawings. Handrail attachment to stairs and platform shall be in accordance with the details shown on the Contract Drawings. Anchorage to concrete for stainless steel items shall be made with 316L stainless steel anchor bolts, with matching washers and nuts.

4. Access stairs, ladders, and platforms other than standard items shall be manufactured per the details provided on the Contract Documents.

C. Galvanized Accessories

1. Materials and fabrication shall conform to Section 05 12 00 – Structural Steel Framing. All galvanizing shall be done after fabrication and shall conform to the requirements of Section 05 05 13.01 – Galvanizing.

D. Anchor Bolts

1. Anchor bolts shall be as specified in Section 05 05 23.02 - Miscellaneous Metal Fastenings.

E. Vertical Ladders

1. Aluminum ladders shall be fabricated from aluminum 6061-T6 as detailed on the Contract Drawings.

2. Stainless steel ladders shall be fabricated from Type 316L stainless steel as detailed on the Contract Drawings.

3. Wall mounted ladders shall have welded brackets attached to the wall with concrete or masonry anchors.

F. Steel Bollards

1. Galvanized steel pipe bollards shall be fabricated to dimensions and details indicated in the Contract Drawings. Bollards shall be fabricated from 8-inch nominal outside diameter pipe, extra strong.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication of steel and stainless steel shall be in accordance with the Specification for the Design Fabrication and Erection of Structural Steel for Building of the AISC. Fabrication of aluminum shall be in accordance with the Aluminum Association Specifications for Aluminum Structures.

B. Holes for bolts and screws shall be drilled. Fastenings shall be concealed where practicable. Joints exposed to the weather shall be formed to exclude water.

C. As far as practicable, all fabricated units shall be fitted and assembled in the shop, with all cuts and bends made to precision measurements in accordance with details shown on approved Shop Drawings.

D. Work shall be fabricated so that it is installed in a manner that will provide for expansion and contraction, prevent the shearing of bolts, screws and other fastenings, ensure rigidity, and provide close fitting of sections.

E. Welding of carbon and low alloy steel shall conform to the applicable requirements of ANSI/AWS D1.1, and Section 05 05 23.01 - Welding. Welding of aluminum shall conform to the applicable recommendations of the Aluminum Company of America publication, "Welding and Brazing Aluminum"; ANSI/AWS D1.2 and Aluminum Association Specification for Aluminum Constructions. Welding shall be done in a manner that will prevent permanent buckling and all welds exposed in the finished Work shall be ground smooth.

F. Welding of stainless steel items shall conform to AWS D1.6.

G. All finished and/or machined faces shall be true to line and level. Steel and aluminum shall be standard, and well finished. Sections shall be well formed to shape and size with sharp lines and angles; curved work shall be sprung evenly to curves.

H. All Work shall be fitted together at the shop as far as possible and delivered complete and ready for erection. Proper care shall be exercised in handling all Work so as not to damage the finished surfaces.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurements

1. 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.
2. The Contractor shall review the Contract Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

B. Inspection

1. The Contractor shall examine the alignment of the substrate and conditions under which metal fabrication Work is to be performed and notify the Engineer in writing of unsatisfactory conditions. Do not proceed with the metal fabrication and installation Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

3.02 IMPLEMENTATION

A. Installation

1. All metal fabrications shall be erected square, plumb and true, accurately fitted, adequately anchored in place, set at proper elevations and positions.
2. All inserts, anchor bolts and all other miscellaneous metal work specified herein or shown on the Contract Drawings or required for the proper completion of the Work, which are embedded in concrete, shall be properly set and securely held in position in the forms before the concrete is placed.
3. All miscellaneous metal fabrications shall be installed in conformance with details shown on the Contract Drawings or on the approved Shop Drawings.

B. Galvanizing

1. All miscellaneous steel fabrications shall be galvanized after fabrication in accordance with Section 05 05 13.01 - Galvanizing.
2. Galvanized surfaces damaged during installation shall be touched up with a galvanizing repair paint applied in accordance with the manufacturer's instructions.

C. Painting

1. All miscellaneous metal fabrications other than aluminum or stainless steel, shall be painted in accordance with the requirements of Section 09 91 00 - Painting.
2. All galvanized metal fabrications, that have the surfaces exposed in the finish work, shall be painted in accordance with Section 09 91 00 - Painting.
3. Aluminum surfaces in contact with concrete or dissimilar metals shall be thoroughly protected with two coats of an epoxy paint with a total thickness of 16 mils or other approved isolating material.
4. Surface preparation shall be done in accordance with Section 09 91 00 - Painting.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the general requirements for fiber-reinforced polymer (FRP) bar strengthened plastic lumber to be used for the construction of concrete deck edge protection systems. The structural shapes used to achieve these systems shall be produced using the pultrusion process and shall conform to the requirements specified herein and as shown on the Contract Drawings.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

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

1.03 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 05 05 23.02 – Miscellaneous Metal Fastening

1.04 REFERENCES

A. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

B.	ASTM A666	-	Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
C.	ASTM D570	-	Test Method for Water Absorption of Plastics.
D.	ASTM D635	-	Test Method for Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position.
E.	ASTM D638	-	Test Method for Tensile Properties of Plastics.
F.	ASTM D695	-	Test Method for Compression Properties of Rigid Plastics.
G.	ASTM D696	-	Test Method for Coefficient of Linear Thermal Expansion of Plastics.
H.	ASTM D746	-	Brittleness Temperature of Plastic and Elastomers by Impact.
I.	ASTM D790	-	Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
J.	ASTM D792	-	Test Method for Specific Gravity (Relative Density) and Density of Plastics by Displacement.
K.	ASTM D953	-	Test Method for Bearing Strength of Plastics.
L.	ASTM D2240	-	Rubber Property-Durometer Hardness.
M.	ASTM D2344	-	Test Method for Short Beam Strength of Polymer Matrix Composite Materials and their Laminates.
N.	ASTM D2583	-	Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
O.	ASTM D2584	-	Test Method for Ignition Loss of cured Reinforced Resins.
P.	ASTM D4060	-	Abrasion Resistance of Organic Coatings by the Taber Abraser.
Q.	ASTM D4329	-	Operating Light and Water Exposure Apparatus (Fluorescent UV Condensation Type) for Exposure of Plastics (UVA-340).
R.	ASTM D4476	-	Flexural Properties of Fiber Reinforced Pultruded Plastic Rods.
S.	ASTM D256	-	Impact Resistance of Plastics.
T.	ASTM D1894	-	Coefficient of Friction of Plastic Film and Sheeting.
U.	ASTM E84	-	Test Method for Surface Burning Characteristics of Building Materials.

V. ASTM F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs.

W. ASTM F594 - Stainless Steel Nuts.

X. ASTM F125 - High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength.

Y. New York City Building Code (NYCBC)

Z. American Society of Civil Engineers (ASCE)

1. MOP 66 - Structural Plastics Design Manual

2. MOP 102 - Design Guide for FRP Composite Connections

1.05 DESCRIPTION

A. FRP lumber shall replace most of the existing retractable gravity fender and timber edge protection systems at the North River WRRF, as per the Contract Drawings. Existing timber and gravity fenders system shall be demolished and new FRP lumber edge protection system shall be installed on to existing concrete deck structure as shown on the Contract Drawings.

1.06 QUALITY ASSURANCE

A. Contractor shall comply with overall project quality requirements.

B. FRP lumber shall be sourced from a single manufacturer. Selected manufacturer shall have a quality control plan in place. Submit a copy of manufacturer’s quality control plan to the Engineer for review and approval.

C. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contract shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but not limited to) the following activities:

a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

b. Perform visual and dimensional inspection of completed work.

1.07 SUBMITTALS

A. Shop Drawings and material specifications shall be submitted to the Engineer for approval in accordance with the requirements of Section 01 33 00 – Submittal Procedures.

1. Shop Drawings:
   a. Shop Drawings shall be submitted for the fabrication and erection of all FRP structural systems, including the deck protection system as shown on the Contract Drawings. Plans, elevations and details of sections and connections shall be included.
   b. Shop Drawings for elevated framing platforms or walkways, shall be certified and stamped by a licensed Professional Engineer registered in New York State who has expertise in the field of fiberglass reinforced plastics as well as structural design.
   c. The manufacturer's shop drawings shall clearly show material sizes, types, styles, part or catalog numbers, and complete details for the fabrication and erection of components including, but not limited to, location, lengths, types and sizes of fasteners, clip angles, member sizes and connection details.
2. The Contractor shall submit the manufacturer's published literature including structural design data, structural properties data corrosion or resistance tables, certificates of compliance, test reports as applicable and design calculations for systems not sized or designed in the Contract documents. Manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions shall be included.
3. Manufacturer's certifications for all material shall be submitted.
4. The Contractor is to submit sample pieces of structural shapes and other finished products for acceptance by the Engineer as to type, quality, texture, color, workmanship and finish. Sample pieces shall be manufactured by the method to be used in the work. Compliance with all other requirements shall be the exclusive responsibility of the Contractor.
5. Recycled material content used in the production of FRP lumber.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Manufactured materials shall be delivered in original, unbroken pallets, packages, containers or bundle bearing the label of the manufacturer.

B. All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, and other types of damage.

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. Pultruded FRP structural shapes shall be as follows:

1. FiberWale as manufactured by Creative Composites Group, Alum Bank, PA.
2. SeaPile & SeaTimber by Tangent Sustainable Lumber,Worthington, MN.
3. or approved equal.

2.02 MATERIALS / EQUIPMENT

A. All structural shapes are to be manufactured by the pultrusion process. Color shall be black or dark gray. The structural shapes shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements, and dimensions as necessary to meet the design requirements and dimensions as required for this Contract.

B. Premium performance vinyl ester resin system, with fire retardant additives to meet a tested flame spread of 25 or less per ASTM E84 and shall meet the self-extinguishing requirements of ASTM D635. Glass content for structural shapes shall be a minimum of 45% and a maximum of 55% by the weight as determined by ASTM D2584 for a maximum sunlight and chemical/corrosion resistance.

C. A synthetic surface veil shall be the outermost layer covering the exterior surfaces. Glass strand roving shall be used internally for longitudinal strength. Continuous strand glass mats or stitched reinforcements shall be used internally for transverse strength.

D. A UV inhibitor shall be present in the resin to resist ultraviolet degradation. Standard color shall be as per manufacturer's specifications.

E. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, and free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.

F. The plastic composite marine member shall be reinforced with fiberglass elements and shall conform to the characteristics below:

1.	Tensile Strength (ASTM D638):	40,000 psi minimum
2.	Flexural Strength (ASTM D4476):	70,000 psi minimum
3.	Compressive Strength (ASTM 695)	40,000 psi minimum

G. Pultruded structural shapes are to have the minimum mechanical properties listed below:

Mechanical Properties	ASTM Method	Minimum Value
Tensile Modulus	D638	2,200 psi at break
Compressive Stress	D695	1,400 psi
Hardness	D2240	44-75 Shore D
Flexural Stress	D790	30,000 psi
Yield Stress in Bending	D7914	2,750 psi
Flexural Modulus	D790	300,000 psi
Modulus of Elasticity (Strong axis)	N/A	600,000 psi
Modulus of Elasticity (Weak axis)	N/A	300,000 psi
Coefficient of Friction	D1894	0.25 wet/dry max.
Density	D792	48 – 63 pcf

H. In addition to the above-listed properties, the structural shape of the FRP member shall be capable of resisting the following flexural loads with applicable of factor of safety in both the weak and strong axis:

a. Bending Moment:

FRP Waler 16.0 kip-ft minimum

FRP Post 48.0 kip-ft Minimum

b. Shear Force: 68.0 kip minimum

I. Fasteners and Accessories:

1. Fasteners shall be in accordance with Section 05 05 23.02 – Miscellaneous Metal Fastenings unless otherwise shown or detailed on the Contract Drawings. All fasteners including concrete bolts, washers, and nuts shall be stainless steel Type 316L.

2. End fasteners shall be stainless steel Type 316L for fastening structural shapes together for continuous run and/or installation.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication and Handling

1. Structural shapes and appurtenances shall conform to the requirements specified herein and to the following standards:

a. Sealing: All cut edges and holes shall be sealed with a vinyl ester resin to provide maximum corrosion resistance. All field fabricated

cuts or drilling shall be coated similarly by the Contractor in accordance with the manufacturer's instructions.

b. Hardware: Type 316L stainless steel bolts, nuts, and washers shall be provided.

2. The fabricator and Contractor shall exercise precautions necessary to protect the fiberglass pultruded structural shapes from abuse to prevent breakage, nicks, gouges, etc. during fabrication, handling and installation.

3. Structural shapes shall be fabricated and assembled as indicated on the Contract Drawings and in accordance with the manufacturer's fabrication and repair instructions.

4. All structural shapes shall be accurately fabricated, free from warps, twists or other defects, which affect the appearance and serviceability of the gratings and plates.

5. Materials shall be of the minimum size and thickness as specified herein unless otherwise indicated on the Contract Drawings. The dimensions shown on approved shop drawings shall be followed.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Inspection

1. The Contractor is responsible for all costs for support, equipment and personnel necessary for shop inspection as required by the City. The fabricator shall give ample notice to the Contractor prior to the beginning of any fabrication Work so that inspection may be provided.

a. The structural shapes shall be as free, as possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubble and pits.

b. The inspector will have the authority to reject any Work that does not meet the requirements of this Section.

c. Inspection of personnel, materials and equipment shall not relieve the Contractor of responsibility of providing material and fabrication procedures in compliance with specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurements

1. Field measurements shall be taken prior to preparation of shop drawings and fabrication where required, to ensure proper fitting of the Work.

2. All dimensions shall be checked in the field after all piping and equipment are installed to determine the exact dimensions and locations of openings and cutouts.

3.02 INSTALLATION

A. Structural members shall be installed with each section accurately set plumb, aligned and braced as required to achieve final set condition as shown on the Contract Drawings or Shop Drawings

B. The clearance at the ends or between structural sections shall be a maximum of ¼-inch.

C. Wales, posts, and plates shall be set flush with surrounding construction.

D. Wales shall be set with a full uniform bearing on fiberglass columns and wale frames to preclude rocking movement; wedges or similar shimming devices shall not be used.

E. The composite member shall be manufactured in a continuous process that will result in it having no joints.

F. Making cutouts in the field shall be approved by the Engineer.

G. Exposed connections shall be fitted accurately together to form tight joints.

H. Perform cutting, drilling and fitting required for installation of FRP fabrications. Set FRP fabrication accurately in location, alignment and elevation, with edges and surfaces level, plumb and true.

I. Any field cut and drilled edges, holes and abrasions shall be sealed with a catalyzed resin compatible with the original resin as recommended by the manufacturer.

J. Install items specified as indicated and in accordance with manufacturer's instructions.

K. Fastening Devices

1. Fastening to In-Place Construction: Type 316L stainless steel anchorage devices or approved fasteners shall be provided to secure structural shapes to in-place construction with means for easy removal, as recommended by the manufacturer. Hold down fasteners to supports shall be installed at a maximum spacing of 2 feet on center but not less than four fasteners per each panel. Double nuts or burr threads shall be installed to prevent loosening of the hold down fasteners due to equipment's vibration.

    a. Secure structural shapes to in-place construction with means for easy removal, as recommended by the manufacturer.

    b. Structural shapes shall be secured to other structural members with stainless steel Type 316 fasteners, or as specified by the manufacturer.

    c. Connections shall be combination joints using mechanical fasteners with adhesive bonding, as per manufacturer's instructions.

d. Mechanical connections utilize mechanical fasteners to join parts of fiberglass assemblies. Stainless steel Type 316L fasteners are to be used to eliminate corrosion.

e. Surfaces shall be prepared and joined as per manufacturer's instructions.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 07 13 54 – UNDERDECK MEMBRANE
CONTRACT NR-107

PART 1

PART 2 GENERAL

2.1 SUMMARY

A. This Section describes the general requirements for removal of the existing underdeck protective membrane at repair locations, preparation of the concrete substrate, and the installation of RE-Systems Group's Gel-Tech System to repair the existing underdeck membrane.

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 in the Contract, or required otherwise for a complete installation.

C. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

D. The following index of this Section is presented for convenience:

E.

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2.2 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

2.3 RELATED SECTIONS

A. Section 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete

B. Sections 07 90 00 – Joint Protection

2.4 REFERENCES

A.	ASTM D395	-	Rubber Property - Compression Set, Standard Test Methods for
B.	ASTM D412	-	Vulcanized Rubber and Thermoplastic Elastomers – Tension, Standard Test Methods for
C.	ASTM D471	-	Rubber Property - Effect of Liquids, Standard Test Method for
D.	ASTM D542	-	Index of Refraction of Transparent Organic Plastics, Standard Test Method for
E.	ASTM D573	-	Rubber - Deterioration in an Air Oven, Standard Test Method for
F.	ASTM D624	-	Tearing Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers, Standard Test Method for
G.	ASTM D1149	-	Rubber Deterioration - Cracking in an Ozone Controlled Environment, Standard Test Methods for
H.	ASTM D2137	-	Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics, Standard Test Methods for
I.	ASTM D2240	-	Rubber Property - Durometer Hardness, Standard Test Method for
J.	ASTM D3350	-	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
K.	ASTM C836	-	Standard Specification for High Solids Content, Cold Liquid- Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
L.	ASTM C1135	-	Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants
M.	ASTM D56	-	Standard Test Method for Flash Point by Tag Closed Cup Tester

N. ASTM D751 - Standard Test Methods for Coated Fabrics

O. ASTM D 2196 - Standard Test Methods for Rheological Properties of Non- Newtonian Materials by Rotational (Brookfield type) Viscometer

P. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geo- membranes and Related Products

Q. ASTM E 96 (Method B) -Standard Test Methods for Water Vapor Transmission of Materials

2.5 DESCRIPTION

A. The Contractor shall provide all labor, materials, tools, and equipment required for the completion of the following Work, as shown on the Contract Documents and specified herein:

1. Remove the existing membrane material at repair locations to the extent shown on Contract Documents.
2. Prepare the existing concrete substrate designated to receive new membrane and existing membrane designated to remain in-place.
3. Provide all necessary and specialty equipment and tools needed to install the membrane product.
4. Furnish, transport, and install all new membrane material.
5. Furnish all submittals required by this Section of the Specifications
6. Coordinate all work with other trades on site.

B. Scheduling:

1. Proceed with the membrane repair work only after all other concrete repair work within the repair area has been completed and approved by the Engineer.

2.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Engage installers skilled, trained and with successful experience in the installation of the specified membrane systems, who are equipped to perform workmanship in accordance with the Drawings and Specifications, manufacturer's written instructions for guaranteed construction and the approved Shop Drawings and who agrees to employ only tradesmen with specific skill and successful experience in this type of Work. Submit names and qualifications to Engineer along with the following information on a minimum of three successful projects:

a. Names and telephone numbers of owners, architects or engineers responsible for projects.

b. Approximate contract cost of the installed system.

c. Amount of area installed.

2. Installer shall be licensed, certified in writing, and approved by the material manufacturer. Proof of acceptability of installer by manufacturer to Engineer.

3. Waterproofing material manufacturer shall have available a technical representative to assist the Contractor, when necessary, in application of the products and final inspection of the assembly.

B. Source Quality Control:

1. Contractor shall install RE-Systems Group Gel-Tech System.

C. Pre-Installation Meeting(s): Contractor shall convene at least one pre-installation meeting at the job site with RE-Systems Group and the Engineer to discuss project conditions as they relate to the installation, protection, sequence, and schedule of construction with regard to the Gel-Tech System.

2.7 SUBMITTALS

A. The Contractor shall submit the following for review and approval by the Engineer:

1. Samples: Submit for approval the following:

a. Two 12-inch by 12-inch sheets of the proposed membrane material.

b. Polymer Rubber Gel Material

c. HDPE collars and battens

d. Each fastener type required marked as to type of material and with their intended purpose in the Work.

2. Shop Drawings: Contractor shall submit shop drawings for all repair details, including but not limited to typical repair Type 1 to 4 as well as repairs at caisson penetrations and expansion joints, required by the Contract Drawings indicating materials used, dimensions, and any proposed temporary installations used to complete the work.

3. Mean and Methods statement indicating all materials, equipment, and methods used for preparation, installation, and cleanup of the repairs.

4. Product Data:

a. HDPE protective membrane

b. Polymer Rubber Gel

c. HDPE collars and battens

d. Powder Actuated fasteners and equipment

5. Installer Certification: With the submittals specified above, furnish certification and backup documentation signed by an officer of the waterproofing manufacturer stating that the manufacturer has examined the submitted installation drawings and installation instructions and has found

them acceptable for all conditions and details reasonably expected in this Contract.

a. After installation of the initial Mockup, further certify that the manufacturer's representative has found the substrate conditions and the Contractor's installation procedures to be in accordance with manufacturer's recommendations and requirements.

6. RE-Systems Group's specifications and product manuals indicating product information correlated to specified requirements, installation instructions, maintenance instructions and other data as may be required by Engineer.

7. Statement of Application: Upon completion of the Work, submit a statement to Engineer signed by Contractor stating that the Work complies with the requirements of these Sections and the installation methods comply with the manufacturer's printed instructions and were proper and adequate for the condition of installation and use.

B. Sustainable Design Submittals:

1. VOC Reporting Form. Provide the following information:

a. For all adhesives and sealants, applied on site and within the building's weatherproofing system, provide the VOC content in grams/Liter (g/L) less water and other exempt compounds.

C. Mockup: Contractor shall prepare a mockup showing the full underdeck membrane system, for approval by the Engineer, prior to proceeding with full installation of the underdeck membrane system. A Mockup for each individual repair type indicated on the Contract Drawings shall be installed on a portion of the structure as directed by the engineer and this specification and shall be performed in the presence of a manufacturer representative.

2.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials:

1. Deliver materials to the site in sufficient quantities to ensure uninterrupted progress of the Work.

2. Deliver materials in manufacturer's original, unopened containers and rolls with labels intact and legible.

3. Materials requiring fire resistance classification shall be delivered to the job with labels attached and packaged as required by labeling service.

B. Storage of Materials:

1. Store materials in a dry, well ventilated, weather tight place, and in a manner which will ensure that there is no possibility of significant moisture pick-up.

2. Materials shall be protected from abuse and prolonged or permanent exposure to the elements, not limited to ultraviolet (UV) radiation, heat, rain, and water from runoff.

3. Store in a manner which complies with fire and safety regulations.

4. Store emulsions at temperatures above 40°F.

C. Store materials on clean raised platforms with weather protective covering when stored outdoors. Handling of Materials:

1. Handle rolled goods so as to prevent damage to edge or ends.

2. Select and operate material handling equipment so as not to damage existing construction or membrane material.

2.9 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

2.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 3 PRODUCTS

3.1 MANUFACTURERS

A. Underdeck Membrane System: Underdeck membrane system shall be comprised of GTM-20 high-density polyethylene (HDPE) sheeting with GTS Poly-Rubber Gel (GTS) as manufactured by RE-Systems Group Americas, Inc.

3.2 MATERIALS / EQUIPMENT

A. Underdeck Membrane: Provide the following:

1. HDPE protection sheet membrane: Provide Membrane which complies with the following:

Property	Requirements	Test Method
Classification	meets Class A	ASTM E 1745
Water Vapor Permeability	less than 0.0143 perm	ASTM E 96
Tensile Strength	greater than 50 lbf/in	ASTM E 154
Puncture Resistance	greater than 140 lbf	ASTM D 1709
Chemical Resistance	unaffected	ASTM E 154
Life Expectancy	indefinite	ASTM E 154
Thickness	at least 48-mil HDPE	ACI 302.1R

B. GTS Polymer Rubber Gel

1. Single-component, polymer modified, Non-Newtonian, thixotropic gel which complies with the following:

a. Self-healing at water pressures up to 60 psi.

b. Self-adhering and completely bonded to the entire surface of the concrete with no voids or lack of discontinuity.

c. Resistant to chemical attack.

d. Not affected by wet/dry cycling.

e. Contain less than one percent volatile organic compounds (VOC).

f. Non-toxic.

g. Non-flammable.

h. Seamless.

i. One-part gel type material.

j. Applied without primer.

C. Batten Bars and Collars

1. High Density Polyethylene compliant to ASTM D3350.

D. Fasteners

1. Powder Actuated Fasteners. Provide fasteners which comply with the following:

a. Fasteners and washers shall be marine grade stainless steel, Grade 316L

3.3 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

3.4 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Use

PART 4 EXECUTION

4.1 EXAMINATION / PREPARATION

A. The Contractor shall examine the substrate and the conditions under which the membrane installation 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.

B. The Contractor shall confirm the dimensions of all installation areas prior to beginning work.

C. Membrane installation work areas may coincide with concrete repair work areas. Concrete repair work shall be performed and accepted as final prior to any membrane installation work being performed. All newly installed concrete shall reach design strength as required by the Contract Documents prior to installation of any powder-actuated fasteners. See Specification Section 03 01 30.71 - Rehabilitation of Cast-in-Place Concrete for details.

D. Surface preparation

1. Corroded or deteriorated concrete surfaces shall be repaired in accordance with Specification Section 03 01 30.71 - Rehabilitation of Cast-in-Place Concrete. Concrete repairs shall be completed and accepted by the Engineer as final prior to any membrane installation work being performed.

2. The existing concrete substrate surface must have a maximum surface amplitude of no more than 1/16 in. Areas that exceed this amplitude require additional preparation before installation of membrane repairs.

    a. At Major Repairs (Type 1), there are multiple areas with concrete surface erosion ranging from .5 in. to 2 in. deep. At major repairs with this condition, Contractor shall install a shotcrete overlay on all deteriorated concrete to achieve the required profile. See specification 03 37 13 – Shotcrete for additional requirements.

    b. At Local Repairs (Type 2) if surface roughness exceeding the requirements above are encountered, Contractor shall repair it using trowel-applied cementitious grout. See specification 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete for details.

3. The existing deteriorated membrane shall be removed from the face of the concrete at all repair locations. See demolition details in the Contract Drawings for details on extents of removal at each repair location. Where the existing membrane is removed, the existing cast-in-place ribs shall be cut flush with the existing concrete surface.

    a. Deteriorated Membrane is defined as any existing PVC membrane that is torn, split, delaminating or otherwise not securely connected to the concrete substrate with intact, cast-in-place ribs. Deterioration may also include failed existing epoxy repairs or failed concrete substrate.

    b. If removal of defective membrane exposes additional deteriorated concrete requiring repair, the Engineer shall be notified, and the defective concrete shall be repaired prior to proceeding with any membrane repairs in the area.

4. All existing membrane and concrete surfaces within the repair installation areas shall be cleaned of dirt, dust, laitance, corrosion, marine growth, and other contaminants conforming to SSPC-12 WJ-2. Such work shall be performed within the same work period that the installation of the concrete spall repair material takes place.

    a. All repairs shall be cleaned of marine growth prior to installation of any repairs. The elapsed time between cleaning of the repair area and installation of the repair material shall not exceed 72 hours. If this timeframe is exceeded, the Contractor shall re-clean the area prior to repair installation.

    b. Underdeck surface shall be clean, relatively smooth, and free of all standing water prior to installation.

5. Any existing PVC membrane that is to remain and will overlap with the new membrane repair patch shall be lightly sanded with 80 grit sandpaper to roughen the existing membrane surface.

4.2 INSTALLATION

A. General:

1. Follow all applicable installation instructions and recommendations contained in the membrane manufacturer's written installation and product manuals and the information contained on approved Shop Drawing submittals. Where Contractor wishes to deviate from written installation and product manuals and approved Shop Drawing submittals all such deviations shall be submitted to Engineer for approval along with membrane manufacturer's written agreement and a statement of acceptability for compliance with guaranteed construction.

2. Cut membrane sheets to the maximum size possible, in order to minimize seams and to accommodate contours of the deck.

   a. All localized repairs (Type 2, 3, 4) shall be made using a single sheet of new membrane. No seams between new membrane material is allowed.

   b. For Major Repairs (Type 1), Contractor shall perform installation to minimize the number of individual HDPE sheets required. Where seams are required, Contractor shall overlap sheets in accordance with the Contract Drawings.

B. Application

1. Membrane repairs shall extend for the full height and width of the repair area and overlap onto the existing membrane in all directions. Installation shall be as shown on drawings.

2. The concrete substrate that will receive the membrane installation shall be cleaned of all dust, debris, and standing moisture. Substrate may be damp but shall not have transfer of moisture to the touch. Contractor shall use blowers or other means to remove any excess surface moisture prior to installation.

   a. Repair areas may be in the tidal zone and may be subject to immersion each tidal cycle. Contractor shall ensure that each repair area is dry of standing moisture at the start of each work cycle prior to installation of repair patches.

3. GTS Polymer Gel Application

   a. Once the repair area is prepared in accordance with the Contract Documents, the repair area shall have a layer of GTS Polymer Gel installed.

b. Apply the GTS at a rate to provide a continuous, monolithic coat of 100-mil minimum, onto the concrete surfaces and existing PVC membrane surfaces, as recommended by the manufacturer.

c. GTS Polymer Rubber Gel may be applied by trowel application or by sprayed application. Sprayed application is the preferred method and should be utilized wherever possible.

4. HDPE Membrane Installation

a. Embed the fleece side of the HDPE repair sheet into the GTS as shown on the Contract Drawings, and as recommended by the manufacturer.

b. Overlap adjoining HDPE sheet edges a minimum of six inches to ensure complete coverage.

c. HDPE sheets shall be applied to all areas with the GTS Polymer Rubber Gel applied to it. The membrane shall be pressed using rollers or other methods to ensure 100% adhesion and to remove and wrinkles or folds in the protection membrane.

5. The membrane shall be secured using stainless steel powder actuated fasteners and washers as required on the Contract Drawings. Powder actuated fasteners shall be installed per manufacturer instructions.

6. Seams

a. Adjacent sheets shall overlap a minimum of 6 inches.

b. Fasteners at seams shall go through both overlapping sheets.

C. Protection and Cleaning

1. The Work area includes installation of underdeck membrane in areas subject to daily tidal immersion. Membrane installation shall be performed to ensure that each portion of membrane installation is fully installed with all fasteners in place before each high-tide cycle.

a. Within one tide cycle, the Contractor shall ensure that all of the following is performed:

1) Concrete substrate is blown dry of any standing moisture.

2) GTS Polymer Rubber Gel is installed over full area to be repaired during tide cycle.

3) HDPE Membrane Patch is installed on top of GTS Polymer Rubber Gel

4) All powder actuated fasteners and associated hardware is installed.

2. Contractor shall secure the work area each day or installation cycle prior to high tide to ensure the installed work is protected and able to be submerged with no deleterious effects.

D. Preinstallation Conference:

1. Prior to the installation of the underdeck membrane system and associated Work, Contractor shall schedule and meet at the site with the membrane installer, the installer of each component of associated work, the installers of other work in and around membrane which must follow the membrane installation Work, Engineer and other representatives directly concerned with performance of the Work. Review foreseeable methods and procedures related to the underdeck membrane system Work, including but not necessarily limited to, the following:

   a. Review project requirements, including Drawings, Sections and other Contract Documents.

   b. Review required submittals, both completed and yet to be completed.

   c. Review status of substrate including drying, structural loading limitations and similar considerations.

   d. Review availability of materials, tradesmen, equipment and facilities needed to make progress and avoid delays.

   e. Review required inspection, testing, certifying and accounting procedures.

   f. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.

   g. Review procedures needed for protection of installed membrane during the remainder of the construction period.

2. Reconvene the meeting at the earliest opportunity if additional information must be developed in order to conclude the subjects under consideration.

3. Record any revisions or changes agreed upon, reasons therefor, and parties agreeing or disagreeing with them.

E. Environmental Conditions:

1. The installation of the membrane and related work should follow the weather condition recommendations provided by the membrane material manufacturer.

4.3 FIELD TESTING / QUALITY CONTROL

A. All of the materials on-site shall be an approved product.

B. All components of the waterproofing system shall be provided by the same manufacturer.

C. Each product and component shall be labeled with name, size, manufacturing date, and manufacturer’s name and location.

D. Product shall be protected from ultraviolet (UV) radiation and moisture when packed and during on-site storage.

E. Products shall be inspected and approved upon arrival at site. Submit signed copies of the recorded documents for verification.

4.4 INSPECTION AND ACCEPTANCE

A. Prior to acceptance of work, a technical representative of the membrane manufacturer shall make a final inspection of the Work and prepare a written report to DEP and Engineer of any deterioration, damage or deficiencies found in the Work.

B. Only the installer shall repair or replace deteriorated or defective Work.

C. Certify that the completed Work is in accordance with the Sections, and without damage or deterioration (except for normal weathering) at time of Final Acceptance.

4.5 STARTUP / DEMONSTRATION

A. Not Used

4.6 ADJUSTING / PROTECTION / CLEANUP

A. Protect membrane from damage during the construction period so that it will be undamaged in any way at the time of Final Acceptance by DEP.

B. Replace Work which is damaged by the performance of the waterproof membrane system and associated Work and from improper installation techniques.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The work in this Section includes providing all labor, materials, and incidentals necessary to furnish and install joints, joint materials, waterstops and embedded items as indicated on the Contract Drawings, specified herein and as needed for a complete installation.

B. Complete technical services from the approved joint filler and sealant manufacturers and on-site technical representation by their Technical Representatives during the time of delivery, storage and installation of the work of this Section and during other work which may affect the work of this Section as specified herein is also included.

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, specified herein or required otherwise for a complete job.

D. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

E. The following index of this Section is presented for convenience:

F.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 02 41 10 – Demolition and Removals

B. Section 03 01 30.71 - Rehabilitation of Cast-in-Place Concrete

C. Section 07 13 54 – Underdeck Membrane

1.04 REFERENCES

A.	NYCBC	-	New York City Building Code
B.	ASTM C510	-	Staining and Color Change of Single or Multi component Joint Sealers, Standard Test Method for
C.	ASTM C661	-	Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer, Standard Test Method for
D.	ASTM C793	-	Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants, Standard Test Method for
E.	ASTM C794	-	Adhesion-in-Peel of Elastomeric Joints Sealants, Standard Test Method for
F.	ASTM C920	-	Elastomeric Joint Sealants, Standard Specification for
G.	ASTM C1247	-	Durability of Sealants Exposed To Continuous Immersion In Liquids, Standard Test Method for
H.	ASTM D297	-	Standard Test Methods for Rubber Products—Chemical Analysis
I.	ASTM D412	-	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
J.	ASTM D746	-	Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
K.	ASTM D2240	-	Standard Test Method for Rubber Property—Durometer Hardness

1.05 DESCRIPTION

A. System Design Requirements

1. The joint sealant system to be furnished under the work of this Section shall include extruded, polychloroprene, pre-formed expansion joint seals, hydrophilic grout joint filler, epoxy adhesive, and miscellaneous materials used for sealing expansion joints.

2. The Work shall include but is not limited to:

a. All underdeck expansion joints to be repaired as designated by the Contract Documents.

B. Substitutions

1. Do not change products, system components, colors or manufacturers after Shop Drawing and Samples approvals 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

A. Work of this Section shall be coordinated with the work of other trades so that construction is not delayed.

B. The final responsibility for constructing a watertight condition at expansion joints and construction joints remains with the Contractor as part of the Work under this Contract. Errors of detailing and fabrication and for the correct fit of the work shall be the responsibility of the Contractor.

C. Engage a single manufacturer who shall provide the services of a Technical Representative who shall assist Contractor and Engineer by providing technical opinions on the adequacy of materials and methods of installation based on Shop Drawings approved by Engineer.

1. Provide such services during the time of delivery, storage, handling and installation of all caulking and sealant system components.

D. Test adhesives and sealants for compatibility with the substrates specified for conformance to current industry standards, and recommend remedial procedures as required.

E. Installer Qualifications: Engage a single installer skilled, trained and with successful experience in the application of the types of material required and who agrees to employ only tradesmen with specific skill and successful experience in this type of work.

1.07 SUBMITTALS

A. The Contractor shall submit the following to the Engineer for review and approval.

B. Samples:

1. Samples of each type of pre-formed expansion joint seal specified, 12-inches long.

C. Product Data. The contractor shall submit product data for the following materials. Include manufacturer's published data, indicating that each material complies with the requirements and is intended for the applications shown:

1. Preformed expansion joint seal

2. Expansion joint seal adhesive
3. Hydrophilic grout joint filler

D. Contractor shall submit Shop drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Sizes, sections, and dimensions for each type of joint repair indicated on the Contract Drawings.
2. Any proposed temporary means of support or anchorages required for installation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in an undamaged condition and at such intervals as will avoid delay in the Work.

B. Materials shall be stored and protected in a clean, properly drained location and shall be kept off the ground under a weather-tight covering permitting good air circulation. Materials shall be stored on dry wood sleepers, pallets, platforms or other appropriate supports which have slope for positive drainage. Materials shall be protected from distortion, excessive stresses, corrosion and other damage. Materials shall not be stored on the structure in a manner that might cause distortion or damage to the supporting structure. The maximum uniform distributed storage load shall not exceed 20 pounds per square foot.

C. Materials shall be protected before, during and after installation to ensure acceptable finished Work. In-place materials and other Work in connection with the joint installations shall be protected.

D. Material shall be handled safely in a manner that will prevent distortion or other damage. Care shall be exercised at all times to avoid damage through careless handling during unloading, storing and installing.

E. In the event of damage to the Work, necessary repairs or replacements shall be performed until satisfactory work is met at no expense to the City.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer’s standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Preformed, Extruded Polychloroprene Expansion Joint Seals: Provide one of the following:

1. Delastic Preformed Compression Seal by D.S. Brown, North Baltimore, OH
2. Wabo Compression Seal by Watson Bowman Acme Corp., Amherst, NY
3. Or approved equal.

B. Hydrophilic Grout Joint Filler: Provide one of the following:

1. Flexgel by Sealboss Corp., Santa Anna, CA
2. Sikaflex HH Hydrophilic by Sika Corp., Lyndhurst, NJ
3. Dural Aqua-fil by Euclid Chemical Co., Cleveland, OH
4. Or approved equal.

C. Joint Seal Adhesive

1. Joint seal adhesive shall be as recommended by the joint seal supplier.

2.02 MATERIALS / EQUIPMENT

A. Preformed, Extruded Polychloroprene Expansion Joint Seals shall have the following properties:

1. Tensile Strength – 2,000 psi (min.) – ASTM D412
2. Elongation at Break – 250% - ASTM D412
3. Hardness, Type A durometer – 55 – ASTM D2240

B. Hydrophilic Grout Joint Filler shall have the following properties:

1. Tensile Strength – 300 psi – ASTM D3574
2. Elongation – 350% - ASTM D3574
3. Shrinkage - <10% - ASTM D1042

2.03 FABRICATION / ASSEMBLING / FINISHES

1. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examination

1. The Contractor shall examine the joint surfaces, substrates, backing, and anchorage of units forming sealant rabbet, and the conditions under which the joint sealing work is to be performed, and notify Engineer in writing of any condition detrimental to the proper and timely completion of the Work and the performance of the sealant systems. Do not proceed with the work

until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

B. Joint Surface Preparation

1. Prior to installation of the joint seals and fillers, all existing steel edge protection angles shall be removed. And deterioration to the concrete surface that will prevent the successful installation of the new joint sealers shall be repaired prior to proceeding with the work. See Specifications 02 41 10 – Demolition and Removals and Section 03 01 30.71 - Rehabilitation of Cast-in-Place Concrete for details.

2. Clean joint surfaces immediately before installation of the joint seal. Remove dirt, insecure coatings, moisture and other substances using water blasting or other abrasive method and as recommended by joint seal manufacturer's written instructions. A blower or other means shall be used to remove all surface moisture from the substrate before installation of joint seal.

3. Apply joint seal adhesive to the seal and substrate per the manufacturer instructions and insert the seal into the joint.

3.02 INSTALLATION

A. Comply with joint seal manufacturer's written instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.

B. Prime or seal the joint surfaces wherever recommended by the sealant manufacturer. Do not allow prime or sealer to spill or migrate onto adjoining surfaces. Allow primer to dry prior to application of sealants.

C. Install joint seals as recommended by the sealant manufacturer.

D. After installation of the seal is complete, inject hydrophilic grout to fill the entire annular space between the joint seal and water stop above.

3.03 FIELD TESTING / QUALITY CONTROL

A. Where questions of compatibility of joint seals or filler and substrate arise the manufacturer shall test the substrate in question for compatibility with the specified sealant and report his findings, with recommendations, to Engineer. Any required sealant change shall be at no additional expense to the City.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Protection: Do not allow joint filler or adhesives to overflow or spill into waterway. Use forms, covers, and other means of protection as required to prevent leakage or staining of adjoining surfaces.

B. Repair seal installation at leaks or, if leakage is excessive, replace seal installation as directed.

C. Protect the sealants during the construction period so that they will be without deterioration, soiling, or damage at the time of the City's Final Acceptance.

END OF SECTION

SECTION 07 95 13 – EXPANSION JOINT COVER ASSEMBLIES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and services, and perform all operations required for completed installation of expansion joint assemblies and related work as indicated on the Contract Drawings and as specified herein.

B. The work of this Section shall include, but not be limited to, the following for seismic joint seals:

1. Floor expansion joint cover assemblies.
2. Wall/ceiling expansion joint cover assemblies.
3. Exterior expansion joint seals (above and below grade).
4. Fire barrier systems.

C.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 50 00 - Metal Fabrications.

B. Section 07 90 00 - Joint Protection.

1.04 REFERENCES

A. ASTM A36 - Carbon Structural Steel

B. ASTM A283 - Low and Intermediate Tensile Strength Carbon Steel Plates

C. ASTM A786 - Rolled Steel Floor Plates

D. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate

E. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes Profiles and Tubes

F. ASTM C920 - Elastomeric Joint Sealants

G. ASTM D2000 - Classification System for Rubber Products in Automotive Applications

H. ASTM E119 - Test Methods for Fire Tests of Building Construction and Materials

I. ASTM E814 - Test Method for Fire Tests of Penetration Fire Stop Systems

J. ANSI/UL 263 - Standard for Safety for Fire Tests of Building Construction and Materials

K. National Association of Architectural Metal Manufacturers (NAAMM) - Metal Finishes Manual

L. NFPA 25 - Standard Methods of Tests of Fire Endurance of Building Construction Materials

M. NYBC - New York City Building Code

1.05 DESCRIPTION

A. Seismic Joints

1. Seismic joint seals, generally referred to as "expansion joint" covers or assemblies, shall be furnished and installed at all seismic joints. Seismic joints are considered to be all 2-inch minimum and wider joints shown on the Contract Drawings.

2. All exterior and interior seismic joints above and below grade shall be included, except under footings and under slabs on grade.

3. All seismic joints between stationary constructions of similar or dissimilar materials shall be provided with a seal or cover assembly.

4. Seismic joint seals as indicated on the Contract Drawings are shown to demonstrate general intent only. All required locations are not specifically indicated on the Contract Drawings, but are generally specified herein.

5. Seismic joint seals are required across each joint on both sides of all horizontal, vertical, or sloped construction including, but not limited to, the following areas or conditions exposed or concealed from view:

   a. Walls and foundation walls.

   b. Piers and columns.

   c. Slabs - top and underside.

   d. Pits, tanks, curbs.

   e. Grating or plates.

   f. Ceilings.

   g. Beams.

   h. Mullions at window framing.

   i. Roof coping and parapet areas.

   j. Finishes.

6. Where manufacturer's standard products will not, in the judgement of the Engineer, satisfy project requirements, custom designs and fabrications shall be provided by the manufacturer.

B. Fire Performance Characteristics

1. Where indicated, provide expansion joint cover assemblies identical to those of assemblies whose fire resistance has been determined per ANSI/UL 263, NFPA 251, or ASTM E119 and E814 including those stream test at full-rated period by Underwriter Laboratories, Inc.

2. Fire Rating: Not less than the rating of adjacent construction.

C. Loading Characteristics: Standard floor covers should be designed to withstand a 1 square inch point load of 500 pounds minimum without damage or permanent deformation.

D. Single-Source Responsibility: Obtain expansion joint cover assemblies from one source from a single manufacturer. The manufacturer shall be required to provide technical assistance during the installation of the joint cover assemblies to insure a full performance of the systems installed.

E. Environmental Exposure: Where indicated and required for intended use each respective expansion joint assembly shall be certified as acceptable and suitable for exposure to environmental conditions, including but not limited to the following predominating conditions.

1. Exterior Use:

a. Below Grade.

b. Sunlight.

c. Traffic.

2. Interior Use:

a. Chemicals normal to the treatment plant operation and maintenance.

b. Traffic.

1.06 QUALITY ASSURANCE

A. Materials and work shall conform to the latest edition of reference specifications specified herein and to all applicable codes and requirements of local authorities having jurisdiction.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings for approval by the Engineer. Submittals shall include, but not limited, to the following:

1. Shop Drawings showing full extent and location of all expansion joint cover assemblies; include large-scale details indicating profiles of each type of expansion joint cover assembly, splice joints between sections, joinery with other types, special end conditions, anchorages, fasteners, and relationship to adjoining work and finishes. Include description of materials and finishes and installations instructions.

2. Product Data: Submit copies of manufacturer's latest published literature for materials specified herein for approval, and obtain approval before materials are fabricated and delivered to the Site. Data to clearly indicate movement capability of cover assemblies and suitability of material used in exterior seals for UV exposure.

3. Certificates: Material test reports from qualified independent testing laboratory indicating interpreting test results relative to compliance for items specified herein including but not limited to fire-rated and seismic expansion joint assemblies with requirements indicated.

4. Samples of materials specified herein shall be submitted for approval, and approval obtained before materials are delivered to the site. Samples shall include the following:

a. Samples for each type of metal finish indicated and metal of the same thickness and alloy to be used in the Work. Where normal color and texture variations are to be expected, include two or more units in each set of samples showing limits of such variations.

b. Samples of each type of flexible seal to be used in Work with color samples as above.

c. Submit a 12-inch long sample mock-up of each type of expansion joint assembly indicating location for use and referenced on Shop

Drawing submittals. Each mock-up shall be provided with all the necessary components required for the final and complete assembly including fasteners appropriate to the substrate or adjacent surfaces. All mock-ups shall be provided fully assembled to indicate final in place arrangement and to demonstrate adjacent construction. Submit separate mock-ups for joints between expansion control joints required between long assembly lengths and each type of prefabricated corner joint.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to the City the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Expansion joint cover assemblies shall be manufactured by:

1. Construction Specialties, Inc., Muncy, PA
2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Seismic Joint Seals, Assemblies

1. Exterior:

a. Vertical: Exterior surfaces (above and below grade) including but not limited to, exposed and concealed spaces at exterior concrete, masonry, metal fascia, and coping surfaces.

1) Silicone face seal and back seal. Face seal color as selected by the Engineer.

2) Single grooved rib at face seal to be center of joint.

3) Each retainer bracket shall be continuous and shall be secured and set in a continuous seal or tape as recommended by the manufacturer and approved by the Engineer.

4) Provide manufacturer's prefabricated retainer bracket/steel angle assembly at areas as indicated on the Contract Drawings. Steel angle shall be type 304 stainless steel,

primed and painted to match exterior face seal and come prefinished ready to install at Site.

b. All exterior assemblies shall be compatible to permit continuity of exterior system components without adversely affecting required fire ratings, water tightness or weather tightness of the seals, including but not limited to, transitions from walls to floor slabs and walls to roofs.

2. Interior:

a. Vertical: Masonry or concrete wall surfaces.

1) Silicone face seal with continuous groove at center at joint.

2) Provide a continuous concealed UL rated 2-hour fire barrier at all rated walls including 1 hour rated wall construction.

3) Provide rigid insulation (minimum R=10) at all exterior wall cavities at interior side of wall construction.

4) Color: As selected by Engineer.

b. Horizontal: Ceilings including suspended ceiling.

1) Silicone face seal with continuous groove at center of joint.

2) Color as selected by Engineer.

c. Horizontal: Floor surfaces.

1) All floor seal assemblies shall be provided with a UL listed 2 hour rated fire barrier below the traffic joint, and also between pairs of columns along the joint.

d. Horizontal: Underside of roof and floor construction.

1) Provide a continuous UL rated 2-hour fire barrier at all rated areas.

2) Color as selected by Engineer.

B. Structural steel shapes - ASTM A36.

C. Steel Plates - ASTM A283, Grade C.

D. Rolled Steel Floor Plates - ASTM A786.

E. Aluminum - ASTM B221, alloy 6063-T5 for extrusions, ASTM B209, alloy 6061-T6, sheet and plate.

F. Protect aluminum surfaces in contact with cementitious materials with zinc chromate primer or chromate conversion coating.

G. Stainless Steel - Type 304 with 2B finish, unless indicated otherwise, for plates, sheet and strips.

H. Extruded Preformed Seals: Single or multilayered rubber extrusions as classified under ASTM D2000, designed with or without continuous, longitudinal, internal baffles and formed to fit compatible frames, in color indicated, or, if not indicated, as selected by the Engineer from manufacturer's standard colors.

I. Elastomeric Sealant: Manufacturer's standard elastomeric sealant complying with ASTM C920, use T, factory-formed and bonded to metal frames or anchor members; in color indicated, as selected by the Engineer from manufacturer's standard colors.

J. Exterior Seals: Typically two single layered flexible extrusions, one interior PVC and one exterior thermoplastic rubber, as classified under ASTM D2000, retained in a set of compatible frames, in color indicated, or, if not indicated, as selected by the Engineer from manufacturer's standard colors.

K. Fire Barriers: Designed for indicated or required dynamic structural movement without material degradation or fatigue. Tested in maximum joint width condition as a component of an expansion joint cover in accordance with ANSI/UL 263, NFPA 251, or ASTM E119 and E814 including hose stream test at full-rated period by Underwriters Laboratories, Inc. (UL)

L. Accessories: Manufacturer's standard anchors, fasteners, set screws, spacers, flexible vapor seals and filler materials, drain tubes, adhesive and other accessories compatible with material in contact, as indicated or required for complete installations.

M. Joint Protection shall conform to the applicable requirements of Section 07 90 00 - Joint Protection.

N. Location of joints in cover system assemblies shall be subject to the Engineer's approval.

O. Anchoring sleeves shall be subject to the Engineer's approval. The use of plastic anchor sleeves shall be prohibited.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication

1. Provide expansion joint cover assemblies of design, basic profile, materials, and operation indicated. Select units comparable to those indicated or required to accommodate joint size, variations in adjacent surfaces, and structural movement. Furnish units in longest practicable lengths to minimize number of end joints. Provide hairline mitered corners where joint changes directions or abuts other materials. Include closure materials and transition pieces, tee-joints, corner, curbs, cross-connections, and other accessories as required to provide continuous joint cover assemblies.

2. Fabrications shall be custom fabricated as required to suit installation requirements and shall conform to the requirements of Section, Section 05 50 00 - Metal Fabrications.

B. Metal Finishes

1. Comply with NAAMM, Metal Finishes Manual for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory after products are fabricated. Protect finishes on exposed surfaces with protective covering before shipment.

2. Aluminum Finish:

   a. Clear Anodized Finish - AA-C22A41; medium matte etches finish with 0.7 mil. Minimum thick anodic coating.

   b. Factory-Primed Concealed Surfaces - Protect concealed metal surfaces that will be in contact with concrete and masonry surfaces when installed by applying a shop coat of manufacturer's standard primer to contact surfaces. Provide minimum dry film thickness of 20 mils.

C. Dissimilar Materials

1. Protect dissimilar materials from deleterious interaction by coating with an asphaltic or other approved coating as recommended by the manufacturer.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examination

1. Where necessary, check actual locations of walls and other construction to which Work must fit, to determine accurate field measurements before fabrication. Show recorded measurements on final Shop Drawings and coordinate fabrication schedule with construction progress to avoid delay of Work.

2. The Contractor shall make a thorough examination of all surfaces receiving the Work of this Section and before starting the installation, notify the Engineer, in writing, of any defect which would affect the satisfactory completion of the Work of this Section.

B. Preparation

1. The Contractor shall examine the Contract Drawings and Specifications in order to insure the completeness of the Work required under this Section.

2. The Contractor shall verify all measurements and dimensions at the Site and cooperate in the coordination and scheduling of the Work of this Section with the Work of related trades, with particular attention given to the installation of items embedded in concrete and masonry so as not to delay project progress.

3. The Contractor shall provide all templates as required to related trade for location of all support and anchorage items.

3.02 INSTALLATION

A. In addition to requirements of these Specifications, the Contractor shall comply with manufacturer's instructions and recommendations as approved by the Engineer for all phases of Work, including preparation of substrate, applying materials, and protection of installed units.

B. Provide anchorage devices and fasteners where necessary for securing expansion joint cover assemblies to in-place construction, including threaded fasteners with drilled-in-fasteners for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.

C. Perform all cutting, drilling and fitting required for installation of expansion joint covers. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels.

D. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling.

E. Set floor covers at elevations to be flush with adjacent finished floor materials. If necessary, shim to level, but ensure base frames have continual support to prevent rocking and vertical deflection.

F. Locate wall, ceiling, roof, and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with all required accessories.

G. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches on centers.

H. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames.

I. Adhere flexible filler materials (if any) to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

1. Installation of Extruded Preformed Seals - Install scales to comply with manufacturer's instruction and with minimum number of end joints.

2. For straight sections provide preformed scales in continuous lengths.

3. Vulcanize or heat-seal all field splice joints in preformed seal material to provide watertight joints using manufacturer's recommended procedure.

4. Apply manufacturer's approved adhesive, epoxy, or lubricant-adhesive to both frame interfaces prior to installing performed seal.

5. Seal transitions in accordance with manufacturer's instruction.

J. Installation of Elastomeric Sealant Joint Assemblies:

1. Seal all end joints within continuous runs and joints at transitions in accordance with manufacturer's directions to provide a watertight installation.

2. Install exterior flexible seal in standard lengths.

3. Seal transitions and butt joints in accordance with manufacturer's instructions.

K. Installation of Seismic Seals:

1. Install secondary seals in continuous lengths; vulcanize all filed splice joints in secondary seal material to provide watertight joints using manufacturer's recommended procedures.

2. Install primary flexible seals in standard lengths.

3. Seal transitions and butt joints in accordance with manufacturer's instructions.

L. Installation of Fire Barrier:

1. Install fire barrier in accordance with the New York City Building Code and local authorities having jurisdiction, as well as UL requirements and using manufacturer's recommended procedures.

2. Install transition and end joints to provide continuous fire resistance and in accordance with manufacturer's instructions.

3. Provide continuity of fire rated construction at all joint system assemblies where adjacent construction requires by code or is provided with a fire rating. Such assemblies shall be not less than the rating of the adjacent wall, floor or roof construction, but at least a two-hour rated joint assembly shall be provided.

M. Protect joint covers below grade with insulation board.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Do not remove strippable protective material until finish Work in adjacent areas is complete. When protective material is removed, clean exposed metal surfaces to comply with manufacturer's instructions.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Painting, as specified herein, shall include, but not be limited to, preparation of surfaces, shop painting of items furnished, and field painting of structures, piping, conduit, ducts and equipment, and marking of piping and electrical conduit.

B. Painting shall be provided as shown on the Contract Drawings, specified herein or in the Contract, or as required for a complete installation.

C. Ice breakers and fender mounting frames shall be hot-dip galvanized per Specification 05 05 13.01 and then coated according to this specification.

D. The following index of this Section is presented for convenience:

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E. The following schedule, attached after the End of Section designation, is a part of this Section:

1. Material Paint Schedule

1.2 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.3 RELATED SECTIONS

A. Section 05 05 13.01 - Galvanizing.

1.4 REFERENCES

A. SSPC - The Society of Protective Coatings (formerly of Steel Structures Painting Council)

1. SSPC-SP 1 Solvent cleaning
2. SSPC-SP 6 Commercial blast cleaning
3. SSPC-SP 10 Near white cleaning
4. SSPC-SP 2 Hand tool cleaning
5. SSPC-SP 11 Power tool cleaning to bare metal
6. SSPC-SP 15 Commercial grade power tool cleaning
7. SSPC-SP 16 Brush off Blast Cleaning of Non Ferrous Metals

B. ASTM - American Society for Testing Materials

1. ASTM D3359 - Measuring Adhesion by Tape Test
2. ASTM D16 - Terminology Relating to Paint, Varnish, Lacquer, and related Products

C. NSF - National Sanitation Foundation Standards

D. Specification 05 05 13.01 - Galvanizing

E. ISO - International Organization for Standardization

1. ISO 14025 – Requirements and Guidelines for Type III Environmental Labels and Declarations.
2. ISO 14044 - Requirements and Guidelines for life cycle assessment (LCA) studies and life cycle inventory (LCI) studies.

F. EPD - Environmental Product Declaration

1. A third-party verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

1.5 DESCRIPTION

A. Safety Requirements

1. All painting materials specified herein, and ingredients of coatings containing substances that are potentially toxic or hazardous shall be

shipped with warning labels. These products shall be applied in strict conformance with the safety requirements of the following:

a. Manufacturer

b. National Paint and Coatings Association (NPCA)

c. Society of the Plastics Industry (SPI)

d. Manufacturing Chemist Association (MCA)

e. Association for Materials Protection and Performance (AMPP), formerly National Association for Corrosion Engineers (NACE) and Society of Protective Coatings (SSPC)

f. United States Government Occupational Safety and Health Administration (OSHA)

g. Health and Safety Requirements of the State of New York (PESH-Public Employees Safety and Health)

h. Health and Safety Requirements of the City of New York (COSH-Citywide Office of Safety and Health)

B. Environmental Requirements

1. Weather:

a. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with manufacturer's instructions.

b. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point.

c. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.

d. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog or mist.

e. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.

2. Ventilation

a. Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWA D102.

3. Dust and Contaminants:

a. Schedule coating Work to avoid excessive dust and airborne contaminants.

4. Protect Work areas from excessive dust and airborne contaminants during coating application and curing.

1.6 QUALITY ASSURANCE

A. SSPC Quality Certification

1. PAINT SHOP engaged in painting of items described herein shall have a current SSPC QP3 certification.
2. FIELD PAINTING CONTRACTOR for items described herein shall have a current SSPC QP1 certification.

B. Paint Quality Assurance Records

1. The following information shall be recorded for every paint project and submitted to the Project-Manager:
    a. Date
    b. Shift
    c. Part Temperature
    d. Dew Point
    e. Paint Batch Number/s
    f. Mixing Time for Each Part and the Combined Parts of a Paint System
    g. Pot Life
    h. Curing Time of Primer and Finish Layers
    i. Paint thickness measurements (DFT)
    j. Number of coats
    k. Holiday Test Results and Repair Data
    l. Peel Test Results and Repair Data
    m. Foreman or Supervisor's Signature

C. Test Surfaces

1. The Contractor shall paint certain areas of concrete and other surfaces, where directed, using approved coatings for use by the Engineer for comparisons with coating systems applied during the progress of the Work.
2. Such coated areas shall not be subsequently painted during the entire period of construction or during the period one-year after the date of Final Acceptance.
3. At or about one year after Final Acceptance, the test surfaces shall be inspected by the City for any deterioration such as cracks, blisters, flakes and excessive chalking.
4. The Contractor shall supply all material and labor and shall perform any remedial Work on all such deteriorated surfaces using the coating system represented by the test surface at no additional cost to the City.

D. Painting Requirements

1. General: The Contract does not specify the surface treatment for every individual part of the Work, however this Contract shall be provided with a complete painting job throughout the Work as specified herein. All items customarily or specified to be shop painted shall be primed and finished in the shop. Ice breaker and fender panels and mounting steel frames shall be hot dip galvanized prior to shop painting. Field painting will not be allowed unless requested in writing to the Engineer, and written consent is given by the Engineer. In general, only areas that are to be field-welded are not to be painted until field-erected.

2. Painted Items: The following items shall be painted as specified herein: steel water storage tank, structural steel and wrought metals, composite metal floor deck, pipelines, hangers and supports, sluice gates, pumps and pumps parts, valves, valve and sluice gate operators and stands, guard housings, air filter equipment, effluent strainers, heat exchangers, air receivers, tanks, air silencing equipment, storage tanks, gas domes, sediment tanks, steel stair framing, steel lintels, hollow metal doors and frames, gypsum wallboard, interior concrete block, interior concrete walls, columns, beams and ceilings, covering over insulation on piping, electrical conduit systems, small piping and copper tubing, ducts, covering over ducts, and PVC piping, valves and fittings. Mooring bollards and cleats at Sludge Dock shall be shop painted, but not galvanized.

3. Unpainted Items: The following items shall not be painted, unless otherwise specified: registers, grilles, dampers and linkage, fire sprinklers, name and identification plates and tags, floor gratings, brass pipe and fittings, brass valves, stainless steel, wood, stop log panels, spray-on fireproofing steel to receive spray-on fireproofing, surfaces to receive field welding, and faying surfaces of high strength bolted connections.

1.7 SUBMITTALS

A. Contractor shall submit Shop Drawings for approval by the Engineer. Submittals shall include, but not be limited to:

1. Catalog cuts and reference materials.

2. Color Chart: The Contractor shall submit the manufacturer's standard color chart for color selection for painting of items other than process piping, valves, pipe line equipment, pump casings, blowers and other mechanical equipment and their drive units, all of which shall be in conformance with the "BACKGROUND COLOR" of the General Color Code specified in Section 40 05 97 – Identification for Process Equipment.

   a. Fendering Panel and Support Frame Coating System: black.
   b. Ice Breaker Coating System: black.
   c. Bollard and Cleat Coating System: black.

3. Coating system summary table providing surface preparation, with primer, intermediate coat, and finish coat products, number of coats, and thickness.

4. Paint Samples:

   a. Two one-quart samples of each required kind of paint material, or the ingredients thereof which are to be mixed on the job.

   b. Samples shall be labeled and shall include the certificate of the manufacturer stating the actual percentages by weight and volume of all ingredients entering into the mixture.

   c. Upon request, further samples shall be provided as the Work progresses.

   d. Painting materials shall not be applied without written approval of samples by the Engineer.

5. Painted Surface Samples:

   a. Upon request, duplicate samples of the results obtained by painting and finishing various materials on the Work shall be submitted. Such samples, and the approved paint applied thereto, shall be applied in strict conformance with these Sections.

   b. All painting work shall be performed in a quality equal to the approved samples.

   c. Where equipment is customarily shipped with a standard finish, samples of the proposed color and finish shall be submitted for approval prior to shipping.

6. Certification:

   a. Affidavits from the manufacturer certifying that materials furnished conform to the requirements specified.

   b. And that paint products have been checked for compatibility.

7. Immersion Certification:

   a. Affidavits from the manufacturer certifying that coatings in immersion service contain no water soluble solvents or corrosion inhibitive (active) pigments with slight water solubility.

8. List of Paints:

   a. A list of paint products with mil thickness and solids by volume, including all paint applied in the shop and in the field. The list shall be in accordance with the requirements of this Section and the recommendations of the paint manufacturer.

9. Applicator’s Quality Assurance:

   a. Submit a list of a minimum of 5 completed projects of similar size and complexity to this work. Include for each project:

1) Project name and location
2) Name of owner
3) Name of contractor
4) Name of engineer
5) Name of coating manufacturer
6) Approximate area of coatings applied
7) Date of completion

10. Warranty:
    a. Submit manufacturer's standard warranty.
11. Environmental Product Declarations
    a. The Contractor shall provide product-specific type III Environmental Product Declarations (EPDs) conforming to ISO 14025 and ISO 14044.

1.8 DELIVERY, STORAGE, AND HANDLING

A. General: All products and materials shall be delivered, stored, and handled as specified in Contract Documents and as follows:

B. Delivery and Storage: All paint materials delivered and stored at the site shall be from the approved manufacturer only.

C. Packaging and Labeling: Paints, stains, varnish or ingredients of paints to be used on the job shall be properly prepared, packed, and labeled. All materials shall be delivered to the Site in original, unbroken containers bearing the manufacturer's printed labels, which shall specify the following:

1. Project and Contract No.
2. Name of manufacturer
3. Address of manufacturer
4. Generic name of paint or ingredients
5. Brand and trademark
6. Schedule letter as listed herein
7. Percent solids by volume
8. Net quantity
9. Date of manufacturer
10. Date packed

D. Storage: Painting materials shall be stored at the Site in manner and place which shall be in accordance with applicable codes and regulations, and in accordance

with manufacturer's instructions. The storage space shall be kept clean at all times. Every precaution shall be exercised to eliminate fire hazards.

1.9 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Standards of Quality: Proprietary protective coatings included herein by brand name or trademark are given solely as standards of quality and for bidding purposes and do not preclude the use of an approved equivalent.

B. Latest Products: Unless specified otherwise, the proprietary protective coatings of the manufacturer's latest products in regular production on the date of receipt of order shall be provided.

C. Equivalents: Equivalent products shall be of a standard, regularly produced product of a manufacturer. Equivalent products shall be submitted on their applicable published printed literature that states the generic type, instructions for use, solids by volume, application rates, and chemical components of vehicles and solids. Equivalent products shall be accompanied by a list of projects where each of the coatings has been used on new construction and has rendered satisfactory service for at least three years. Should the manufacturer's literature of the product being offered call for higher film thickness, the greater film thickness shall be applied, and the submitted schedule shall so state.

D. Paints shall be as manufactured by the following manufacturers:

1. Tnemec Company, Inc., Kansas City, MO.
2. Sherwin Williams, Cleveland, OH.
3. International Paint, Houston, TX.
4. Carboline Company, St. Louis, MO.
5. PPG Amercoat, Little Rock, AR.
6. Or approved equal.

2.2 MATERIALS / EQUIPMENT

A. General:

1. Compatible shop and field coats shall be provided. Field coats shall only be performed if approved by the Engineer.

2. All coats of paint for any particular surface shall be from the same manufacturer.

3. Paint shall be of approved color as selected from the manufacturer's standard range of colors.

4. The Contractor shall submit proposed modifications to the specified painting systems for the Engineer's approval prior to use.

5. Paints containing lead or manganese driers shall not be submitted.

B. Classification of Paints: Alphabetical designations have been used in the following list to classify/group acceptable paints by the type and quality of materials desired. Equivalent material from the manufacturers named above or from other approved manufacturers may be used in any of these paint groups in accordance with the procedures for substitution. Refer to the "Material Painting Schedule", attached after the "End of Section" designation, for applicability of these paint groups.

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
A	**Tnemec:** Series 90-94	68	3.0-5.0
	Carboline: Carbo zinc 859	69	3.0-5.0
	Sherwin Williams: Zinc Clad III HS	72	3.0-5.0
	International Paint: Interzinc 315	70	3.0-5.0
	PPG: Amercoat 68 HS	69	3.0-5.0
B	**Tnemec:** Series V140-44 BR Pota-Pox Plus	69	4.0-6.0
	Carboline: Carboguard 869	73	4.0-6.0
	Sherwin Williams: Dura-Plate 235	68	3.0-5.0
	International Paint: Interseal 670 HS or Bar Rust 233HS	82/80	3.0-6.0 (typically 4.0-8.0)
	PPG: Amerlock 2/400	85	4.0-8.0
C	**Tnemec:** Series 690	68	2.0-3.0
	Carboline: Carboxthane 2000	70 50	2.0-3.0 2.0-3.0
	Sherwin Williams: Sherloxane 800	63 90	3.0-5.0 4.0-6.0
	International Paint: Interfine 2700	71/63	2.0-3.0
	PPG: PSX 700	70	2.0-3.0

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
D	**Tnemec:** Series V69 Hi-Build Epoxoline II	69	3.0-5.0
	Carboline: Carboguard 61 or Carboguard 691 or Carboguard 635 Series	72 80 65	4.0-8.0 4.0-20.0 4.0-8.0
	Sherwin Williams: Macropoxy 646	72	4.0-6.0
	International Paint: Interseal 670HS or Bar Rust 233H/236	82	3.0-6.0
	PPG: Amerlock 2/400	85	4.0-8.0
E	**Tnemec:** Series 90-97 Tnemec-Zinc	63	2.5-3.5
	Carboline: Carbozinc 859 Series or Carboguard 890 Series or Carboguard 60/61	66 75 72	3.0-10.0 4.0-10.0 4.0-10.0
	Sherwin Williams: Corothane I Galvapac	67	2.5-3.5
	International Paint: Interzinc 52	59	3.0-5.0 (typically 2.0-3.0)
	PPG: Amercoat 68HS	70	2.5-5.0
F	**Tnemec:** Series 54 Envirofill Masonry Filler	68	As Required
	Carboline: Sanitile 100 Block Filler or Carbocrylic 3350	54	As Required
	Sherwin Williams: Heavy Duty Block Filler (dry) Kem Cati –Coat Epoxy Filler/ Sealer	50 72	8-10 10-20
	International Paint: Devran 224 or Intercrete 4820	77/NA	As Required
	PPG: Perma-Crete 4-100XI	55	8.0-11.0
G	**Tnemec:** Series 151 Elasto-Grip	17	1.0-1.5
	Carboline: Galoseal WB	31	0.5-1.0
	Sherwin Williams: Pro-Mar 200 Zero VOC / Primer	26	1.0-2.0
	International Paint: Intercryl 520	44	1.0-2.0 (typically 2.0-3.0)
	PPG: Seal Grip 17-921XI	28	1.6
H	**Tnemec:** Series 1026	43	2.0-3.0
	Carboline: Sanitile 155	38	2.0-3.0

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
	Sherwin Williams: Pro-Mar 200 Zero VOC Series Eg-Shel (dry wall) or Pro Industrial DTM Acrylic Gloss (pipe insulation)	42 40	1.5-2.0 2-4
	International Paint: Intercryl 530/WB	35	1.5-2.0 (typically 2.0-3.0)
	PPG: Speedhide Interior Latex 4510XI	37	1.5
I	**Tnemec:** Series V140-AA83 Pota-Pox Plus	82	4.0-6.0
	Carboline: Carboguard 691/ Phenoline Tank Shield	80-100	4.0-20.0
	Sherwin Williams: Macropoxy 646 PW	72	4.0-6.0 (2-4 as concrete primer)
	International Paint: Interseal 670HS or Bar Rust 233H	82/80	4.0-6.0 (typically 4.0-8.0)
	PPG: Amerlock 2	85	4.0-8.0
J	**Tnemec:** Series 141 or Series 435	82 100	1.0-3.0 20-30
	Carboline: Carbozinc 621 / Plastite 4503 / Carboguard 691	80-100	4.0-10.0
	Sherwin Williams: Duraplate 235	68	4.0-10.0
	PPG: Amerlock 2	85	4.0-8.0
K	**Tnemec:** Series 141 or Series 435	82 100	1.0-3.0 20-30
	Carboline: Reactamine 760 Series Plasite 4550S	100 100	20.0-100.0 20.0-60.0
	Sherwin Williams: PolyCote 115 or Duraplate 6000	100 100	25.0-100.0/ 40.0-125.0
	International Paint: Enviroline 222	100	20.0-100.0 (typically 70.0-80.0)
	PPG: Amerthane 490	100	20.0-100.0
L	**Tnemec:** Series 141	82	6.0-14.0
	Carboline: Reactamine 28 or Carboguard 1340 WB	100 55	1.0-2.0 1.5-2.0
	International Paint: Interzone 954	85	14.0-18.0 (typically 18.0-20.0)

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
	PPG: Amerlock 2	85	4.0-8.0
M	**Tnemec:** Series 431 Perma- Shield PL	100	30.0-40.0
	Carboline: Carboguard 163	100	30.0-40.0
	Sherwin Williams: Duraplate 6000	100	30.0-40.0
	PPG: Sigma Shield 880	85	30.0-40.0
	International Paint: Interzone 485	99	30.0-40.0
N	**Tnemec:** Series FC22 or 22 Epoxoline	100	20.0-30.0
	Carboline: Phenoline Tank Shield / Polyclad 777 Series	100	20.0-30.0
	Sherwin Williams: Sher Plate PW or Duraplate UHS	100 100	25.0-35.0 25-35
	International Paint: Interline 975P	100	30.0-40.0 (up to 50.0 mils max)
	PPG: Novaguard 810 ER	100	20.0-40.0

2.3 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.4 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.1 EXAMINATION / PREPARATION

A. Surface Preparation: Prior to painting, Surface preparation prior to painting shall be in accordance with the following guidelines and as recommended by the painting material manufacturer.

SURFACE PREPARATION GUIDELINES	
Class of Work	Preparation of Surface Prior to Painting
Structural Steel and Steel Encased in Concrete, Masonry or Fireproofing	All visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter shall be removed by compressed air nozzle blasting, centrifugal wheels or other specified method. Discoloration caused by certain stains shall be limited to no more than 33 percent of each square inch of surface area in accordance with Society of Protective Coatings (SSPC-SP6).
Steel (other than structural, encased or galvanized) and Steel Submerged Under Water	All visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter shall be removed by compressed air nozzle blasting, centrifugal wheels or other specified method. Discoloration caused by certain stains shall be limited to no more than 5 percent of each square inch of surface area in accordance with Society of Protective Coatings (SSPC-SP10).
Galvanized Steel and Other Metals	All welds, beads, blisters or protuberances, other than identification markings shall be smooth, and other imperfections shall be removed. All nonferrous metals and galvanized steel, whether shop primed or field primed, shall be solvent cleaned in accordance with Society of Protective Coatings (SSPC-SP1).
Canvas Pipe Covering	All adhering debris shall be removed and indentations or other unsightly spots shall be smoothed out to give a uniform, even surface. Surfaces shall be brushed clean.
Gypsum Wallboard and Plastered Surfaces	Gypsum wallboard shall be prepared as recommended by the wallboard manufacturer. Plaster surfaces shall be dry. Scratches, cracks, holes and other defects shall be filled flush with adjoining surfaces by approved methods, sandpapered smooth, and brushed clean.
Concrete and Masonry Surfaces	Concrete and masonry shall be dried for a minimum of 28 days and then the dry concrete and masonry shall be brushed and washed to remove all loose dirt, dust, free lime and other deleterious substances by approved methods. Protruding fins and other adhering matter shall be removed or ground until a smooth, even finish is obtained. Concrete surfaces to be painted shall be acid etched or otherwise roughened as recommended by the manufacturer of the coating to be applied, to produce a slightly granular surface required for adherence of coating to the concrete, unless otherwise indicated.
PVC	All adhering debris shall be removed and surface shall be roughened using suitable sandpaper. Surfaces shall be dry and free from dirt, oil, grease etc.

B. Surface Contamination Testing: A surface contamination analysis test shall be performed every 500 square feet by means of a Chlor test. CSN salts or approved

equivalent for surfaces coated in the field or in outdoor uncontrolled atmosphere environment.

C. Surface Contamination Analysis Test shall be performed every 500 square feet by means of a Chlor Test CSN salts or approved equivalent for surfaces coated in the field or in an outdoor uncontrolled atmosphere environment.

1. Surface with chloride levels exceeding 3 µg/square centimeter for submerged surfaces and 5 µg/square centimeter for exposed surfaces shall be treated with a liquid soluble salt remover equivalent to CHLOR*RID (CHLOR*RID International, Chandler, AZ).

2. Test decontamination water for chloride content prior to use.

   a. Chloride Limit: –100 mg/L.

3. Locally available potable water meeting the chloride limit is acceptable for decontamination. If locally available potable water exceeds the chloride limit, provide imported water that meets the specified chloride limit.

4. Follow manufacturer's recommendations and procedures for the use of this product to remove the surface contamination.

3.2 APPLICATION

A. General: All painting and coatings shall be applied in accordance with the manufacturer's recommendations and approved submittals. A representative of the paint manufacturer shall inspect the surfaces to be painted and shall advise on the proper application. The paint manufacturer representative shall periodically be consulted regarding ambient temperature and humidity conditions.

B. Shop Painting: The following items shall be provided with shop coats of primer and finish coats as herein specified before exposure to the weather:

1. Metals:

   a. Structural steel

      Note: Consider using hot dip galvanizing at crevices or hard to reach places on structural steel.

      1) All steel designated to be galvanized and painted shall be hot dip galvanized in accordance with Section 05 05 13.01 Galvanizing, prior to receiving finish coats.

   b. Bollards and cleats

   c. Miscellaneous steel and wrought iron

2. Machinery and Equipment:

   a. Mechanical and electrical equipment

C. Field Painting: All painting at the site of the project is hereby designated as field painting for those items that cannot be shop painted or are touched up due to minor damage to the painted surface.

1. Repair and Repainting: Field coatings shall not be applied until all marred surfaces have been repaired or repainted. Shop coated surfaces shall be thoroughly cleaned and retouched prior to the application of successive paint coats in the field.

2. Unpainted Materials: Do not paint or finish copper, bronze, chromium plate, nickel, stainless steel, aluminum (except ducts and conduit adjacent to finish painted surfaces), monel metal, lead, lead coated copper and brass, except as otherwise indicated.

3. Items to Receive Coating: All ferrous metals and insulated surfaces shall be provided with a protective coating. Interior surfaces, exposed masonry walls and concrete walls, floors and ceilings shall be provided with protective coatings as specified.

4. Surface Condition: Only surfaces that are dry and free from dust, grease or other undesirable or interfering substances shall receive coatings. Coatings shall be as specified in the "Material Painting Schedule", attached after the "End of Section" designation.

5. Application: Finish coats shall be applied after all adjacent work has been completed. Successive coats shall have different shades or tints of color wherever possible. Colors shall be as selected and approved by the Engineer. Prime and successive finish coats shall be cleaned, sand papered, or otherwise treated before the next coat is applied, in accordance with the recommendations of the coating manufacturer, and as approved by the Engineer. All coats shall be inspected and approved by the Engineer, before application of any succeeding coats. All coats shall be applied to the dry film thickness (DFT) specified. Coatings shall be applied by skilled personnel under adequate illumination. All painted surfaces shall be left in a clean, orderly and acceptable condition.

6. Surface and Atmospheric Conditions: Paints shall not be applied when the surface temperature is less than 40 degrees F, when the relative humidity exceeds 85 percent, or when the surface to be painted is wet or damp, unless more stringent requirements are called for by the paint manufacturer.

D. Painting Schedule

1. Ice Breakers (over hot-dip galvanize per 05 05 13.101)
    a. Prime Coat: Paint Group B – Epoxy Primer (Tie coat for hot dip galvanized steel as recommended by coating Manufacturer)
    b. Intermediate Coat: Paint Group M – High Build Epoxy
    c. Finish Coat: Paint Group C - Polysiloxane
    d. Color: Black

2. Fender Panel and Mounting Frame (over hot-dip galvanize or zinc metalized coating per 05 05 13.01)
    a. Prime Coat: Paint Group B – Epoxy Primer (Tie coat for hot dip galvanized steel as recommended by coating Manufacturer)
    b. Intermediate Coat: Paint Group M – High Build Epoxy
    c. Finish Coat: Paint Group C - Polysiloxane
    d. Color: Black
3. Mooring Bollards and Cleats
    a. Prime Coat: Paint Group A – Zinc rich Epoxy Primer
    b. Intermediate Coat: Paint Group M – High Bild Epoxy
        i. Tint intermediate coat black if coating manufacturer can accommodate.
    c. Finish Coat: Paint Group C - Polysiloxane
    d. Color: Safety Yellow
4. Miscellaneous Steel
    a. Prime Coat: Paint Group A – Zinc rich Epoxy Primer
    b. Intermediate Coat: Paint Group B - Epoxy
    c. Finish Coat: Paint Group C - Polysiloxane
    d. Color: Black

E. Field Painting Operations: Surfaces to be given protective coating shall be thoroughly cleaned. Scratches and abrasions on equipment which has been shop coated shall be refinished and all surfaces to be field painted shall be approved by the Engineer before proceeding with painting. Painting shall be performed in a continuous and orderly operation to facilitate adequate inspection, however material subject to weathering or corrosion shall be given prime coats as quickly as practicable.

1. Method of Application: All paint material shall be applied by brush or roller. Spray painting will be permitted only with the specific approval of the Engineer. Surfaces which are so close together as to prevent the insertion of a standard size roller or brush shall be painted thoroughly with the prescribed number of coats by using special narrow rollers or brushes.

2. Adjacent Areas: Areas under and adjacent to painted surfaces shall be fully protected at all times. Dripped or spattered paint shall be promptly removed and any adjacent surfaces that have been damaged or discolored by overspray shall be repaired, refinished, and repainted.

3. Tinting: Successive coats of paint shall be tinted to make the various coats easily distinguishable. Undercoats of paint shall be tinted to the approximate shade of the final coat of paint. Final coats of paint shall not be applied until all other work has been completed, the dirt and rubbish removed and the surfaces suitably prepared. Paint to be applied shall be at room temperature.

4. Conditions for Application: Each coat of paint shall be given sufficient time to cure per the manufacturer's recommendation before application of the succeeding coat. Each succeeding coat shall be applied within the recoat time specified by the manufacturer; otherwise the painted surface shall be prepared per the manufacturer's recommendation before it is recoated. Exterior painting will not be allowed in dust laden air, during damp or threatening weather, or on moist or wet surfaces, or when the surface temperature is below 40 degrees F on a falling thermometer or under 50 degrees for catalyzed epoxy material; it will not be allowed in extreme heat or when metal is hot enough to cause the paint to blister and produce a porous film. Do not apply interior painting until the building is thoroughly dry. If the temperature in the interior of the building, in the opinion of the Engineer, is too low painting will be stopped until the building is heated. Proper ventilation and sufficient heat shall be maintained to permit the paint to dry. The building shall be maintained to be free from dust.

5. Remedial Work: Any paint found defective shall be removed. Touch-up and remedial painting shall be provided as directed and as required until completion and acceptance of final work. If damage to the painted surface is excessive, as determined by the Engineer, that item shall be rejected and shipped back, at Contractor's expense, to be properly recoated before it can be accepted.

6. Application: Each coat of paint shall be applied as a continuous film of uniform thickness, free of pinholes and blemishes, to the maximum extent practicable. Any thin spots or areas missed in the application shall be repainted and permitted to dry before the next coat is applied. All paint shall be carefully applied to a smooth even coating without runs or sagging. Enamels shall be brushed with a smooth even flow. Each coat of paint shall be dry, not only on the surface, but throughout the thickness of the paint film, before the next coat is applied. Finished surfaces shall be uniform in gloss, finish, and color, and free from flash spots and brush marks. In all cases, the resultant paint film produced shall be satisfactory in all respects to the Engineer.

7. Thinning: If the paint material must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material (i.e., one gallon of paint as originally furnished must not cover a greater surface area when sprayed than when applied unthinned by brush). Where thinning is necessary, only the products of the manufacturer furnishing the paint shall be used for the particular purpose, and thinning shall be done with the manufacturer’s knowledge, in accordance with his printed instructions.

8. Thickness and Adhesion Testing: Dry film thickness of each coat shall be as specified herein. Dry film thickness will be checked by the Engineer or a representative with a magnetic gauge for ferrous metal in accordance with SSPC 2 or Tooke gauge destructive test for concrete. Film thickness of

shop coats or other previously applied coating shall be checked by the Engineer or a representative and recorded before painting in order to determine thickness of field coats. Dry film thicknesses for concrete surfaces shall be determined by measuring with a wet-film gauge and by material consumption. Paint adhesion shall be tested by the peel method in accordance with ASTM D 3359.

9. All surfaces of ice breakers and fender panels and mounting frames steel shall be 100 percent holiday tested per NACE SP 0188. Any coating discontinuities shall be repaired. Pinholes which can be identified by visual inspection shall be repaired.

10. Inaccessible Items: Exposed members which will be inaccessible after erection shall be painted and cleaned prior to erection.

11. Coverage: All surfaces to be painted shall be completely covered. When color on undercoats shows through the final coat of paint, surfaces shall be covered by additional coats until paint is of uniform color and appearance and coverage is complete.

12. Safe Atmosphere: The Contractor shall provide sufficient temporary ventilation during painting operations in enclosed areas to remove moisture and solvents, and to keep the atmosphere safe from harmful or dangerous fumes and dust levels for personnel.

F. Workmanship: Only skilled painters shall perform the work and specialists shall be employed where required. Finished surface shall not show brush marks or other irregularities. Top and bottom edges of doors shall be painted as required for the adjacent surfaces. Undercoats on hollow metal shall be thoroughly and uniformly sanded with No. 00 sandpaper, or equal abrasive, to remove all surface defects and provide a smooth, even surface.

G. Mixing: All paints and coatings shall be mixed in accordance with the manufacturer's instructions on the printed label. The Contractor shall provide galvanized iron pans of sufficient size to contain all mixing pails and mix all paints and ingredients therein.

H. Rates of Application: Paints shall be applied so as to give coverage per gallon not greater than that recommended by the manufacturer. Quantities of paint used for successive coats on the various parts of the work shall be recorded in a manner satisfactory to the Engineer.

I. Touch-Up of Shop-Primed and Finished Items: Touch-up of any and all damaged portions and imperfections in shop-primed and finished items shall be accomplished using the same paint as used for the shop prime and finish. Surface shall be prepared prior to touch-up by wire brushing and sanding to remove rust, scale and loose paint.

J. Aluminum and Incompatible Surfaces: Where aluminum surfaces come in contact with incompatible metals, lime, mortar, concrete or other masonry materials, one

field coat of Group A paint as specified under Article 2.03 "Classification of Paints" in this Section shall be applied to the incompatible surfaces.

K. Concealed Surfaces: All wall surfaces which will be concealed by equipment shall be painted before equipment installation.

3.3 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.4 STARTUP / DEMONSTRATION

A. Not Used

3.5 ADJUSTING / PROTECTION / CLEANUP

A. The Contractor shall touch up and restore any finish damaged. Paint or other finishes spilled, splashed or splattered shall be removed from all surfaces using care so as not to mar any surface or item being cleaned.

1. The Contractor shall rectify any failures or breakdowns, loosening of the paint or coatings within a year after acceptance of work, regardless of the paint systems used. This will require removal of the entire coating where failure occurs and repainting with the coating system previously specified. Patching will not be allowed.

END OF SECTION

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N) Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat**																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Steel and Iron - Structural and Miscellaneous Uses:																				
Interior (Indoors) shop primed, field finished	B or E or I	A	A or D	A	A	B or I	A	D	A	B	B or I	A	D	A	B	--	A	D	A	B
Exterior (Outdoors) shop primed, field finished	B or I	A	A or D	A or B or E	A	C	A	D	A or B	B	--	A	D	A	B	--	C	C	C	C
Submerged, Buried or Continuously Wet Exposed to sewage, shop primed, field finished	B or I	A	A	B	B	J or K or L or M	A	B or J	B	B	--	D	B or J	D	B	--	D	B or J	D	--
Steel and Iron - Industrial Equipment (Exposed to wastewater):																				
Submerged, Buried or **continuously wet in wastewater**, completely shop coated inside and out, includes OEM factory finished items such as gates, valves, etc.	J or K or L or M	A Or K*	A or M*	D or K or L	A	J or K or L or M	A	B or J	D	B	--	A	B or J	D	B	--	--	B or J	D	B

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N)** **Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat**																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Above grade, indoors, **exposed to waste water**, completely shop coated inside and out, includes OEM factory finished, items such as gates, valves etc.	J or K or L or M	A or N*	A or M*	D or K or L	A	J or K or L or M	A	B or J	A or D	B	--	A	B or J	A or D	B	--	--	B or J	A or D	--
Above grade, outdoors, **exposed to waste water**, completely shop coated inside and out, includes OEM factory finished, items such as gates, valves etc.	J or L or M	A or N*	A or M*	D or E or K or L	A	J or L or M	A	B or L	A or D	B	--	A or C	B or J	A or D	B	--	--	C	A or D	--
Inside of item immersed in sewage	J or K or L or M	A or N*	A or M*	D or K or L	B	J or K or L or M	A	B or J	D	B	--	A	B or J	D	B	--	--	B or J	D	B
Ductile Iron or Steel Process Piping, submerged, Buried or constantly wet, **exposed to sewage**, H2S exposures, OEM factory finished.	M*	A or K*	A Or M*	D or K	M	--	A	B	D or K	--	--	A	B or J	D or K	--	--	--	B or J	D or K	--
Steel and Iron - Industrial Equipment (Exposed to Potable water):																				

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N)** **Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat**																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Shop primed, field finished	B or I	A or J	E or I	B or I	A	B or I	D	I	B or I	B	B or I	D	I	B or I	B	--	--	--	B or I	--
Exposed to Potable water (NSF) completely shop coated, inside and out, OEM factory finished items such as Gates, Valves etc.	B or I	A or J	E or I	B or I or N	A	B or I	D	I	B or I	B	B or I	D	I	B or I	B	--	--	--	--	--
Equipment above grade, indoors, **exposed to Potable water** (NSF), completely shop coated inside and out, OEM factory finished items such as Gates, Valves etc.	B or I	A or J	E or I	B or I or N	A	B or I	D	I	B or I	B	B or I	D	I	B or I	B	--	--	--	--	--
Equipment above grade, outdoors, **exposed to Potable water** (NSF), completely shop coated inside and out, OEM factory finished items such as Gates, Valves etc.	N*	A or J	E or I or N*	B or I or N	N*	--	D	I	B or I	--	--	D	I	B or I	--	--	--	--	--	--
Ductile Iron or steel process piping **exposed to Potable Water** (shop finished) alternate	N*	A or L or N*	E or I or N*	B or I or N	N*	--	A	I	B or I	--	--	C	I	B or I	--	--	--	--	--	--
MISCELLANEOUS USES:																				
Piping concealed in Masonry	B or I	A	A	A	A	A	A	D	A	B	A	--	D	A	B	--	--	--	--	--

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N)** Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Piping wrapped in Insulation	A	A	A or D	A or B	A	A	A	D	A or B	B	A	--	D	A or B	B	--	--	--	--	--
Heated Metal (Air Main Piping): Submerged, Buried and Exposed	J or L or M*	D or E or M*	D or M*	D	D	--	E	D	D	D	--	A or D	D	D	--	--	A or D	D	D	--
Concrete Masonry: Interior	F	--	F	--	F	A or D	F	D	F	B	D	A	D	D	B	D	A	D	D	--
Concrete: Interior excluding floors	A	B	--	--	A	A or D	A	D	D	B	D	A	D	D	B	--	--	--	D	--
Concrete: Immersion, Waste Water	A or J or L	J or L	--	--	N	A or J or L	D or I or K*	I	D	N	--	D	B or J or K	D	--	--	--	--	D or K	--
Pipe and Duct Insulation: Exposed	A	--	--	--	A	H	B	H	H	B	H	H	H	H	B	--	--	--	--	--
PVC (Interior)	A	--	--	--	A	A	B	D	A	B	A	A	D	A	--	--	--	--	--	--
PVC (Exterior)	A	--	--	--	A	A	B	D	A	C	A	C	C	A	--	C	--	C	C	--
Gypsum Wallboard and Plaster:	G	B	G	G	G	H	H	H	H	H	H	H	H	H	--	H				--

MATERIAL PAINTING SCHEDULE																				
Materials and Conditions	**Paint Groups (refer to "Classification of Paints" table for acceptable paints in Groups A-N)** **Tn: Tnemec, Cb: Carboline, SW: Sherwin Williams, IP: International paint, PPG: PPG/Amercoat**																			
	Prime Coat					**Finish Coats**														
						1st					**2nd**					**3rd**				
Paint Manufacturer	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**	**Tn**	**Cb**	**SW**	**IP**	**PPG**
Nonferrous Metal and Galvanized steel: Interior	A	--	--	--	A	A	G	D	A	B	A	A	D	A	--	A	--	D	A	--
Nonferrous Metal and Galvanized Steel: Exterior	A	--	--	--	A	A	G	D	A	C	A	C	C	A	--	C	--	C	C	--
* Requires only one coat.																				

SECTION 22 05 33 –HEAT TRACING FOR PLUMBING PIPES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install heat tracing and insulation systems as shown and required by the Contract Drawings. All heat tracing components shall be supplied as indicated under this Section and the Contract Drawings. The heat tracing and insulation system shall include but shall not be limited to self-regulating heater cables, grommet end termination kits, power connection kits, splice kits, NEMA 4X Control Panels, ambient air temperature sensors, piping insulation and jacket, aluminum tape, and installation tape. The intent of this Section is for the Contractor to supply all appurtenances needed for a complete and fully operational system at each location that a heat tracing system is required. The heat tracing system supplier shall be completely responsible for the design of the system such that the entire system meets all aspects of this Section and the system functions in the environment where it will be installed. All parameters of the system shall be sized and as recommended by the supplier.

B. Piping insulation and jacket shall be supplied with all heat traced piping and shall be in conformance with Section 40 05 19 – Ductile Iron Process Pipe and Section 40 05 53 – Process Valves Four-inch Diameter and Larger. The thickness of the insulation shall be as stipulated in this Section.

C. The minimum design ambient temperature for the heat tracing system design shall be –20 degrees Fahrenheit.

D. Each component of the heat tracing system shall be Underwriters Laboratory (UL) listed.

E. The following index of this Section is presented for convenience:

F.

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1.03	RELATED SECTIONS	2
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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 79 05 – Equipment Start-up and Training

B. Section 40 05 19 – Ductile Iron Process Pipe

C. Section 40 05 53 – Process Valves Four-inch Diameter and Larger

1.04 REFERENCES

A. Reference Standards:

1. NEC - National Electric Code
2. NEMA - National Electrical Manufacturers Association
3. NFPA - National Fire Protection Association
4. NYCBC - New York City Building Code
5. UL - Underwriters' Laboratories

1.05 DESCRIPTION

A. This Section includes requirements for providing heat tracing system conductors for ductile iron pipe and accessories in accordance with the applicable standards and regulations.

B. Heat tracing shall be installed on single wall pipe in accordance with the Contract Drawings.

1.06 QUALITY ASSURANCE

A. Qualifications of Manufacturer:

1. The manufacturer shall have a minimum of five (5) years of experience in the design and fabrication of heat tracing process pipe, fittings, appurtenances, and specials of similar size, capacity, and type to those shown on the Contract Drawings and specified in the Contract Documents and shall show evidence of at least five (5) substantially similar installations in satisfactory operation.

B. Regulatory Requirements:

1. Pipe and fittings shall conform to the New York City Building Code with respect to plumbing and other applications covered by these laws.

1.07 SUBMITTALS

A. Submittals for all process pipe heat tracing systems shall comply with the requirements of the following Sections:

1. Section 01 33 00 – Submittal Procedures

B. The following items shall be submitted by the Contractor:

1. Submittal data on all components of the heat trace system and any other data recommended by the manufacturer.

2. Installation and maintenance instructions.

3. List of replacement parts for the complete system in table format.

4. Bill of materials list of the system as supplied in table format.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials provided under this Section in accordance with the requirements of the Contract Documents.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Spare parts shall be provided in accordance with Section 01 78 24 – Spare Parts and Maintenance Materials and shall include the following:

1. 50 LF of self-regulating cable for each cable wattage provided for the system(s).

2. One (1) spare ambient air temperature sensor.

3. One (1) cable power connection kit.

4. One (1) cable termination kit.

5. Two (2) cable splice/tee kits.

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The following manufacturers have been approved for the Main heat tracing system. All system components shall be supplied by a single manufacturer.

1. Control Panels, Heat Trace Cable, and all associated appurtenances:

a. Chromalox;

b. Thermon Manufacturing Company;

c. Raychem Corporation;

d. Or -approved equal.

2.02 MATERIALS / EQUIPMENT

A. Heat Tracing Cable:

1. The self-regulating heater cable assembly shall consist of two parallel copper bus wires, minimum size 16 AWG, connected through a semi-conductive heating matrix. This heating element shall be covered with a cross-linked polyolefin insulation jacket. This insulation shall be covered by a tinned copper braid and then covered with a TPE over-jacket for hostile/corrosive environments. All heat cables shall be rated for 120-Volt 1-Phase supply voltage.

a. Each heat tracing circuit shall be supplied with a power connection and end seal kit. Each end seal kit shall include a lighted end termination kit. It shall be the Contractor's responsibility to make sure

that no circuit in the system be longer than as recommended by the heat tracing system manufacturer.

b. All terminations, splices, junctions and tees in the circuit shall be made using manufacturer recommended and supplied kits. Junction boxes shall be provided where required for access to all circuit appurtenances.

B. Control Panel:

a. The heat tracing system shall be controlled by a monitoring and control panel manufactured specifically for this purpose by one of the listed heat trace manufacturers.

b. The panel shall be a microprocessor-based control system incorporating a digital information display.

c. The panel shall be equipped for ambient temperature sensing.

d. The control panel shall be housed in a NEMA 4X 316 stainless steel enclosure.

e. Digital HMI display shall be door mounted for access.

f. The Control Panel shall be 2-circuit ambient sensing type that uses only one RTD to control both circuits.

g. Each circuit shall have ground fault alarm/monitoring.

2. The control panel shall have the following capabilities and specifications:

a. Factory Mutual and Underwriters Laboratory listed.

b. Designed for 120V 1-Phase input/supply voltage and 120V 1-Phase output voltage.

c. Control Panel operating ambient temperature range of -40°F–104°F.

d. Accept input from up 3-wire platinum RTDs for ambient temperature sensing with quantities as indicated on the Contract Drawings.

e. Temperature control range -20°F - 185°F

f. Alarm functions for high operating current, low operating current, and ground fault indication.

g. Alarm information for low heater current, high heater current and ground fault current.

h. Communication capability via a RS 485 port.

i. Real time data for temperature, heater current and ground fault current.

j. The total quantity of heat tracing circuits for each heat trace controller shall be as indicated on the Contract Drawings.

k. The control panel shall also include an ambient temperature sensing 3-wire platinum RTD supplied by the manufacturer. The RTD shall be housed in a nonmetallic NEMA 4X enclosure and shall be adaptable for mounting in a number of configurations. The RTD resistance shall be 100 ohms at 32 deg F. The sensor housing material shall be 316 stainless steel. The RTD calibration shall conform to ASTM E1137 Grade B.

C. OPERATING CONDITIONS AND PERFORMANCE REQUIREMENTS

1. Heat tracing system conductors and insulation for metal piping shall be supplied in conformance with Table 1:

Table 1: Heat Tracing Conductors and Insulation for Metal Piping

Pipe Description	Insulation Thickness (in)	Cable Heat Rating for Design Ambient Air Temperature -20°F (Watts per Foot)
Sludge Riser Piping	As per Section 40 05 19 – Ductile Iron Process Pipe	8 x 2 passes

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. Damaged equipment will be rejected and shall be replaced at the expense of the Contractor.

3.02 INSTALLATION

A. The installation of all heat tracing and insulation components shall conform to all instructions and requirements recommended by the heat tracing system manufacturer. All installation and terminations shall conform to the National Electric Code.

B. All piping shall be tested prior to installation of any heat tracing or insulation components. Thermal insulation shall only be installed when all heat tracing components are in place and satisfactorily tested as indicated herein. Once tested, the insulation shall be installed immediately to prevent damage to the heat tracing system components.

C. No insulation shall be installed using staples. Insulation jackets shall be installed as recommended by the insulation system supplier such that no damage is done to the heat tracing system components.

D. The Contractor shall ensure that surfaces of pipes, valves, heat tracing, and fittings are clean and dry prior to installation of insulation. Insulation shall be installed so as to make surfaces smooth, even, and substantially flush with the adjacent insulation. The Contractor shall follow the manufacturer's application instructions for the materials used.

E. A label shall be installed on the piping insulation jacket every 10 feet and readily visible from ground level and shall read: “ELECTRIC HEAT TRACING: CAUTION”.

3.03 FIELD TESTING / QUALITY CONTROL

A. All heating cable shall be tested using a megohmmeter (megger) between the heating cable bus wires and the metallic ground braid. A 2,500 VDC megger test is required, and the minimum acceptable resistance value shall be 20 megaohms regardless of the circuit length. Any cables found to be less than this value shall be replaced at no additional cost to the Owner. The megger tests shall be performed as follows:

a. After installation of the cable and all fabrication kits but prior to installing any of the insulation system components.

b. After installation of the insulation system components but prior to energizing the cables.

c. All test reading for each megger test shall be recorded by the installer and submitted with the maintenance instructions.

3.04 STARTUP / DEMONSTRATION

A. Equipment start-up and operator training shall be completed in accordance with Section 01 79 05 – Equipment Start-up and Training.

A. Manufacturer's Field Services

1. The Contractor shall provide the services of a qualified manufacturer's service representative who shall adequately supervise and assist in the installation of the process piping heat tracing system, check the installation before it is placed into operation, assist in the performance of field tests, observe and assist initial operations and train the Contractor and the Plant's operations and maintenance staff in the care, operation and maintenance of the heat tracing system

2. The Contractor shall provide process piping heat tracing equipment start-up services and training in accordance with this Section, the Specifications and the Contract Drawings and the following requirements:

3. Minimum number of manufacturer's representative site visits per Heat Trace Control Panel. Contractor shall include the following site visits:

Service	Number of Trips	Number of Days/Trip
Installation	1	1
Testing	1	1
Startup	1	1
Training	1	1

4. Any additional time required to achieve a successful installation shall be at the expense of the Contractor.

5. The Engineer shall have the right to reallocate any unused person-days.

6. The Contractor shall provide a field report from the manufacturer's representative for each visit to the site. The report shall include complete information on time, schedule, tasks performed, persons contacted, problems corrected, tests results, training, instruction and all other pertinent information.

7. The service representative shall sign in and out with the Engineer on each day they are at the site. Person-days shall be understood to be the actual time spent at site and does not include travel to and from the site.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleaning:

a. During construction, all piping shall be thoroughly cleaned before placement and the lines kept free from foreign matter of whatever

origin. The pipes shall be left thoroughly clean to the satisfaction of the Engineer.

END OF SECTION

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SECTION 26 05 11 – GENERAL ELECTRICAL REQUIREMENTS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials and equipment required to perform the Work in accordance with the general electrical requirements as specified under this Section and shown on the Contract Drawings.

B. The Work shall also include the following:

1. Inserts and other electrical items which shall be installed embedded in concrete, or built into walls, partitions, ceilings or panels constructed by other Prime Contractors.

2. Installation procedures and schedules under other contracts shall be reviewed and coordinated with other Prime Contractors regarding the installation of electrical items that must be installed.

3. Keep informed of the construction so the electrical work shall be installed within such time periods as will not delay the work of the other Prime Contractors.

4. Notify other Prime Contractors in advance of the installation of the work included, so they shall have sufficient time for coordination and installation of interrelated items that are included in their contracts and that must be installed in conjunction with the Work included under this Contract.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 09 91 00 - Painting

1.04 REFERENCES

A. NYCEC - New York City Electrical Code

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. All equipment and devices, provided under each Contract, shall be properly connected and interconnected with other equipment and devices so as to render the installations complete for successful operation, regardless of whether all the connections and interconnections are specifically mentioned in the Sections or shown on the Contract Drawings.

B. Similar products shall be by the same manufacturer for uniformity on the Contract.

C. Electrical material and equipment shall be new and shall bear the label of UL, or other nationally recognized, independent testing laboratory, wherever standards have been established and label service regularly applies.

D. Where execution of the work under this Contract requires certain systems and equipment to be modified, the Contractor shall perform the work with due regard to maintenance of operations and construction staging in accordance with the Specifications.

E. The modification work shall be coordinated in advance with the plant superintendent and existing conditions. Contractor shall field determine and make such investigations as required to determine the functionality of each circuit and identify circuit terminations as required for the modifications intended to ensure the proper interface of all components for a complete functional system.

F. Area Classifications

1. Materials and equipment for all indoor areas shall conform to the area classifications shown on the Contract Drawings or stated in the Specifications.

2. Materials and equipment for all outdoor areas shall conform to corrosive requirements, unless shown otherwise on the Contract Drawings or stated in the Specifications.

3. The locations and requirements shall be in accordance with the following:

   a. Materials, equipment and incidentals installed in corrosive areas shall meet NYCEC and NEMA requirements for corrosive locations. Enclosures installed in corrosive locations shall meet NEMA 4X requirements.

   b. Materials, equipment and incidentals installed in hazardous locations shall meet NYCEC requirements for the Class and Division designated. Enclosures installed in hazardous locations shall be provided with stainless steel hardware and watertight gasketing.

   c. Materials, equipment and incidentals installed in dusty locations shall meet NYCEC and NEMA 12 requirements.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited, to:

1. Point-to-point field wiring diagrams.

B. Reports

1. Demonstration of equipment report shall be submitted.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Point-To-Point Field Wiring Diagrams

1. The Contractor shall provide point-to-point field wiring diagrams for all equipment, including equipment provided by other Prime Contractors.

2. The diagrams shall be developed for performance of the work and to document terminations. The diagrams shall be prepared based upon approved shop drawings of related Contracts and inspections as necessary to complete the diagrams. The diagrams shall include:

   a. External wiring for each piece of equipment, panel, instrument and other devices to control stations, lighting panels and motor controllers. The diagrams shall include control, status, signal and power wiring. Power diagrams shall include connections to switchgear, motor control centers, panelboards, panels and field devices.

   b. Numbered terminal block identification for each wire termination.

   c. Identification of the assigned wire numbers and color coding for all interconnections.

   d. Identification of all wiring by the conduit tag in which the wire is installed.

   e. Terminal, junction, and pull boxes through which wiring is routed.

   f. Identification of equipment with functional name and number to which wiring is to be connected.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Shop Finishes

1. Electrical equipment shall be shop painted in accordance with the requirements of Section 09 91 00- Painting.

2. Exposed ferrous metal surfaces except aluminum, bronze, brass and stainless steel components shall be cleaned with a commercial blast and primed with one coat of rust inhibitive primer.

3. Manufactured assemblies such as switchgear, substations, motor control centers, panelboards and motor controllers shall be shop painted in accordance with the requirements of Section 09 91 00 - Painting.

4. Other equipment shall be painted with the manufacturer's best grade finish paint system compatible with the finish coatings specified in Section 09 91 00 - Painting.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Maintenance of Operations

1. Where execution of the work under this Contract requires certain equipment to be taken out of service, the Contractor shall perform the work with due regard to maintenance of operations and construction staging in accordance with the Specifications.
2. The Contractor shall schedule the work in advance with the Engineer so as not to affect proper plant operations. When the work is scheduled, the Engineer shall be notified 48 hours prior to proceeding with the work to allow time for the plant superintendent to perform load switching and alternation of equipment.
3. To the maximum extent possible at the end of the workday, all equipment shall be back in place and ready for its normal service use should a plant emergency arise. In addition, should an emergency condition occur during execution of the work, at the request of the plant engineer, the equipment shall be placed back in service immediately and turned over to plant personnel.
4. In the event of accidental shutdown of plant equipment, the Contractor shall notify plant personnel immediately to allow for an orderly restart of affected equipment.

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. The Contractor shall demonstrate, in the presence of the Engineer that all electrical systems and electrically operated equipment operates as specified, designed and as required.

B. The Contractor shall coordinate the demonstration of the electrical systems which are part of other Contracts with the other Prime Contractors.

C. The demonstration of equipment shall include the following:

1. All power circuits shall be operated to verify proper connection to equipment. Mechanical key-interlocks for circuit breakers shall be operated to verify their proper operation. Power shall be removed and reapplied to automatic transfer switches to verify their operation.
2. Emergency power systems shall be activated to verify their automatic start-up, proper operation while running and proper deenergization and cool down upon availability of normal power.
3. All pushbuttons, indicating lights and similar devices shall be operated to verify proper connection and function. All devices, such as pressure and flow switches and similar devices shall be operated to verify that shut-downs and control sequences operate as required.

4. The Contractor, with coordination of the other Prime Contractors, shall operate the systems to verify wiring and adjust the controls, as required, to achieve proper operation. This shall include wiring, timing and switching functions.

D. The Contractor shall provide a demonstration of equipment report. The report shall include complete information on time, schedule, tasks performed, persons contacted, problems corrected, and all other pertinent information.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Restoration

1. The Contractor shall field paint after installation marred or scratched surfaces. All scratches, abrasions and other damage to equipment shall be touch-up painted in accordance with the requirements of Section 09 91 00 - Painting.

END OF SECTION

SECTION 26 05 20 – LOW-VOLTAGE WIRES, CABLES AND ACCESSORIES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing low-voltage electric wires, cables and accessories.

1. Low-voltage electric wires, cables, and accessories shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

B. Low-voltage electric wires and cables to be provided shall include all accessories.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Definitions

1. Low-voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation within the 600 Volt Class.
2. Low-voltage wires and cables shall mean all insulated electric wires and cables intended for use for power, lighting, control, instrumentation, communication, security and alarm circuits.
3. Low-voltage wires and cable accessories shall mean all devices and items intended to provide mechanical protection, terminate, connect, splice, insulate, tag and manage low-voltage wires and cables.
4. Cable is an assembly of insulated wires combined with fillers and separators in an enclosing jacket of insulating material.
5. All references to the Electric Utility or Utility shall mean Consolidated Edison Company or the Local Electric Utility having jurisdiction.

B. Reference Standards

Low-voltage wires and cables shall comply with the latest applicable provisions and recommendations of the following:

1. ANSI/ICEA S-95-658/
   NEMA WC70 - Power Cables Rated 2000 V or Less for the Distribution of Electrical Energy
2. ASTM B5 - Standard Specification for High Conductivity Tough-Pitch Copper Refinery Shapes
3. ASTM B8 - Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
4. ASTM D69 - Standard Test Methods for Friction Tape
5. ASTM D2301 - Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
6. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
7. ICEA S-58-679 - Standard for Control, Instrumentation and Thermocouple Extension Conductor Identification

8.	IEEE 1210	-	Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable
9.	NEMA WC 26/ EEMAC 201	-	Binational Wire and Cable Packing Standard
10.	NETA ATS	-	NETA Acceptance Testing Specifications
11.	NYCEC	-	NYC Electrical Code
12.	NYCCC	-	NYC Construction Code
13.	UL Standard 486A-486B	-	Wire Connectors

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. General:

1. All low-voltage wires, cables and accessories shall be made by an approved manufacturer, and in their construction shall be employed the most improved commercial materials and processes of manufacture.

2. Only low-voltage wires, cables and accessories manufactured under high standards of production and meeting the approval of the Engineer shall be used.

3. Friction tape shall be in accordance with ASTM. D69.

4. All low-voltage wire and cable splicing and terminations shall be done by experienced cable splicers who have worked with similar wire and cable for a period of at least 5 years, using materials and procedures recommended by the wire and cable manufacturer. All splicing and terminations of low-voltage wire and cable shall be in accordance with the instructions of the low-voltage wire and cable manufacturer.

5. The low-voltage wire and cable manufacturer shall use a shop test facility that has recently calibrated testing apparatus and qualified, experienced technicians, for all shop tests. Calibration of testing apparatus shall be within one year.

6. All test equipment and instrument calibration shall be in accordance with the latest edition of the accuracy standard of the U.S. National Institute of Standards and Technology and the NETA acceptance testing specification.

7. The mineral-insulated metal sheath cable installation shall be performed by experienced mineral-insulated metal sheath cable installers who shall have been regularly engaged in the installation of mineral-insulated metal sheath cable for a minimum of the past three years.

8. The Contractor shall retain the services of the mineral-insulated metal sheath cable manufacturer's representative to certify the cable installation is in accordance with the manufacturer's requirements.

9. Field testing of low-voltage wires and cables shall be in accordance with the requirements specified under this Section.

10. The Contractor shall retain the services of an independent testing firm who shall perform acceptance testing on the low-voltage wire and cable installation.

    a. The testing firm shall have experience in the inspection and testing of wires and cables of the type specified and shall be a member company of NETA.

    b. Provide proof of membership or demonstrate that the standards and experience required for membership are possessed, all to the satisfaction of the Engineer.

    c. The testing shall be performed in accordance with the requirements specified under this Section.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. A list of proposed manufacturers shall be submitted with the products they produce proposed for the contract.

2. Manufacturer's Literature, specifications and engineering data for low-voltage wires, cables and accessories including but not limited to:

    a. Manufacturer and type of wire or cable.

    b. Minimum insulation resistance in megaohms per 1,000 ft. at 20 degrees C.

    c. Material, number and size of strands composing each conductor.

    d. Conductor insulation thickness in inches with material and voltage rating.

    e. Jacket thickness in inches.

    f. Average outside diameter of bare conductor.

    g. Average outside diameter of finished wire or cable and jacket material.

    h. Weight per 1,000 ft. of finished wire or cable.

    i. Minimum bending radius, in inches.

    j. Minimum pulling temperatures at which cable may be pulled without damage.

k. Maximum pulling tensions which may be applied to the cable without damage.

l. Literature identifying the methods and materials which Contractor proposes to use to make splices and terminations. Submittal shall consist of manufacturer's literature evidencing compatibility of the conductor insulation and jacket of the wire or cable with the splicing or terminating materials and methods which Contractor proposes to use.

m. Manufacturer recommended pulling lubricants.

n. Qualifications of splicing and termination personnel.

3. Description of shop and field testing methods, procedures and apparatus with calibration dates shall be submitted. Testing methods and procedures shall be submitted at least 45 days in advance prior to conformation of witness testing dates and actual testing.

4. Qualifications of proposed testing firm to perform acceptance testing shall be submitted. Submit firm experience records at least 45 days in advance to actual testing, five recent references with phone numbers shall be submitted.

5. Qualifications of proposed mineral-insulated metal sheath cable installer shall be submitted. Submit installer experience records with five recent completed installations with names and phone numbers.

6. Certification from the mineral-insulated metal sheath cable manufacturer's representative that the cable installation is in accordance with the manufacturer's requirements.

B. Reports:

1. Shop and field test reports shall be submitted.

2. Acceptance testing report shall be submitted.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Low-voltage wires, and cables shall be delivered, stored and handled in accordance with the Specifications and the manufacturer's instructions.

B. Deliver low-voltage cables on factory reels conforming to NEMA WC26. Each end of each length of cable shall be hermetically sealed with the manufacturer’s end caps and securely attached to the reel. Reels with unsealed ends will be rejected.

C. Inspect wire and cable protective coverings for evidence of damage during shipment.

D. Accomplish unloading without contacting cable surface or protective coverings or dropping cable reels from the delivering vehicle to the ground.

E. Store wires and cables on reels on elevated hard surfaces in a clean dry locations away from construction equipment, falling objects, sources high heat and chemicals or petroleum products.

F. Seal cut cable ends using properly sized heat shrink cap to prevent moisture ingress and wicking into the cable interior.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Low-voltage single conductor wires for installation in conduit shall be as manufactured by:

1. Southwire, Carrollton, GA;
2. General Cable, Highland Heights, KY;
3. Okonite Company, New York, NY;
4. Or approved equal.

B. Low-voltage cable shall be as manufactured by:

1. Southwire, Carrollton, GA;
2. General Cable, Highland Heights, KY;
3. Belden; Indianapolis, IN
4. Okonite Company, New York, NY;
5. Or approved equal.

C. Compression connectors ring tongue type shall be manufactured by:

1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Burndy, Manchester, NH;
4. Or approved equal.

D. The mineral-insulated metal sheath cable shall be as manufactured by:

a. Pentair Pyrotenax, Houston, TX;

b. AFC Cable Systems, New Bedford, MA;

c. Or approved equal.

E. Compression splices shall be manufactured by:

1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Burndy, Manchester, NH;
4. Or approved equal.

F. Waterproof compression splices shall be manufactured by

1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Burndy, Manchester, NH;
4. Or approved equal.

G. Spring connector splices shall be manufactured by:

1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Burndy, Manchester, NH;
4. Or approved equal.

H. Markers shall be as manufactured by:

1. Grafoplast Wire markers, Inc, Denver, CO;
2. Thomas and Betts, Memphis, TN;
3. Brady, Milwaukee, WI;
4. Or approved equal.

I. Pulling lubricant shall be as manufactured by:

1. American Polywater Corporation, Stillwater MN;
2. 3M – St. Paul, MN;
3. Ideal Industries, Sycamore, IL;
4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Low-voltage Voltage wire and cable

1. Low-voltage wire and cable shall be used for all power, lighting, control instrumentation, alarm and security system circuits. The size and quantity of low-voltage wires and cables shall be as indicated in the conduit and cable schedule. The conductor jacket shall be in accordance with color identification requirements specified under this Section.

2. Low-voltage single conductor wires for installation in conduit shall be in accordance with the following:
    a. Conductors shall be stranded, copper, single conductor wire conforming to ASTM B8, and B33 No. 12 AWG minimum size.
    b. Conductor insulation shall be flame-retardant, moisture- and heat-resistant thermoset rated 90 degrees C in dry locations and 75 degrees C in wet locations, listed by UL as type XHHW-2 or RHW, and shall be flame-retardant, cross-linked polyolefin low smoke zero halogen (LSZH) type XHHW-2 or LSZH type RHW-2.
    c. XHHW-2 shall be used for all indoor circuits and RHW for all underground and outdoor circuits.
3. Low-voltage cable for installation in conduit shall be in accordance with the following:
    a. Conductors shall be stranded, copper conforming to ASTM B8 and B33, No. 12 AWG minimum size.
    b. Conductor insulation shall be moisture- and flame-resistant cross-linked polyethylene rated 90 degrees C in wet and dry locations, listed by UL as type XHHW-2, and shall include flame-retardant, cross-linked polyolefin low smoke zero halogen (LSZH) type XHHW-2 or LSZH type RHW-2.
    c. Cable conductors shall be assembled together with flame and moisture resistant filters and tape to make round.
    d. Cable shall include an overall protective jacket of polyethylene compound, 45 mils minimum thickness.
4. Instrumentation cable shall in addition comply with the following:
    a. Conductors shall No 16 AWG minimum size
    b. All conductors shall be polyethylene insulated and twisted in pairs with aluminum-mylar shield overlap.
    c. Cable jacket shall be low halogen, low smoke zero halogen (LSZH) type, such as those made by Beldan.
5. Communication cable shall in addition comply with the following:
    a. Conductors shall be No 24 AWG minimum size.
    b. Conductor twist and shielding shall be as shown on the Contract Drawings or as stated in this Specification.
    c. Cable jacket shall be low halogen, low smoke zero halogen (LSZH) type, such as those made by Beldan.
6. Fire Alarm cable shall in addition comply with the following:
    a. Conductors shall 18 AWG minimum size

b. Cables shall be UL listed for the intended service

c. Cables intended for use in the installation shall be approved for the intended use by the New York City Building Department, Material and Equipment Acceptance Division.

d. Cable jacket shall be low halogen, low smoke zero halogen (LSZH) type, such as those made by Beldan.

7. Security system cable shall in addition comply with the following:

a. Conductors shall be No 22, AWG minimum size.

b. Conductor twist and shielding shall be as shown on the Contract Drawings or as stated in this Specification.

c. Coaxial cable shall be as shown on the Contract Drawings or as stated in this Specification.

8. Mineral-insulated metal sheath cable shall be used for the fire pump circuits. The mineral-insulated metal sheath cable shall be in accordance with the following:

a. The mineral-insulated metal sheath cable shall be NYCEC, type MI. The cable assembly shall be UL listed including support for a 2 hour fire rating.

b. Conductors shall be solid copper conforming to ASTM B5.

c. Cable insulation shall be magnesium oxide mineral rated 600 volts, 90 degrees C. The cable shall include a metal-sheath consisting of seamless soft drawn copper.

d. The cable shall be provided with all fittings and hardware necessary for proper installation.

B. Low-voltage wire and cable accessories

1. Cable connectors shall be provided for terminating low-voltage wire and cable. Connectors shall be solder less type and properly sized to fit fastening device and wire size. Connectors shall be in accordance with the following:

a. For wire sizes up to and including No. 6 AWG, compression type with UL 486A listing shall be used. All cable terminations for conductors No. 10 AWG and smaller shall be terminated using UL listed terminals, nylon insulated connectors, at each terminal board.

b. For wire sizes No. 4 AWG and above, either compression type or bolted type with tin-plated contact faces shall be used.

c. For wire sizes No. 250 kcmil and larger, connectors with at least 2 cable clamping elements or compression indents and provision for at least 2 bolts for joining to apparatus terminal shall be used.

2. Splicing for low-voltage wire and cable shall be performed when terminals are not provided. Splicing shall be in accordance with the following:

a. For wire sizes No. 8 AWG and larger, splices shall be made up with compression type copper splice fittings with UL 486A listing. Splices shall be taped and covered with materials recommended by the cable manufacturers, to provide insulation equal to that on the conductors.

b. For wire sizes No. 10 AWG and smaller, splices shall be made up with preinsulated, spring connectors. Connectors shall be flame retardant with UL listing. Spring connectors shall be Twister type.

c. For wet locations, splices shall be waterproofed. Compression type splices shall be waterproofed by a sealant-filled, thick wall, heat shrinkable, thermosetting tubing or by pouring a thermosetting resin into a mold that surrounds the joined conductor. Waterproof compression splices shall be UL listed, heavy wall type. Spring connector splices shall be UL listed and waterproofed with a sealant-filler. Spring connectors shall be Twister DB type.

3. Compression connectors shall be UL listed terminals.

4. Cable markers shall be provided for the identification of low-voltage wire and cable. Markers shall be in accordance with the following:

a. Markers shall be vinyl type, moisture, heat and abrasion resistant with adhesive back. Cable identification shall be clearly marked.

5. Low-voltage wire and cable pulling lubricant shall be used to reduce wire and cable tension and side wall pressure and aid in minimizing damage during low-voltage wire and cable installation. Pulling lubricant shall be in accordance with the following:

a. UL Listed, compatible with the wire insulation or cable jacket, the raceway involved and acceptable to the wire and cable manufacturer. When wire and cable manufacturer shall be provided.

b. Pulling lubricant shall be water based, with a 0.17 average coefficient of friction and a temperature range of 20 to 120 degrees F.

c. Pulling lubricant shall confirm to IEEE 1210

d. Pulling lubricant shall not support combustion.

e. Pulling lubricant shall not cause residue to cement insulation or jackets to the inside of conduit or ducts.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Certified Shop Tests:

1. Shop testing shall be performed on the low-voltage wire and cable at the manufacturer's plant prior to shipment. Shop test shall be in accordance with the latest revisions of ICEA and UL and shall demonstrate that the wire and cable tested conforms to the requirements specified.
2. The Contractor shall provide a shop test report. The report shall identify the tests performed and the results obtained.
3. All low-voltage wire and cable shall be shop tested in accordance with the requirements of this Specification.

B. Witnessed Shop Tests:

1. The Contractor shall perform witnessed shop tests in accordance with this Specification.
2. The Engineer shall have access during working hours for inspection purposes to all parts of the works where material and cable are being manufactured, and all reasonable inspection and testing facilities shall be provided to him without increase in price. The Engineer may request that dielectric strength tests and measurements be made to verify the cable data furnished by the Contractor. For this purpose the Contractor shall furnish without increase in price, a length of cable, not to exceed 3 feet for each size to be cut from one or more reels as directed by the Engineer. Each sample shall be marked with a tag bearing full description of cable insulation and number of reel from which it is cut.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. All low-voltage wires and cables shall be installed within the raceways as shown on the Contract Drawings. They shall be carefully handled so as to avoid twists or kinks in the conductors or damage to the insulation.

B. The Contractor shall ensure that the manufacturer's recommended cable bending radii and pulling are not exceeded and that the number of conductors permitted in a conduit are in accordance with the latest applicable section of the NYCEC.

C. No splices shall be permitted between terminals except at approved junction or terminal boxes. Boxes shall be provided as shown on the Contract Drawings or as required by Code for the pull lengths. No more than two terminations shall be made at each terminal point. Cable and wire runs shall be looped through pull boxes without cutting and splicing where possible. All splices below grade, in manholes, hand holes and wet locations shall be waterproofed.

D. No splicing of instrument wiring shall be permitted. Instrument wiring shall be extended by use of field termination boxes employing labeled terminal strips. Shield continuity shall be maintained. Ultimate shield termination (ground) shall be at one end only.

E. The mineral-insulated metal sheath cable manufacturer's representative shall review the cable installation to certify that the cables are installed in accordance with the manufacturer's requirements.

3.02 INSTALLATION

A. Wire and Cables

1. Cables shall be installed complete with proper terminations at both ends. For each motor circuit, Contractor shall ensure proper phasing, phase sequence and motor rotation.

2. Wire and cable contained within a single conduit shall be pulled simultaneously using insulating pulling compounds containing no mineral oil.

3. Pulling tension on wires and cables shall be continuously monitored using a calibrated Dynamometer type device, having a calibration label within six months of its use.

4. Cables shall be installed with maximum slack at all terminal points, boxes, handholes and manholes.

5. Low-voltage cables located within manholes, handholes and boxes shall be wrapped with fireproofing tape for their entire length on an individual cable basis.

a. Tape shall be 30 mills thick of self-extinguishing material which will not support combustion.

b. Tape shall not deteriorate when subjected to water, salt, sewage or fungus and shall be secured with glass cloth tape.

c. Low-voltage cables shall be fireproofed in accordance with the cable manufacturer's recommendations and then covered with tape extending at least one inch into any duct.

B. Conductor Identification

1. Each conductor shall be labeled at each termination point and all splice locations. Carry individual conductor or circuit identification throughout, with circuit numbers or other identification stamped on terminal boards when provided or the cable so it is visible around the cable's circumference.

2. Each conductor shall be identified in junction boxes, cabinets, and terminal boxes. Adhesive type pre-printed labels for wire markers, and adhesive wrap around wire markers, plastic coated and paper type, shall not be used. Pre-printed wire numbers are to be used on halogen free sleeve type wire markers, or approved equal (equal to those manufactured by Grafoplast or Brady Corporation).

3. In manholes and handholes, each power conductor shall be identified by a laminated plastic tag located so that it can be seen from center of manhole

without moving adjoining wires. Bundle and mark control wires as listed in conduit and cable schedule.

4. Multi-conductor control cables shall be color coded in accordance with ICEA S-58-679, Method 1, Table E

5. The following identification scheme shall be used for all low-voltage power circuits:

Voltage	Colors				
	Neutral Conductor	Phase A Conductor	Phase B Conductor	Phase C Conductor	Ground Conductor
208/120V	White	Black	Red	Light Blue	Green
240/120V	White-Gray Strip	Black-Blue Strip	Red-Blue Strip	None	Green
480/277V	Gray	Brown	Orange	Yellow	Green

3.03 FIELD TESTING / QUALITY CONTROL

A. After installation, all low-voltage wire and cable shall be field tested. The field tests shall be performed by the Contractor who shall furnish all testing equipment. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide a report identifying the tests performed and the results obtained.

B. Each electrical circuit shall be tested after permanent wires and cables are in place to demonstrate that the circuit and equipment are connected properly and will perform satisfactorily, as required, as intended, and that they are free from improper grounds and short circuits. The tests shall consist of the following:

1. Low-voltage wire and cable mechanical connections shall be individually tested after installation and before they are put in service with a calibrated torque wrench. Values shall be in accordance with manufacturer's recommendations.

2. Low-voltage wires and cables shall be individually tested for continuity between the required termination points for each ungrounded and grounded conductor. Test wire and cable after installation and before first energization or before they are put in service with an approved continuity tester. Test results shall be as recommended by the wire and cable manufacturer or in accordance with NETA ATS, NEMA, ICEA Standards.

3. Low-voltage wires and cables shall be individually tested for insulation resistance between ungrounded and grounded conductors, and from each ungrounded and grounded conductor to ground. Test wire and cable after installation and before first energization or before they are put in service with an approved insulation resistance tester, for one minute at a voltage

rating recommended by the cable manufacturer or in accordance with NETA ATS, NEMA, and ICEA Standards.

4. The insulation resistance for any given conductor shall not be less than the value recommended by the cable manufacturer or in accordance with NETA ATS, NEMA and ICEA Standards. Any cable not meeting the recommended value or which fails when tested under full load conditions shall be replaced with a new cable for the full length.

5. Shielded instrumentation cable shields shall be tested with an ohmmeter for continuity along the full length of the cable and for shield continuity to ground.

6. Connect Shielded instrumentation cables shall be connected to a calibrated 4-20 milliamp DC signal transmitter and receiver. Test at 4, 12, and 20 milliamp transmitter settings.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing grounding.

1. Grounding shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

2. The grounding Work shall be a complete system for the electrical and instrumentation systems, structures and equipment. The Work shall include grounding of all electrical equipment, transformer neutrals, equipment enclosures, grounding electrodes, fences, and gates.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 20 – Low -Voltage Wires, Cables and Accessories

B. Section 26 05 33 – Raceways and Boxes for Electrical Systems

1.04 REFERENCES

A. Definitions

1. Grounding

a. Grounding and grounding system shall be used interchangeable in this Section and the Specifications to mean, the means and methods by which all electrical and instrumentation systems are grounded for the purposes of attaining safety grounding, equalization of ground potential, reducing ground potential rises during fault events and the grounding of the ungrounded conductor as required by the NYCEC and Electric Utility Standards

2. Electric Utility

a. All references to the Electric Utility shall mean the Consolidated Edison Company or the Local Electric Utility having jurisdiction.

B. Reference Standards

1.	ASTM B8	-	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft
2.	NYCEC	–	New York City Electrical Code
3.	Electric Utility	-	Standards and Guidelines
4.	UL 467	-	Electrical Grounding and Bonding Equipment

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. The grounding system maximum resistance shall not exceed 5 ohms under normally dry conditions. All structures and metal equipment containing electrical apparatus shall be connected to ground.

All grounding associated with the service feeders shall be in accordance with the requirements of the Electric Utility.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. A list of proposed manufacturers with the products they produce proposed for the contract.

2. Manufacturer's catalog cuts for the grounding materials proposed for use.

3. Scaled Shop Drawings showing proposed routing and layout of the grounding system.

B. Field test report shall be submitted.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The grounding equipment shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's recommendations.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ground cable shall be as manufactured by:
   1. Erico, Solon, OH;
   2. Harger, Grayslake, IL;
   3. General Cable, KY;
   4. Or approved equal.

B. Ground rods shall be as manufactured by:
   1. Erico, Solon, OH;
   2. Harger, Grayslake, IL;
   3. Blackburn/Thomas and Betts, MN;
   4. Thompson Lightning Protection Inc, MN;
   5. Or approved equal.

C. Bolted or compression grounding connectors shall be as manufactured by:
   1. Burndy, Manchester, NH;
   2. Harger, Grayslake, IL;
   3. Thomas and Betts, Memphis, TN;
   4. Or approved equal.

D. Welded grounding connections shall be as manufactured by:
   1. Cadwell, Solon OH;
   2. Harger, Grayslake, IL;
   3. Or approved equal.

E. Ground Resistance Tester shall be as manufactured by:

1. Fluke, Everett, WA.
    a. Model 1625-2 GEO or approved equal.
2. Megger, Dallas, TX.
    a. Model DET 2/3 or approved equal.
3. AEMC Instrument, Dover, NH.
    a. Model 6471 or equal
4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Ground Cable

1. The ground cable shall be soft drawn bare stranded copper conforming to ASTM B8, No. 8 AWG minimum size.
2. The insulated cable for equipment grounding shall conform to the requirements of Section 26 05 20 – Low-Voltage Wires, Cables and Accessories.

B. Ground Rods

1. Ground rods shall be stainless steel, 3/4-inch diameter and 10 feet long.
2. Ground rods shall have a drive point at the lower ends. The upper end of each rod shall be equipped with bronze, clamp type connectors with not less than four bolts.

C. Grounding Connectors.

1. Compression connectors shall be heavy duty copper. Bolted connectors shall be copper alloy castings, designed specifically for the items to be connected, and assembled with Durium or silicone bronze bolts, nuts and washers.
2. Welded connections shall be by exothermic process utilizing molds, cartridges and hardware designed specifically for the connection to be made.

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. A complete ground grid system shall be installed as shown on the Contract Drawings.

B. Ground cable shall be installed around perimeter of structures at a minimum of 2 feet-6-inches below grade.

C. Ground rods shall be installed 2 feet below grade, 2 feet from foundation walls and shall extend 10 feet vertically into the earth or horizontally not less than 36 inches below grade.

D. Test points shall be installed at locations and in accordance with the details shown on the Contract Drawings.

E. Equipment shall be connected in accordance with the details shown on the Contract Drawings. All steel column and underground connections shall be welded except for test points.

F. Metal casings or supporting frames of electrical equipment, such as transformers, panel boards, control panels, motor control centers, and individual motor controllers shall be grounded. The equipment shall be thoroughly grounded to the facility grounding system. All metal conduits leaving all electrical equipment shall be grounded. Grounding type fittings shall be installed on flexible conduits.

G. An insulated cable for equipment grounding shall be installed with the phase conductors within the conduit for the nominal 120 volt and higher power, lighting and control circuits.

3.03 FIELD TESTING / QUALITY CONTROL

A. After installation, the completed ground system shall be field tested for operation and conformance. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide testing consisting of the following:

1. Resistance testing shall be made using approve Earth Ground Resistance Testers not less than 48 hours after rainfall.

    a. Resistance values above 5 ohms shall be brought to the Engineer's attention with remedial recommendations.

2. Grounded cables and metal parts shall be continuity tested. The conduit system shall be ground tested in accordance with the requirements of Section 26 05 33 – Raceway and Boxes for Electrical Systems.

B. The Contractor shall provide a Field Test Report, the report shall identify the testing performed and the results obtained.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing supporting devices.

1. Supporting devices shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

2. The supporting devices shall be a complete system for the equipment.

3. The Work shall include providing all required support devices to properly mount and secure all equipment furnished under this Contract.

B. This Section also includes equipment anchorage and restraints suitable to meet the specified seismic requirements.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 33 - Raceways and Boxes for Electrical Systems

1.04 REFERENCES

A. Supporting devices shall comply with the latest applicable provisions and recommendations of the following:

1.	ASTM A1011/A1011M	-	Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength, Low-Alloy, High-Strength, Low-Alloy with Improved Formability, and Ultra-High Strength
2.	ASTM B633	-	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
3.	MFMA 103	-	Guidelines for the Use of Metal Framing
4.	MFMA 4	-	Metal Framing Standards Publication
5.	ASTM A123 and A153	-	Hot Dipped Galvanized Finish
6.	ASTM B117	-	Salt Fog Spray Test
7.	ASTM A1046 and 1059	-	Defender Finish

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. General

1. All channels, fittings and hardware used in the supporting system shall be in accordance with MFMA 4 and MFA 103.

2. The design of the support system shall be the responsibility of the Contractor. The Contractor shall provide the proper sized rods, channels, fittings, brackets and appurtenances necessary to adequately support the equipment.

3. The Contractor shall retain the services of a licensed Professional Engineer, registered in the State of New York, to prepare support details for equipment exceeding 50 pounds in weight. The Professional Engineer shall stamp the support system design details.

B. Seismic Requirements

1. Equipment assemblies such as secondary unit substations, switchgear, transformers, motor control centers and panelboards shall be certified to meet seismic requirements of the New York City Building Code.

2. The Contractor shall provide equipment anchorage details for all equipment certified to meet seismic requirements. The details shall be coordinated with the manufacturer's equipment mounting provisions.

3. Electric conduit shall include seismic restraints in accordance with the requirements of Section 26 05 33 – Raceways and Boxes for Electrical Systems.

4. The Contractor shall retain the services of a licensed Professional Engineer, registered in the State of New York, to prepare the seismic anchorage and restraint details. The Professional Engineer shall stamp the seismic anchorage and restraint details.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for approval by the Engineer.

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

1. Manufacturer's catalog cuts for the supporting devices proposed for use with specifications and other data required to demonstrate compliance with the specified requirements.

2. Scaled Shop drawings showing dimensions and locations of all items and clearance requirements.

3. Support design details and equipment seismic anchorage and restraint details, stamped by a Licensed Engineer as required.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The supporting devices shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's recommendations.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Supporting devices shall be manufactured by:

1. B-Line, Highland, IL;

2. Atkore Unistrut/Power Strut, Harvey, IL;

3. Thomas and Betts Kindorf, Memphis, TN;

4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Channels, Fittings and Brackets

1. The Contractor shall provide channels, fittings, brackets and related hardware for mounting and supporting the electrical equipment. Anchor bolts, concrete inserts and related hardware for proper support of equipment shall also be provided. All equipment necessary to meet the seismic requirements specified shall be provided.

2. Channels shall conform to ASTM A1011/A1011M. Channels shall have a minimum thickness of 12 gauge. The cross sectional width dimension shall be 1-1/2 inch minimum. The depth shall be as required to satisfy load requirements.

3. Attachment holes, when required, shall be factory punched on hole centers approximately equal to the cross sectional width and shall be 9/16 inch diameter.

4. Fittings and brackets shall have 9/16 inch diameter holes on centers identical to the channel or as required to align with the channel holes. Fittings and brackets shall have the same width as the channel and shall be 1/4 inch thick minimum. Fittings and brackets shall mate properly with the channel.

5. All channels, fittings, brackets and related hardware shall be steel and have an electro-plated zinc; for wet areas, outdoor locations, roofs or vents use hot dipped galvanized or defender with self-healing properties finish according to ASTM B633, ASTM A123 and A153, ASTM B117, ASTM A1046 and ASTM A1059.

6. In corrosive and classified areas, channels, fittings, brackets and related hardware shall be type 316 stainless steel or PVC coated. Dissimilar metals shall be avoided when installing stainless steel channels or PVC coated .

B. Conduit Hangers, Supports and Inserts

1. The Contractor shall provide channels, rods, straps, anchors and related hardware for support of the exposed electric conduit system.

2. The Contractor shall also provide anchor bolts, concrete inserts and related hardware for proper support of equipment. All equipment necessary to meet the seismic requirements specified shall be provided.

3. Conduit hangers, supports and inserts shall be in accordance with Section 26 05 33 – Raceway and Boxes for Electrical Systems.

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. All supporting devices shall be installed level, parallel and perpendicular to building walls and floors, such that the support system is installed in a neat and professional manner.

B. All holes in hung ceilings for support rods and other equipment shall be made adjacent to bars where possible, to facilitate removal of ceiling panels.

C. The channels, fittings and brackets shall be rigidly bolted together and braced to make a substantial supporting framework support system.

D. Where motor control centers, switchgear, unit substations and other electrical equipment is being installed on concrete pads, the Contractor shall furnish leveling channels to the General Contractor. The General Contractor shall install the leveling channel in the concrete pads. Seismic certified equipment shall be anchored in accordance with the seismic anchorage details.

E. All equipment fastenings to steel columns, beams and trusses shall be by beam clamps. In lieu of beam clamps, equipment may be welded to steel structures, subject to Engineer approval.

F. No holes shall be drilled in any steel columns, beams and trusses.

G. Hanger rod supports shall be installed such that threaded rod is parallel to building walls and perpendicular to floors.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing conduit system.

1. The conduit system shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

2. The conduit system required shall be provided with all rigid and flexible conduits, boxes, fittings, supports, hangers and inserts and other conduit accessories as required for the installation of the electric wire and cable.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 05 23.02 - Miscellaneous Metal Fastening

B. Section 09 91 00 - Painting

C. Section 40 05 07 - Hangers and Supports for Process Piping

1.04 REFERENCES

A. Definitions

1. Conduit System: Shall mean a complete installation comprising all rigid conduit and flexible connections, boxes, fittings, supports, hangers, inserts and other conduit accessories as required for the installation of electric wires and cables.

2. Conduit Accessories: Shall mean all fittings required to ensure a complete conduit system installation. Conduit accessories shall include, but is not limited to, expansion, deflection, seal and drain fittings, hubs, bushings, duct seal, tags, markers, thruwall seals and bushings.

B. References

1. Electric conduit system shall comply with the latest applicable provisions and recommendations of the following:

2. NYCEC - New York City Electrical Code

3. UL 6 - Electrical Rigid Metal Conduit - Steel

4. UL 360 - Standard for Liquid-Tight Flexible Metal Conduit

5. UL 514A - Metallic Outlet Boxes

6. UL 514B - Conduit, Tubing and Cable Fittings

7. ANSI C80.1 - Electric Rigid Steel Conduit

8. ASTM D870 - Standard Practice for Testing Water Resistance of Coatings Using Water Immersion

9. ASTM D1735 - Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus

10. NEMA RN-1 - PVC Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

11. ASTM-2247 - Standard Practice for Testing Water Resistant Coating Using 100% Relative Humidity

12. ETL-PVC 001 - PVC Externally Coated Galvanized Conduit PVC Coating Verified for Adhesion

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. A list of proposed manufacturers with the products they produce proposed for the Contract.
2. Manufacturer's catalog cuts for the conduit, boxes, fittings and supports proposed for use.
3. Construction details of conduit racks and other conduit support systems with seismic restraint details and calculations signed by a licensed Professional Engineer, registered in the State on New York.
4. Scaled Shop Drawings showing proposed routing of all conduits, inclusive of conduits embedded in structural concrete and conduits directly buried in earth.
5. Scaled Shop Drawings showing locations of pull and junction boxes and all penetrations in walls and floor slabs.
6. Field test report.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Electric conduit system shall be delivered, stored and handled in accordance with the Specifications, the manufacturer's instructions and the following:

1. Conduit shall be delivered to the Site in standard bundles having each length suitably marked with the manufacturer's name or trademark and bearing the label of the Underwriters' Laboratories, Incorporated inspection service.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Rigid steel conduit shall be as manufactured by:

1. Atkore/Allied Tube and Conduit Corporation, Harvey, IL;

2. Wheatland Tube Company, Sharon, PA;
3. Republic Conduit, Louisville, KY;
4. Or approved equal.

B. PVC coated rigid steel conduit shall be as manufactured by:
1. Robroy Industries, Gilmer, TX;
2. OCAL by Thomas & Betts, Memphis, TN;
3. Atkore/Calbond, Harvey, IL;
4. Or approved equal.

C. Hangers, Supports and Inserts shall be as manufactured by:
1. B-Line, Highland, IL;
2. Atkore Unistrut / Power Strut Harvey, IL
3. Kindorf, Harahan, LA;
4. Or approved equal.

D. Flexible conduit shall be as manufactured by:
1. Anaconda American Brass Company, Rolling Meadows, IL;
2. Atkore AFC Cable New Bedford MA
3. Electric-Flex Company, Roselle, IL;
4. Or approved equal.

E. Hazardous area flexible conduit shall be as manufactured by:
1. Crouse Hinds Company, Syracuse, NY;
2. Appleton Electric Company, Rosemont, IL;
3. Or approved equal.

F. Unions in hazardous locations shall be as manufactured by:
1. Crouse-Hinds Syracuse, NY;
2. Atkore/Calbond/Calbrite, Harvey, IL;
3. Or approved equal.

G. Unions in non-hazardous areas shall be as manufactured by:
1. Thomas & Betts, Memphis, TN;
2. Or approved equal.

H. Expansion and deflection fittings shall be as manufactured by:
1. Crouse-Hinds, Syracuse, NY;
2. Atkore/Calbond, Harvey, IL;

3. Appleton Electric, Rosemont, IL;
4. Or approved equal.

I. Sealing fittings shall be as manufactured by:
1. Crouse-Hinds, Syracuse, NY;
2. Appleton Electric, Rosemont, IL;
3. Or approved equal.

J. Drain fittings shall be as manufactured by:
1. Crouse-Hinds, Syracuse, NY;
2. Atkore Calbrite, Harvey, IL;
3. Appleton Electric, Rosemont, IL;
4. Or approved equal.

K. Conduit hubs shall be as manufactured by:
1. O-Z/Gedney Rosemont, IL;
2. Atkore/Calbond, Harvey, IL;
3. Thomas and Betts, Memphis, TN;
4. Or approved equal.

L. Conduit bushings and locknuts shall be as manufactured by:
1. a. O-Z/Gedney, Rosemont, IL;
2. b. Thomas and Betts, Memphis, TN;
3. c. Or approved equal.

M. Duct seal shall be as manufactured by:
1. American Polywater Corp, Stillwater, MN;
2. O-Z/Gedney, Rosemont, IL;
3. Ideal Industries, Sycamore, IL;
4. Or approved equal.

N. Thruwall seals shall be as manufactured by:
1. O-Z/Gedney Rosemont, IL;
2. Or approved equal.

O. Floor seals shall be as manufactured by:
1. O-Z/Gedney, Rosemont, IL.;
2. Or approved equal.

P. Sealing bushings shall be as manufactured by:

1. O-Z/Gedney, Rosemont, IL;
2. Or approved equal.

Q. Fire stop fittings shall be as manufactured by:

1. O-Z/Gedney, Rosemont, IL;
2. Or approved equal.

R. Thru-wall barriers shall be as manufactured by:

1. Crouse-Hinds, Syracuse, NY;
2. Or approved equal.

S. Conduit tags shall be as manufactured by:

1. Seton Nameplate Corporation, Branford, CT;
2. Or approved equal.

T. Conduit markers shall be as manufactured by:

1. Thomas and Betts, Memphis, TN;
2. Or approved equal.

U. Terminal blocks shall be as manufactured by:

1. Allen-Bradley Company, Milwaukee, WI;
2. General Electric Company, Fairfield, CT;
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Rigid Steel Conduit

1. The Contractor shall provide rigid steel conduit. All steel conduit shall comply with the requirements of ANSI C80.1, and UL 6.
2. Both the inside and outside surfaces of the rigid steel conduit shall be protected against corrosion by a coating of zinc applied by the hot-dip galvanizing process.
3. Conduits, elbows and couplings shall be rigid, heavy wall, mild steel, hot dip galvanized. Conduits, elbows and couplings shall have a smooth interior with tapered threads and carefully reamed ends. Conduit size shall be 3/4-inch minimum and shall conform to UL 6.
4. Conduits, elbows and couplings shall include a PVC coating for all areas. For conduits located indoors in dry, dusty areas the use of rigid steel conduit without PVC coating shall be permitted.
5. PVC coating of conduit shall be factory applied and shall include a smooth 2 mil thick urethane interior coating and 40 mil thick polyvinyl chloride exterior coating. PVC coated conduit shall conform to NEMA RN-1, ASTM D870, ASTM D1735, ETL-PVC 001, and UL 6. The exterior PVC

coating color shall be gray and listed UL DYJC. The threads of conduits that have been cut in the field to size shall have the same PVC coating applied.

B. Hangers, Supports and Inserts

1. The Contractor shall provide hangers, supports and inserts for support of the electric conduit system. The supports shall securely attach the electric conduit system to the channel and structure.

2. The electric conduit system shall be designed, constructed and installed suitable for earthquake regulations in accordance with the seismic requirements of the New York City Building Code and the Uniform Building Code for Zone 2A application.

3. Transverse and longitudinal bracing shall be provided as required to brace the electric conduit for the seismic requirements specified.

4. All drilled in type concrete inserts shall be expansion shields or anchors conforming to Section 05 05 23.02 – Miscellaneous Metal Fastenings and 40 05 07 - Hangers and Supports for Process Piping. In corrosive and Class 1 and Division 1 locations, concrete inserts shall be 316 stainless steel.

5. Hangers and supports shall be in accordance with the requirements of Section 40 05 07 - Hangers and Supports for Process Piping except beam clamps, hanger rods and hardware shall be steel with electro-plated zinc finish, hot dipped galvanized or defender finish. This shall also include bolts, nuts and washers. In corrosive locations, hangers and support hardware shall be type 316 stainless steel or factory applied 40 mil thick PVC coated.

C. Flexible Metallic Conduit

1. The Contractor shall provide flexible metallic conduit where required to permit movement of connected devices and where it is impracticable to complete runs with rigid conduit subject to the limitations imposed by the NYCEC.

2. Flexible conduit used indoor in non-hazardous dry dusty areas shall be non-liquid-tight, with a steel core.

3. Flexible conduit used indoors/outdoors and in non-hazardous, wet and corrosive areas shall be UL Listed and include a hot dipped galvanized steel core with a liquid-tight, polyvinyl chloride cover and shall include a built-in copper ground for sizes 3/4-inch through 1-1/4 inch.

4. For hazardous areas flexible conduit shall include a brass inner core with a bronze outer braid and protective neoprene plastic coating. End fittings shall be steel, brass or bronze.

D. Outlet Boxes and Fittings

1. The Contractor shall provide outlet boxes and fittings for rigid and flexible conduit. The outlet boxes and fittings required for the work which constitutes a part of the conduit system, shall be of approved types.

2. Fittings, bodies and boxes installed on PVC coated conduits shall have interior and exterior PVC coatings equivalent and corresponding to that of the conduit on which they are installed and shall be NEMA 4X rated.

3. For outdoor, wet and corrosive areas, conduit fittings and outlet bodies shall be cast gray iron alloy, cast malleable iron bodies and covers. All units shall be gasketed, watertight, and threaded with five full threads and shall have rust-proofing in accordance with the requirements of this Section.

4. Threaded cast ferrous metal, hub type outlet boxes shall be used throughout, except in the interior walls of superstructures and in roof slabs protected by built-up roofing where pressed steel boxes shall be installed. Cast iron or alloy outlet boxes of the proper size and depths for the application, complete with watertight gaskets and covers secured by brass screws, shall be furnished and installed as indicated on the Contract Drawings or as required by the conduit run. Outlet boxes, furnished and installed for the installation of lighting fixtures, switches and receptacles in a future contract, shall be furnished with watertight gaskets and blank covers.

5. For non-hazardous, indoor dry dusty areas pressed steel boxes of the proper size and depths for the application shall be provided. Boxes shall be rated NEMA 12, not less than No. 14 U.S. Standard Gauge (0.078 inch). The conduit openings shall be provided with oil-resistant gaskets. Conduits shall be fastened to these boxes with locknuts and bushings, and all unused outlets or holes shall be left sealed.

6. All outlet boxes intended for the support of fixtures shall be provided with approved fixture studs.

7. For concealed conduit runs in outside walls and all exposed conduit work, connections to boxes and fittings shall be made through threaded holes, unless otherwise approved by the Engineer. For concealed conduit work in non-hazardous areas in other than outside walls, connections between conduit and boxes may be made with drilled holes, using locknuts and bushings.

8. Where necessary unions may be used.

   a. In non-hazardous locations unions shall be universal or Erickson

   b. In hazardous locations unions shall be type UNF, UNL or YNY.

9. All boxes installed for concealed conduit, shall be provided with extension rings or plaster rings and covers as required. For non-hazardous, dry indoor areas stainless 302/304, 306, satin beveled steel cover and device plates for surface mounted boxes shall be used. For corrosive locations, galvanized ferrous and galvanized cast ferrous metal cover and device plates with neoprene gaskets shall be used.

10. Outlet boxes and fittings installed on PVC coated conduit shall also include interior and exterior coatings equivalent to the conduit. Dissimilar metals shall be avoided.

E. Conduit Accessories

1. The Contractor shall provide conduit accessories for use with the conduit system. The conduit accessories shall be of approved types.

2. Expansion and Deflection Fittings:

   a. Expansion and deflection fittings shall be made up of non-corrodible parts and shall provide for ample longitudinal and lateral movement. A suitable bond shall provide a low resistance, continuous longitudinal path for ground currents.

   b. Expansion and deflection fittings shall be watertight cast iron, malleable iron or hot dipped galvanized. Fittings shall be corrosion-resistant, UL listed and compatible with the conduit system.

   c. Expansion /deflection fittings shall provide both expansion and deflection in a single fitting in accordance with the following:

      1) Axial expansion or contraction up to 3/4-inch.

      2) Angular misalignment up to 30 degrees.

      3) Parallel misalignment up to 3/4-inch.

      4) Expansion fittings shall provide expansion /contraction with eight-inch total movement.

3. Sealing Fittings:

   a. Sealing fittings shall be cast gray iron alloy or cast malleable iron or copper free aluminum with zinc electroplate and lacquer or enamel finish.

   b. Sealing fittings shall have an ample opening with threaded closure for access to conduit hub for making dam. Sealing fiber and compound shall be suitable for use with the fitting and shall be the products of the fitting manufacturer.

   c. For corrosive locations, seal fittings shall include interior and exterior coatings equivalent to the PVC conduit coating specified under this Section. Dissimilar metals shall be avoided.

4. Drain Fittings:

   a. Drain fittings shall be a combination device designed to provide ventilation to minimize condensation and drains accumulated condensate.

   b. The combination drain/breather fitting shall be 3/8 inch male thread size with stainless steel body.

5. Conduit Hubs:
   a. Conduit hubs shall be threaded, insulated throat type with bonding screw locknut.
   b. The conduit hub and locknut shall be malleable iron or zinc and shall include a 90-degree C insulating surface and a sealing ring for a water tight and dust tight connection. Dissimilar metals shall be avoided.
6. Conduit Bushings:
   a. Conduit bushings shall be insulated, grounding type with lay-in-lug connection. Two locknuts shall be provided for each bushing.
   b. The conduit bushing and locknuts shall be steel, malleable iron or zinc. The bushing shall include a 90 degrees C insulating surface.
7. Duct Seal:
   a. Duct seal shall be a suitable for forming a water and gas tight seal between cables and conduits.
   b. Completed seal shall be resistant to gasoline, oils, dilute acids and bases.
   c. The completed seal shall be capable of blocking water pressure of at least 10 psi.
8. Thruwall Seals and Bushings:
   a. New Construction
      1) WSK and WCSC type thruwall seals shall be used for conduits and cables passing through exterior subsurface walls and exterior concrete walls.
      2) CSMI type seal bushings at the inside and CSMC type seal bushings at the outside of the structure in the same core bit-drilled hole shall be used for conduits passing through interior concrete wall, interior floors, interior block walls, exterior block walls, exterior subsurface walls, exterior concrete walls, floor slabs.
      3) CFS and or CFSI type fire stop fittings shall be used for conduits passing through fire rated floors and walls.
      4) TW type thru wall type barriers shall be use for multiple conduit runs passing through interior or exterior and fire rated walls.
   b. Existing Construction
      1) SK and FSCS type seals shall be used for conduits and cables passing through concrete floors and floor slabs.

2) CSMI type seal bushings at the inside and CSMC type seal bushings at the outside of the structure in the same core bit-drilled hole shall be used for conduits passing through interior concrete wall, interior floors, interior block walls, exterior block walls, exterior subsurface walls, exterior concrete walls, floor slabs.

3) CFS and or CFSI type fire stop fittings shall be used for conduits passing through fire rated floors and walls.

4) TW type thru wall type barriers shall be use for multiple conduit runs passing through interior or exterior and fire rated walls.

9. Conduit Tags:

a. Conduit tags shall be 19 gauge, 1-1/2-inch diameter round brass which shall be secured to the conduit with annealed brass wire.

b. Conduit tags shall be clearly stamped with the conduit number in conformity with the conduit and cable schedule or as directed by the Engineer.

10. Conduit Markers:

a. Conduit identification markers shall be self-sticking color-coded tape. Identification tape shall be two inches wide and colored in accordance with the color banding specified under this Section.

F. Terminal, Junction and Pull Boxes.

1. The Contractor shall provide terminal, junction and pull boxes as shown on the Contract Drawings and where otherwise required, or as directed by the Engineer.

2. Boxes located indoor in dry, dusty areas shall be NEMA Type 12, constructed of welded and galvanized sheet steel. Boxes of dimensions 24 inches and less shall be 14 USS standard gauge metal. Boxes of dimensions greater than 24 shall be 12 USS standard gauge metal, except 10 USS standard gauge shall be used for boxes with any dimension of 36 inches or more. Boxes located in other areas shall conform to the following area classifications:

a. For wet locations boxes shall be watertight NEMA Type 4. Boxes shall be constructed of galvanized cast iron and shall include gasketed, bolt on covers, with tapped holes in bosses or hubs for conduit entrance. Boxes shall be provided with cast mounting lugs for installation in concrete.

b. For hazardous locations boxes shall be explosion proof NEMA Type 7. Boxes shall be constructed of cast iron and shall include threaded connections and ground joint surfaces.

c. For corrosive locations boxes shall be corrosion resistant, NEMA Type 4X. Boxes shall be constructed of 316 stainless steel material with sealed seams.

3. Pull and junction boxes shall be provided with covers held in place by brass screws. Terminal boxes shall be provided with terminal block supports and approved hinged covers fitted tightly against a gasket and secured by lug bolts and wing nuts. Hinges, lug bolts, wing nuts and other fittings shall be made of an approved, non-ferrous, non-corrodible metal. All boxes shall be provided with rabbeted gaskets or flange gaskets securely held in place.

4. Tapping for threaded connections to outlet boxes, junction boxes, pull boxes and conduit fittings in non-explosion proof construction shall conform to the following:

   a. All threads shall be tapered.

   b. If threads for connection of conduit are tapped all the way through a hole in an enclosure, or if an equivalent construction is employed, there shall be not less than 3-1/2 threads in the metal and the construction of the enclosure shall be such that a suitable conduit bushing can be properly attached.

   c. If threads for connections of conduit are not all the way through a hole in a box wall, conduit hub or the like, there shall be not less than five full threads in the metal and there shall be a smooth, well rounded inlet hole for the conductors, which shall afford protection to the conductors equivalent to that provided by a standard conduit bushing and which shall have an internal diameter approximately the same as that of the corresponding trade size of rigid conduit. The threaded hole shall be provided with a conduit end stop.

   d. Tapping for threaded connections for explosion proof construction shall conform to the requirements of the NYCEC for construction in Class I, Division 1, and hazardous locations.

5. Cast iron or cast ferrous alloy outlet boxes, junction boxes, pull boxes, conduit fittings and conduit accessories such as box covers shall be rust-proofed by zinc coating applied by the "hot-dip" process or shall be given a rust protective coating applied by either of the following methods:

   a. Method A:

      1) Castings shall be given a mechanical and chemical cleaning.

      2) Castings shall be given a phosphoric acid type dip.

      3) Then a coating of zinc chromate primer shall be applied, and finally

      4) A coating of baked enamel finish shall be applied over the outside and inside surfaces of the castings.

b. Method B:

1) Castings shall be given a mechanical and chemical cleaning.

2) Then a coating of cadmium shall be deposited electrolytically.

3) Then a coating of zinc shall be applied by electroplating.

4) Then a vinyl resin base aluminum lacquer shall be applied.

6. Stamped steel outlet boxes, junction boxes and box covers shall be rust-proofed by a zinc coating applied by an electro-galvanizing or sherardizing process. Fabricated sheet steel boxes shall be formed from galvanized sheet steel. Welded joints shall be touched up with aluminum lacquer and boxes and covers shall be given a shop priming coat of zinc chromate rust inhibiting paint.

7. Terminal blocks shall be used within terminal boxes for termination of prepared conductors No. 10 AWG and smaller. Terminal blocks shall be in accordance with the following:

a. Terminal blocks shall be high density, screw terminal type suitable for rail mounting with quantities sufficient for the conductors to be terminated plus 20 percent spare.

b. Terminal blocks shall be NEMA rated, 600 volt, 35 ampere suitable for 85 degrees C.

c. Terminal block components shall have stainless steel and tin plated copper alloy components, backed out captive screws and marking surface.

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. All conduits shall be installed in accordance with the requirements specified under this Section and in conformity with the sizes stated in the Specifications or shown on the Contract Drawings. They shall be installed complete with all accessories, fittings and boxes, in an approved and workmanlike manner so as to provide proper raceways for electrical conductors.

B. The Contractor's attention is called to the fact that all conduit runs indicated on the Contract Drawings are shown diagrammatically for the purpose of outlining the general method of routing the conduits to avoid interference. Where conduit runs

are not shown, it shall be the responsibility of the Contractor to establish the runs required based upon the various systems shown on the Contract Drawings.

C. Should any structural difficulties prevent the setting of cabinets, boxes, conduits, etc., at points shown on the plans, deviations therefrom as determined by the Engineer will be permitted and shall be made without additional cost.

D. All exposed steel conduits, fittings, boxes, straps, racks and hangers shall be painted in conformity with Section 09 91 00 - Painting. PVC coated conduit systems shall not be painted. Paint shall match the gray color of the PVC coated conduits.

E. Conduits shall be tagged using conduit tags. Conduit tags shall be installed where conduits terminate in equipment and enclosures.

F. Exposed conduits shall be color banded using conduit markers. Markers shall also include operating voltage when over 600 volts. Conduit markers shall be installed 360 degrees, double wrap around conduit exterior. Conduit markers shall be installed where conduits enter equipment, boxes, within each room, at wall penetrations and 50 feet on centers in each area. When exposed conduits are to be painted, markers shall be installed after the conduits are painted. Color banding shall be in accordance with the following:

1. 120/208 volt AC: Gray.
2. 277/480 volt or 480 volt AC: Sand.
3. 4160 volt AC: Silver.
4. 13800 volt AC: Brown.
5. Fire Detection and Alarm: Red.
6. Telephone: Blue.
7. Intercommunication: Yellow.
8. Security System: Rust.
9. Low Voltage Switching, Instrumentation and Controls System: Black.

G. All enclosing cases, including condulets and conduit bodies, for fire, sprinkler, smoke detection, and associated systems alarm apparatus and equipment shall be painted or colored Fire Department “RED”, in accordance with New York City Building Code, unless otherwise required by the local Authority Having Jurisdiction (AHJ).

3.02 INSTALLATION

A. Installation of Raceways

1. The Contractor shall install all exposed raceways parallel or at right angles to walls and ceiling beams. Changes in directions shall be made with bends, elbows and pull boxes. All parallel runs shall be spaced uniformly throughout and secured in place with hangers and fasteners. Brace raceways to satisfy the specified seismic requirements in accordance with the restraint details.

2. Conduits, where exposed, shall in all cases be substantially supported in an approved manner, but they shall not be fastened to or come in contact with any other pipes, ducts or other work of a similar nature. In all exposed work, approved channel or angle iron hangers, racks, one-hole straps or a combination thereof shall be provided to support the conduits. Where conduits are supported with one-hole straps, spacers shall be used to provide 1/4-inch minimum clearance between the conduits and walls or ceilings.

3. Hanger rods for trapeze type hangers shall be not less than 3/8 inch diameter. Conduit supports shall be located at intervals not exceeding 8 feet. Conduits shall be securely fastened to each support with U-bolts, straps or clamps.

4. All concealed conduits shall be placed in walls, floors, ceilings or slabs at the proper time in accordance with the progress of the structural Work. The Contractor shall cooperate in every respect in meeting schedules and shall not delay the structural Work unnecessarily.

5. Conduits embedded in concrete shall be blocked and braced in place by use of adequate conduit separators to prevent displacement during the pouring of concrete. The Contractor will be held responsible for proper position of conduits and shall rearrange any conduit that may be displaced while concrete is poured, without additional cost.

6. Where conduit runs are to be concealed and the Contractor fails to place such conduit in sufficient time to be included in the structures and the structures are completed without such conduit, the Contractor shall install such runs either concealed or exposed as directed by the Engineer, with no extra payment for additional work or for more conduit than the original lengths.

7. Embedded conduit shall be run in structural concrete in the center of slabs and walls and above waterstops. Conduit connections shall be made watertight. Contractor shall confirm that concrete thickness is sufficient for embedding the quantity of conduits intended. Unless specifically shown otherwise on the Contract Drawings or stated in the this Specification or the Specifications, embedded conduits shall be in accordance with the following criteria:

    a. Minimum concrete thickness shall be as follows:

        1) For concrete 16 inches thick and less, the minimum concrete thickness shall be 11.5 inches plus the depth of the largest conduit assembly. The conduit assembly depth shall be from the top of the uppermost conduit to the bottom of the lowest conduit.

        2) For concrete greater than 16 inches thick, the minimum concrete thickness shall be 13.5 inches plus the depth of the largest conduit assembly.

3) For concrete at foundation slabs, an additional inch shall be added to the minimum concrete thicknesses previously stated.

b. Conduit spacing shall be as follows:

1) Conduits shall be separated three times outer diameter of larger conduit center to center.

2) For multiple conduit layer assemblies, conduits shall be separated vertically three times outer diameter of larger conduit center to center.

3) When conduits cross at a given point, the conduits may be in direct contact and the angle of cross shall be 45 degrees or greater. Conduits may also cross within the vertical spacing of a multi-conduit layer assembly.

4) When conduits cross a structural expansion joint, conduits shall be separated three times outer diameter of larger conduit fitting center to center.

8. A run of conduit between outlet and outlet, between fitting and fitting or between outlet and fitting shall not contain more than the equivalent of three quarter bends, including those bends located immediately at the outlet or fitting.

9. Factory-made conduit bends or elbows shall be used wherever possible in making necessary changes in direction. Field bends shall be carefully made so as to prevent conduit damage or reduction in the internal areas. The radius shall not be less than six times the nominal diameters for the conduit with carefully matched bends on parallel runs so as to present a neat appearance.

10. All conduits, where cut, shall be carefully reamed to remove burrs. No running threads will be permitted. All screw joints shall be watertight. Conduits shall be fitted in an approved manner to all devices and boxes. The ends of all conduits shall be equipped with suitable approved conduit fittings. The ends of all empty conduits shall stub up six inches above the slab and shall be capped.

11. As far as practicable, conduits shall be pitched to drain to outlet boxes or otherwise so installed as to avoid trapping moisture. Trapped conduits in concealed construction shall be provided with outlet boxes for drainage. Where necessary drainage in outlet boxes or where dips are unavoidable in exposed conduits, a drain fitting shall be installed at the low point.

12. Thruwall type seals and conduit sealing bushings shall be installed for all conduits passing through concrete slabs, floors, walls or block walls.

13. Conduit runs shall be installed so as to avoid flues, heat sources, and steam or hot water pipes. A minimum separation of 12 inches shall be maintained where conduit crosses or parallels hot water, steam pipes or heat sources.

14. Where conduit enter or leave equipment located within electrical and control rooms the conduit shall be sealed and packed with a suitable duct seal compound.

15. A 250 pound tested polyethylene pull tape shall be provided in all empty conduits, with a minimum 8 inch of slack, double backed into the conduit. Conduit shall be protected immediately after installation by installing flat non-corrosive metallic discs and steel bushings designed for this purpose at each end. Discs shall not be removed until it is necessary to clean the conduit.

16. All conduit that is cut on the job shall be cut square and taper reamed to remove burrs before installation. Where steel conduit is cut and threaded on the site, it shall be coated before and after making connections.

17. PVC coated conduit shall be installed in compliance with the latest version of the National Electrical Code and other applicable codes and standards as indicated in these specifications.

18. PVC coated conduit shall be installed in accordance with NECA National Electrical Installation Standards (NEIS) 101. Standards for installing steel conduit.

19. Conduits embedded in concrete shall stub up 6 inches above the slab. A three inch high curb extending three inches from the outer surface of the conduit penetrating the floor shall be provided to prevent corrosion. Conduit stub-ups shall be terminated in couplings, slightly above the finished concrete curb.

B. Conduit Connections to Equipment.

1. At each motor, limit switch, solenoid valve, electrical control device or other electrically controlled or operated equipment, the Contractor shall install a complete conduit connection between the conduit system and the terminal box of the motor or the conduit connection point of the equipment.

2. Conduits installed in the conduit system shall be terminated in such locations as to permit direct connections to motors, devices or equipment.

3. Connections shall be made with rigid conduit if equipment is fixed and not subject to adjustment, mechanical movement or vibration. Rigid connections shall be provided with union fittings to permit removal of equipment without cutting, breaking or burning conduit.

4. Motors, transformers and equipment subject to adjustment, mechanical movement or vibration shall be connected with flexible metallic conduit.

5. Devices such as solenoid valves, small limit switches, etc., shall be connected with flexible metallic conduit arranged to prevent strain and distortion.

6. Flexible conduit connections shall be watertight unless the area of installation requires explosion-proof construction.

C. Installation of Boxes and Fittings.

1. All concealed outlet boxes shall be set in such a manner that they will be plumb and flush with the finished surface.

2. Boxes shall be installed rigidly and securely to the structure. Independent supports shall be provided where no walls or other structural surface exists.

3. Expansion and expansion/deflection fittings shall be installed where conduits cross structural expansion joints and at locations shown on the Contract Drawings. Fittings shall be installed on each conduit and incorporated into the expansion joints of structures, at right angles to the joint, to insure their proper functioning and preservation.

4. Expansion fittings shall be installed on exposed conduit runs exceeding 200 feet. Unless specifically shown otherwise on the Contract Drawings or stated in this Specification or the Specifications, when crossing structural expansion joints larger than one inch, an expansion fitting shall also be installed together with an expansion/deflection fitting. The fittings shall be installed on each conduit run in accordance with manufacture's recommendations to provide the additional movement necessary.

5. All conduit connections in wet and corrosive locations shall be made up watertight and shall terminate at enclosures with an approved conduit hubs.

6. All conduit connections in dry and dusty locations shall terminate at enclosures with bushings and lock nuts. Terminations shall include one bushing and two lock nuts at each location. Lock nuts shall be installed one inside and one lock nut outside the enclosure. All conduit shall be bonded to the safety ground.

7. At pull and junction boxes having any box dimension in excess of 18 inches, jumper type grounding bushings shall be installed on conduit ends and jumper wires shall be installed to bond all conduits and to bond conduits to boxes.

8. All insulated grounding bushings shall be bonded together and to the structure of the enclosure by a continuous, copper bonding wire.

9. Removable, flame-retardant, insulating cable supports shall be provided in all boxes with any dimension exceeding 3 feet.

10. Scratched PVC coated boxes and fittings damaged as a result of installation work shall be touched up by field applying PVC coatings. All touch up work shall be in strict conformance with manufacturer's recommendations.

D. Installation within Hazardous Areas.

1. Explosion-proof boxes and fittings shall be of a type approved by the Engineer. Boxes and fittings shall be of cast iron with finish as specified hereinbefore or of an aluminum alloy specially developed for use in hazardous areas.

2. Explosion-proof boxes shall be suitable for the installation of explosion-proof switches, receptacles, lighting fixtures or other devices as indicated. All conduit connections to such boxes shall be made with threaded fittings. Bushings and locknut connections shall not be used.

3. Conduits terminating at explosion-proof boxes, enclosing circuit opening equipment, shall be sealed at the entrance to the box with an approved compound-filled sealing fitting to prevent passage of explosive or combustible gases through the conduit. Where construction prevents the use of sealing fittings, the ends of the conduits shall be properly sealed with sealing compound.

4. Sealing fittings shall be installed to seal each conduit leading from or entering into hazardous locations. Exposed conduits passing through hazardous locations shall be sealed at point of exit and entrance.

5. The installation of explosion-proof boxes, fittings and all conduits in connection therewith shall conform to the requirements of the NYCEC for Class I, Division 1 Group D hazardous location.

3.03 FIELD TESTING / QUALITY CONTROL

A. After installation, the electric conduit system shall be field tested. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide testing consisting of the following:

1. Each conduit shall be tested by pulling through a cylindrical mandrel as specified under this Section. Maintain a record of all conduits testing clear.

2. Conduit systems shall be ground tested in the presence of the Engineer, who will inspect all enclosures, pull and junction boxes for bonding to the safety green conductor pulled with the nominal 120 volt and higher power and control circuits, and for bonding of the conduit grounding bushing to this safety ground.

3. The separation of above safety grounding system from the instrumentation signal grounding shall be verified.

4. The Contractor shall provide a Field Test Report. The Report shall identify the testing performed and the results obtained.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. All conduits shall be carefully cleaned before and after installation and all inside surfaces shall be free from all imperfections likely to injure the cable. Conduits shall be cleaned in accordance with the following:

1. After erection of complete conduit runs, conduits shall be snaked with a suitable swab to which shall be attached an approved tube cleaner equipped with an approved cylindrical mandrel of a diameter not less than 85 percent of the nominal diameter of the conduit.

2. All conduits through which the mandrel will not pass shall be removed and replaced by the Contractor at its own expense.

3. After snaking, the ends of the dead-ended conduits shall be protected with standard malleable iron caps to prevent the entrance of water or other foreign matter.

4. Conduit ends shall be protected after cleaning with caps to prevent entrance of water, concrete, debris or other foreign substance.

END OF SECTION

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing labeling and identification.

1. Labeling and identification shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

2. Labeling and identification shall be provided for the identification of electrical equipment.

B. The work shall include providing all voltage signs, equipment nameplates, markers, tags and arc flash labels for all electrical equipment furnished under this Contract.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 20 - Low-Voltage Wires, Cables and Accessories

B. Section 26 05 33 - Raceways and Boxes for Electrical Systems

C. Section 40 05 97 - Identification for Process Equipment

1.04 REFERENCES

A.	NYCEC	-	New York City Electrical Code
B.	NFPA 70E	-	Standard for Electrical Safety in the Workplace
C.	ANSI Z535.4	-	American National Standard for Product Safety Signs and Labels
D.	BWT Arc Flash	-	Arc Flash Personal Protective Equipment BWT Guidelines
E.	OSHA 1910 Subpart S	-	Electrical

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. All labeling and identification signs and nameplates shall be provided in accordance with the NYCEC, NFPA 70E and OSHA 1910 Subpart S.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include but not be limited to:

1. Submit signs, nameplates and other labeling and identification devices proposed for use with specifications and other data required to demonstrate compliance with the specified requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The labeling and identification devices shall be delivered, stored and handled in accordance with the Specifications and the manufacturer’s recommendations.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Labels shall be as manufactured by:

1. Brady, Milwaukee, WI;
2. Seton Nameplate Corporation, North Branford, CT;
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. High Voltage Signs

1. High voltage signs shall be provided for equipment operating over 600 volts.
2. High voltage signs shall be fiberglass reinforced polyester, rigid acrylic or aluminum plate 1/16-inch thick. Finish shall be industry standard of red, white and black graphics. Signs shall be 10 inches by 14 inches with the following exceptions:
    a. Use 7-inch by 10-inch signs where this is the largest size that can be applied.
    b. Use 14-inch by 20-inch signs where needed for adequate vision.
3. High voltage signs shall read; "DANGER - HIGH VOLTAGE KEEP OUT".
4. High voltage sign mounting screws shall be 3/16 inch diameter, round head, stainless steel, and self-tapping type.

B. Equipment Nameplates

1. Equipment nameplates shall be provided in addition to the manufacturer’s nameplate, to identify the equipment number and the item’s function and the equipment to which it serves.
2. Equipment nameplates shall be provided in accordance with the requirements specified under this Section and Section 40 05 97 – Identification for Process Equipment.
3. Equipment nameplates shall be laminated plastic with black letters on a white background.
4. Nameplates for equipment identification shall have 1/2-inch high letter engravings.
5. Nameplates for pilot device identification shall have 1/4-inch high letter engravings.
6. Nameplates for distribution equipment shall have the following information:
    a. Equipment name and number.

b. Voltage.

c. Phases and number of wires.

7. Pull boxes, junction boxes and control stations shall have a nameplate identifying the equipment name and number.

8. All feeders and branch circuit devices shall have nameplates identifying the served equipment name and number.

9. Where execution of the Work under this Contract requires certain feeders and branch circuit devices to be modified, the Contractor shall provide new nameplates reflecting the modifications. The nameplates shall identify the served equipment name and number.

10. All control and indicating devices shall have individual nameplates identifying device function.

11. Nameplate mounting screws shall be 3/16 inch diameter, round-head, stainless steel and self-tapping type. Adhesives shall not be used.

C. Conduit Markers and Tags

1. Conduit markers and tags shall be provided for the identification of the electric conduit system.

2. Conduit markers and tags shall be in accordance with Section 26 05 33 - Raceways and Boxes for Electrical Systems.

D. Cable and Wire Markers

1. Cable and wire markers shall be provided for the identification of the electric wire and cable.

2. Cable and wire markers shall be in accordance with Section 26 05 14 - Medium-Voltage Cables and Accessories and Section 26 05 20 - Low-Voltage Wires, Cables and Accessories.

E. Arc Flash Labels

1. Labels shall be provided in addition to the manufacturers nameplate and equipment nameplate, to identify equipment name, bolted fault and arcing fault current levels, flash protection boundary distances, working distances, personal-protective equipment classes and AFIE (Arc Flash Incident Energy) levels.

2. Labels shall be able to withstand their usage environment, the print shall not fade, and adhesive should be aggressive enough to avoid peeling.

3. Arc flash labels shall be printed on a durable polyester base over-laminated to protect the text and graphics.

4. The back of the labels shall employ an acrylic adhesive, which allows the labels to be securely and permanently affixed to a wide range of surfaces.

5. Labels shall include no field markings.

6. Labels shall be generally in accordance with ANSI Z535.4.

7. Labels shall include at a minimum the following information based on the Arc Flash Hazard Analysis performed:

   a. Nominal Voltage of the Equipment

   b. Flash Protection Boundary

   c. Personal Protective Equipment category at the working distance

   d. Arc Flash Incident Energy Value (cal/cm^2) at the working distance

   e. Limited and Restricted Boundaries

   f. Study Report Number and Issue Date

   g. Location of Study Report.

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. Signs and Nameplates

1. All signs, nameplates and tags shall be installed neatly, properly and as recommended by the manufacturers.

2. Signs and nameplates shall be mounted with screws.

   a. Where mounting of signs or nameplates with screws is impractical, the Contractor shall alert the Engineer.

B. High Voltage Signs

1. High voltage signs shall be installed on equipment operating at over 600 volts. High voltage signs shall also be installed on sides of fences or walls which enclose outdoor equipment operating at over 600 volts.

C. Signal Wire and Cable

1. Control, signal and status wire and cable shall be identified by a unique number. The numbering system shall reflect the actual identification used in the Work and shall be documented on the point-to-point wiring diagrams.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Electrical testing shall be provided in accordance with this Section, the Specifications and the Contract Drawings.

1. The Contractor shall provide all labor, materials, tools, instruments, power and all services necessary to provide the tests specified for all electrical materials, equipment and systems provided under this Contract.

2. The Contractor shall engage the services of an Independent Testing Company (ITC) to perform specific tests as detailed in this Section and the Specifications.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Not Used

1.04 REFERENCES

A. Definitions

1. Plant refers to facilities used for the processing and conveyance of water or wastewater and includes pump stations, water and wastewater processing or treatment facilities.

2. Low-voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation within the 600 Volt Class.

3. Medium-voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation at above 1000 volts and below 99000 volts.

4. All references to the Electric Utility or Utility shall mean Consolidated Edison Company or the Local Electric Utility having jurisdiction.

B. Reference Standards

1.	NETA ATS	-	Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
2.	Infraspection Institute	-	Standard for Infrared Inspection of Electrical Systems & Rotating Equipment

1.05 DESCRIPTION

A. Upon completion of the electrical installation, the Contractor shall perform tests to demonstrate that the entire electrical system is in proper working condition and is in accordance with the Contract Drawings and the Specifications.

1. Tests shall be as outlined in this Section and those of the individual Sections.

2. Field tests shall be in addition to the factory tests on individual items previously performed at the manufacturer's plant.

3. Perform insulation integrity tests and ground resistance tests before operating tests.

4. Determine proper rotation of motors before permanent connections are made.

1.06 QUALITY ASSURANCE

A. ITCs conducting Electrical Testing shall

a. Have a minimum of 10 years conducting tests as detailed in NETA ATS

b. Be a first tier Subcontractor.

c. Be a firm independent of any Other Contractor.

d. Be a firm independent of the Engineer or the Designer.

e. Be a NETA Accredited Company deploying NETA certified personnel.

B. ITCs conducting Thermographic Testing shall

a. Have a minimum of 10 years conducting tests as detailed by the Infraspection Institute.

b. Be a first tier Subcontractor.

c. Be a firm independent of any Other Contractor.

d. Be a firm independent of the Engineer or the Designer

e. Deploy Infraspection Institute certified personnel.

C. Calibration of Equipment

1. All test instruments and test equipment shall have been calibrated within the 12 month period immediately preceding the dates when they will be used on this Contract.

2. All test instruments and test equipment shall bear the calibration marks, stamps or seals of an approved testing body or agency with reference standards directly traceable to those held by the National Institute of Standards and Technology (NIST).

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer.

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

1. Organization of the Testing Companies inclusive of details of the specific personnel that will be utilized on specific tests.

2. Documentation detailing firm accreditation

3. Qualifications of testing personnel

4. Proposed testing methods and schedules, test setup and sample data sheets

5. Calibration Reports of test equipment

6. All field test reports.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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. Factory Tests

1. Factory and witnessed shop testing requirements shall be as detailed in the individual equipment Sections.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Schedules/Scheduling

1. Written notice of the intent to proceed with any scheduled and approved tests shall be given to the Engineer at least two (2) weeks in advance of the commencement of the testing.
2. When testing requires that certain pieces of equipment be taken out of service, all testing procedures and schedules must be submitted to the Engineer for review and approval 45 days prior to the two (2) week notice above.
3. When testing has been scheduled as above, the Plant Superintendent must be notified 48 hours prior to any Work to allow time for load switching and/or alternation of equipment.
4. All testing that requires temporary shutdown of Plant equipment must be coordinated with Plant Superintendent so as not to affect proper Plant operations.
5. At the end of the each workday, all equipment shall be back in place and ready for immediate use should a plant emergency arise.
6. In addition, should an emergency condition occur during testing, at the request of either the Plant Superintendent or the Engineer or the Engineer's

designated representative attending the testing, the equipment shall be placed back in service immediately and turned over to Plant.

7. In the event of accidental shutdown of Plant equipment the Contractor shall notify Plant Superintendent or the Engineer or the Engineer's designated representative immediately to allow for an orderly restart of affected equipment.

3.02 IMPLEMENTATION

A. Test Personnel/Test Equipment

1. The Contractor, and where applicable in conjunction with the ITC, shall furnish all instruments and qualified personnel for all tests.

B. Attendance at Tests

1. All tests shall be made in the presence of the Engineer or a duly authorized representative of the Engineer.

2. A manufacturer's representative in accordance with the requirements of the specific equipment Section shall be present at all equipment tests

3. When the presence of the Engineer or the Engineer's representative is waived, sworn statements, in duplicate, of the tests made and the results thereof shall be furnished to the Engineer by the Contractor.

4. A manufacturer' representative

C. Tests/Testing by Others

1. The Electrical Contractor shall make available the electrical system and personnel when required by other Contractors to test their respective equipment.

2. The Electrical Contractor shall coordinate their resources with the other Contractors.

3.03 FIELD TESTING / QUALITY CONTROL

A. Non ITC Testing

1. The Contractor shall complete all testing not required to be completed by an ITC including:

a. All low-voltage equipment testing.

b. All raceway testing not requiring the use of medium-voltage test methods.

c. All low-voltage cable testing utilizing low-voltage or extra-low voltage methods.

d. All phasing verifications utilizing low-voltage or extra-low voltage methods.

e. All continuity testing utilizing low-voltage or extra-low voltage methods

f. All ground system bonding and continuity testing utilizing low-voltage or extra-low voltage methods.

g. All low-voltage voltage and potential testing and verifications.

B. ITC Testing

1. An independent testing company comprised of NETA certified test personnel and project administrators shall be retained by the Contractor to complete the following:

a. All medium-voltage equipment testing.

b. All medium-voltage cable testing.

c. All dielectric tests.

d. All low-voltage and medium-voltage protective device testing and setting related to Arc Flash Studies.

e. All low-voltage and medium-voltage Protective Device testing and calibration.

f. All potential and current transformer testing and determination of performance curves.

g. All Primary and Secondary injection tests of protective device systems.

h. All ground systems testing.

2. Thermographic Testing and Imaging

a. An independent testing company comprised of Infraspeciton Institute certified test personnel and project administrators shall be retained by the Contractor to complete the following:

1) All thermographic testing of electrical equipment.

2) As required by specific Sections.

b. The level of plant loading of equipment subject to Thermographic Testing shall be as specified in the equipment Section but shall not less than 60 percent of the rated equipment load.

C. Final Field Testing

1. The Contractor shall complete the installation and testing of the electrical installation at least two (2) months prior to the startup and testing of all other Work of the Contract.

2. During the period between the completion of electrical installation and the startup and testing of all other Work, the Contractor shall make all completed and serviceable components of the electrical installation

available to the other Contractors for their use in performing Preliminary and Final Field Tests.

3. Before each test commences, the Contractor shall submit a detailed test procedure and also provide manpower and scheduling for the approval of the Engineer.

4. The Contractor shall furnish detailed test procedures for any of his equipment required as part of the field tests of systems by other contractors.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 26 22 13 – LOW-VOLTAGE DISTRIBUTION TRANSFORMERS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing individually mounted dry type transformers single-phase and three-phase general purpose individually mounted mini-power centers of the two-winding type, self-cooled, as specified herein and as shown on the contract drawings.

B. The following index of this Section is included for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 27 - Grounding

B. Section 26 05 29 - Hangers and Supports for Electrical Systems

C. Section 26 05 53 - Identification for Electrical Systems

1.04 REFERENCES

A. Dry type transformers shall comply with the latest applicable provisions and recommendations of the following:

1.	ANSI	-	American National Standards Institute
2.	NYCBC	-	New York City Building Code
3.	NYCEC	-	New York City Electrical Code
4.	UL 1561	-	Dry-Type General Purpose and Power Transformers
5.	NEMA ST 20	-	Dry Type Transformers for General Application

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. General:

1. All transformers shall conform to the applicable NEMA, ANSI and IEEE Standards and shall be built by one approved manufacturer who shall use only best commercial materials and processes of manufacture.
2. Transformer enclosures shall have ample room for primary and secondary wiring connections.
3. All transformers shall be UL listed and certified to ANSI/NEMA sound levels.
4. The transformer manufacturer shall use a shop test facility that has recently calibrated testing apparatus and qualified, experienced technicians, for all shop tests. Calibration of testing apparatus shall be within one year of date of testing.
5. All test equipment and instrument calibration shall be in accordance with the latest edition of the accuracy standard of the U.S. National Institute of Standards and Technology. Calibration of testing apparatus shall be within one year of date of testing.

B. Seismic Requirements

1. The transformer mounting system shall be designed, constructed and installed suitable for earthquake regulations in accordance with the seismic requirements of the NYCBC.
2. Transverse and longitudinal bracing shall be provided as required to brace the transformer for the seismic requirements specified.

C. Field testing of the transformers shall be performed in accordance with the requirements specified under this Section.

1.07 SUBMITTALS

A. 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 catalog cuts for the transformers proposed for use.
2. Dimensional drawings showing transformer details with diagrammatic nameplate.
3. Transformer anchorage and mounting details prepared and stamped by a licensed Professional Engineer, registered in the State of New York.
4. Description of shop and field testing methods, procedures and apparatus with calibration dates shall be submitted. Testing methods and procedures shall be submitted at least 60 days in advance prior to confirmation of witness testing dates and actual testing.

B. Shop test and field test reports shall be submitted.

C. Operations and Maintenance Manuals shall be submitted in accordance with the Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Dry type transformers shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's recommendations.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Dry type transformers / Mini-Power Centers shall be as manufactured by:

1. Eaton Corporation;
2. General Electric Company, Stamford, CT.
3. ABB;
4. Schneider/Square D
5. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Mini-Power Centers

1. The Contractor shall furnish and install three-phase general purpose individually mounted mini-power centers of the two-winding type, self-cooled, as specified herein and as shown on the Drawings. Mini-Power Centers shall be as manufacturer by Eaton, Square D or approved equal.

2. The mini-power center and all components shall be designed, manufactured, and tested in accordance with the latest applicable standards of ANSI and NEMA. The assembly and all components shall be UL listed.

3. Unit kVA and voltage ratings shall be as shown on the drawings. Units shall be designed for continuous operation at rated kVA, for 24 hours a day, 365 days a year operation, with normal life expectancy as defined in ANSI C57.96.

4. Transformer sound levels shall not exceed the following ANSI and NEMA levels for self-cooled ratings: 10 to 30 kVA 45 db.

5. Each mini-power center shall include a primary main breaker, an encapsulated dry-type transformer and a panelboard with secondary main breaker.

6. Primary main, secondary main and feeder breakers shall be enclosed with a pad lockable hinged door. Mini-power centers shall be suitable for service entrance application.

7. Transformers shall be insulated with a 180 degrees C insulation system and rated at 115 degrees C temperature rise. Required performance shall be obtained without exceeding the above-indicated temperature rise in a 40 degrees C maximum ambient, with a 30 degrees C average over 24 hours. All insulation materials shall be flame-retardant and shall not support combustion as defined in ASTM Standard Test Method D635.

8. Transformer core shall be constructed with high-grade, nonaging, silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Maximum magnetic flux densities shall be substantially below the saturation point. The transformer core volume shall allow efficient transformer operation at 10% above the nominal tap voltage. The core laminations shall be tightly clamped and compressed. Coils shall be wound of electrical grade copper with continuous wound construction. The core and coil assembly shall be completely encapsulated in a proportioned mixture of resin and aggregate to provide a moisture proof, shock-resistant seal. The core and coil encapsulation system shall minimize the sound level. The core of the transformer shall be grounded to the enclosure Provide two (2) 5% FCBN taps.

9. Secondary bus shall be copper.

10. All interconnecting wiring between the primary breaker and transformer, secondary main breaker and transformer and distribution section shall be factory installed. All transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring.

11. Each mini-power center shall include a primary main breaker with an interrupting rating of (14kA) at 277/480 volts; and a secondary main breaker with an interrupting rating of 10kA at 120/208 volts, and a panelboard with a minimum of 12 1-pole branch circuits.

    a. Branch circuit breakers shall be rated 20A.

12. The secondary distribution section shall accommodate bolt-on circuit breakers with 10 kA interrupting capacity.

13. The enclosure shall be made of heavy-gauge steel and the maximum temperature of the enclosure shall not exceed 90 degrees C. The enclosure shall be totally enclosed, non-ventilated, NEMA 3R, with lifting eyes.

14. Factory tests shall be performed and be in accordance with the accordance with the latest version of ANSI and NEMA. Tests shall include the following:

    a. Ratio tests at the rated voltage connection and at all tap connections.

    b. Polarity and phase-relation tests on the rated voltage connection.

    c. Applied potential tests.

    d. Induced potential test.

    e. No-load and excitation current at rated voltage on the rated voltage connection.

B. General Purpose Transformers

1. General purpose transformers shall be of the dry, commercially quiet, low temperature rise type consisting of two windings per phase.

2. Transformers shall have kVA rating, primary voltage and connection, secondary voltage and connection and number of phases as shown on the Contract Drawings.

3. Conductors for transformer windings shall be copper only.

4. Transformers shall be suitable for indoor or outdoor installation in accordance with the locations shown on the Contract Drawings.

5. Transformer insulation shall be rated 220 degrees C, 80 degrees C rise.

6. Transformers shall be equipped with six 2-1/2 percent fully rated taps, two above and four below the rated voltage tap on the primary winding.

7. The arrangement, assembly, and laminations of the core shall be such as to facilitate repair to the windings.

8. The design, shape, and arrangement of windings shall allow free flow of air for insulation and cooling.

C. Shielded Isolation Transformers

1. Shielded isolation transformers shall conform to the requirements specified under this Section for General Purpose Transformers and the following:

a. Shielded isolation transformers shall also include an electrostatic shield, grounded to the transformer case, to attenuate electrical noise.

D. Non-Linear Load Transformers

1. Non-linear load transformers shall conform to the requirements specified under this Section for General Purpose Transformers and the following:

a. Non-linear load transformers shall be specifically designed for non-sinusoidal loads.

b. Transformers shall be K-factor rated as shown on the Contract Drawings.

c. Transformers shall be provided with oversize neutral suitable to handle at least 200 percent of normal phase current.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Shop Tests

1. Shop tests shall be performed at the transformer's manufacturer's plant prior to shipment.

2. Shop tests shall demonstrate that the equipment tested conforms to the requirements specified.

3. Each transformer shall be given a routine test in accordance with the latest requirements of UL, ANSI and NEMA standards.

4. The Contractor shall provide a shop test report. The report shall identify the tests performed and the results obtained.

5. Transformer shop tests shall be performed consisting of the following:

a. Applied potential shall be performed.

b. Induced potential shall be performed.

c. No load losses shall be performed.

d. Voltage ratio shall be performed.

e. Polarity shall be performed.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Transformers shall be installed on walls or floors. Floor mounted transformers shall be installed on one inch of Korfund sound absorber material on raised concrete base at locations shown on the Contract Drawings.

B. Sufficient access and working space shall be provided for ready and safe operation and maintenance.

C. Transformers mounting, supports and restraints shall confirm to the requirements of this Section and Section 26 05 29 – Hangers and Supports for Electrical Equipment.

D. Transformers shall be grounded in accordance with the requirements of Section 26 05 27 – Grounding and as shown on the Contract Drawings.

E. The transformer leads shall be provided with solderless, clamp type cable connectors.

F. Conduit runs shall be arranged for easy removal of the transformers.

G. Transformer nameplates shall be installed for identification of equipment. Nameplates shall be provided in accordance with the requirements of Section 26 05 53 – Identification for Electrical Systems.

3.03 FIELD TESTING / QUALITY CONTROL

A. Insulation resistance tests shall be performed on the transformers after installation.

B. The tests shall be witnessed by the Engineer and certified by the Contractor. The tests shall be performed by the Contractor who shall furnish all testing equipment.

C. The Contractor shall provide a field test report. The report shall identify the tests performed and the results obtained.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 26 51 11 – LIGHTING FIXTURES, DEVICES AND SCHEDULES
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing lighting fixtures (luminaires) and devices. Luminaires and devices shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

B. The lighting system shall be complete and include all equipment, devices and accessories as required for the installation of the luminaires and devices.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 26 05 27 - Grounding

B. Section 26 05 29 - Hangers and Supports for Electrical Systems

C. Section 26 05 33 - Raceways and Boxes for Electrical Systems

D. Section 26 05 53 - Identification for Electrical Systems

1.04 REFERENCES

A. Reference Standards

Luminaires and devices shall comply with the latest applicable provisions and recommendations of the following even if not specifically listed in this Section:

1. ANSI C78.377 - Specifications for the Chromaticity of Solid State Lighting (SSL) Products
2. DLC PR - DesignLights Consortium Premium Technical Requirements
3. EISA 2007 - Energy Independence and Security Act of 2007
4. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Sold State Lighting Products
5. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules
6. IES TM-21 - Technical Memorandum on Projecting Long Term Lumen Maintenance of LED Light Sources
7. NEMA SSL-1 - Electronic Drivers for LED Devices, Arrays, or Systems.
8. NYCEC - New York City Electrical Code.
9. NYCECC - New York City Energy Conservation Code
10. UL 20 - General Use Snap Switches.
11. UL 924 - Emergency Lighting and Power Equipment.
12. UL 1598 - Luminaires
13. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. General:

1. Luminaires shall be UL listed, approved for use in the City of New York and comply with NYCECC.
2. The luminaire types are noted within the fixture schedule which is shown in this Section. The descriptions and catalog numbers serve to establish the quality, appearance and performance of the specified luminaires.
3. Luminaires and controls shall be as manufactured by the same manufacturer.
4. All luminaires shall be the products of lighting equipment manufacturers who have previously demonstrated, by performance and reputation, the ability to manufacture products of the quality specified and shall have a minimum of 5 years' experience manufacturing the luminaires specified. Such manufacturers must maintain an organization and manufacturing facility capable of actually manufacturing the specified luminaires. For the purpose of inspection, Contractor shall assure the Engineer, free and easy access to the manufacturing facilities and inventories of any manufacturer whose equipment the Contractor proposes to supply.
5. Luminaries over the range of operating voltage and temperature shall comply with the following:
    a. Minimum power factor of 0.95
    b. THD for both current and voltage of less than 10%
6. Luminaries shall have integral UL Listed Class 2 drivers.
7. Luminaires shall have integral surge protective devices (SPD) to protect the luminaire from common mode transient peak voltages and transient peak currents.
8. Luminaires shall comply with DLC PR.
9. Luminaires utilizing incandescent sources are not permitted.
10. Luminaires shall utilize electronic or solid state drivers where applicable.
11. The Contractor shall be responsible to assure that the exact inscription for exit and stairway signs required by local code is checked against that specified, prior to providing same. The Engineer shall be advised of any changes required to conform to local codes before such changes are effected.
12. The Contractor shall be responsible for reviewing all Contract drawings and coordinating with all trades the installation of luminaires and devices. Luminaire and device finishes and construction shall be compatible with the approved wall and ceiling types which shall be determined by the Contractor's review of all Contract drawings.
13. All luminaires shall be of the highest quality material and construction for their respective types.

14. Lamps for all luminaires shall be in accordance with EISA 2007.

15. Luminaires shall be suitable for connection to concealed or exposed conduit runs as required in each particular location and shall be of sizes suitable for lamp sizes indicated on the Contract Drawings.

16. Fittings and other materials for special luminaires not definitely shown or specified shall be of approved material, make and quality and shall have a finish that will harmonize with other parts of the luminaires. Where suitable standard materials are not available such parts of the luminaires shall be specially manufactured.

B. Field Testing:

1. Luminaires shall be field tested. The field testing shall be performed in accordance with the requirements specified under this Section.

2. Retain the services of the emergency inverter system manufacturer for field services. Field service shall be in accordance with the requirements specified under this Section.

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. A list of proposed manufacturers with the products they produce proposed for the contract.

2. Manufacturer's catalog cuts and drawings showing all technical information, and construction details for luminaires, including dimensions, type of wiring, weight, size, installation methods, provisions for relamping or replacing luminaires from the ground, test information criteria and rated life in hours with corresponding standard.

3. Photometric data, developed for each fixture type.

4. Lamp type and technical information.

5. Driver type for LED luminaires and technical information including input voltage, power factor, Crest Factor and THD.

6. Scaled Shop drawings showing the locations of all fixtures and devices. The Drawings shall include the proposed routing of the branch circuits.

7. Manufacturer shall certify that lead free solder is used in the manufacture of lighting fixtures. The costs of this option are considered to be included in the Lump sum Bid.

B. Reports

1. Field test reports shall be submitted.

2. Manufacturer's site visit report shall be submitted.

C. Operations and Maintenance Manuals

1. Operations and Maintenance Manuals shall be submitted in accordance with this Section and the Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Luminaires and devices shall be delivered, stored and handled in accordance with this Section, the Specifications and the manufacturer's instructions.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall furnish and deliver to the Engineer, at that part of the site and at such time as the Engineer may direct, spare parts for luminaires and devices in accordance with this Section and the Specifications.

B. The spare parts shall be listed in an index and packed in containers suitable for long term storage, bearing labels clearly designating the manufacturer's part number with complete information for use and reordering.

C. The following spare parts shall be furnished:

1. Provide a minimum of four spare luminaires.

a. Where the LED module or array is an integral part of the luminaire and not normally replaceable, spare luminaires shall be provided instead of spare lamps or modules.

2. Provide 5% of each type of driver, but no fewer than two.

3. Provide 5% of total fuses for each luminaire type and size, but not less than one set per size, if applicable.

1.10 WARRANTY

A. The Contractor shall obtain from the manufacturer and provide to DEP the manufacturer's standard warranty, in an acceptable form, warranting against defects in design, materials, abnormal aging, and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Lamps shall be as manufactured by:

1. Holophane, Granville, Ohio;

2. Wolfspeed, Inc., Durham, NC;

3. Nichia America Corporation, Wixom, WI;

4. GE Lighting, Cleveland, OH;

5. Ledvance, Wilmington, MA;

6. Or approved equal.

B. Drivers shall be as manufactured by:

1. Holophane, Granville, Ohio;
2. Ledvance, Wilmington, MA;
3. Eldo LED, Conyers, GA;
4. Advance Transformer, Rosemont, IL;
5. Or approved equal.

C. General use receptacles shall be as manufactured by:
1. Hubbel Incorporated, Shelton, CT;
2. Arrow-Hart Incorporated, Chicago, IL;
3. Or approved equal.

D. General use switches shall be as manufactured by:
1. Hubbel Incorporated, Shelton, CT;
2. Arrow-Hart Incorporated, Chicago, IL;
3. Or approved equal.

E. Plates shall be as manufactured by:
1. Hubbel Incorporated, Shelton, CT;
2. Arrow-Hart Incorporated, Chicago, IL;
3. Or approved equal.

F. Covers shall be as manufactured by:
1. Crouse-Hinds Company, Syracuse, NY;
2. Appleton Electric Company, Rosemont, IL;
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Luminaires
1. A luminaire shall be provided for each luminaire symbol shown on the Contract Drawings.
2. Luminaires shall be provided with all necessary hangers, supports, conduit adaptors, reducers, hooks, brackets and other support hardware. All hardware shall have a protective, non-corrosive finish.
3. Recessed luminaires shall be provided with trim moldings and frames suitable for the types of ceilings.
4. Pendent mounted luminaires shall be suspended by means of an enclosed and gasketed cushion type hanger. The hanger shall be suitable to be mounted directly to the luminaire outlet box and shall provide a minimum of 8 degrees swing from the vertical. Stems shall be threaded rigid metal

conduit, 1/2 inch minimum size. In corrosive areas stems shall be PVC coated.

5. Where luminaires are subjected to moisture, or assembled of dissimilar metals, gaskets of approved material and thickness shall be provided.

6. Luminaires shall be completely wired except where they will be directly connected to branch circuit wiring. The conductors shall be not less than No. 12 gauge, stranded, with approved heat resistant covering.

7. Mounting heights of all luminaires shall be as shown on the Contract Drawings. For special types, the height shall be determined at the time of installation.

B. Lamps

1. Lamps in association with their drivers shall have voltage ratings suitable for the voltages shown on the Contract Drawings.

2. The color temperature of lamps shall be such that the installed luminaire color temperature is as listed in this Section or shown on the Contract Drawings.

3. LED lamps shall be in accordance with the following:

a. Comply with UL 8750

b. CRI of not less than 85

c. Minimum efficacy of 140 lumens/watt

d. Lamp L80 life of not less than 100,000 hours at 25 degrees C

e. Maximum junction temperature of 150 degrees C

f. Binning per ANSI C78.377 at 85 degrees C

g. Very low thermal resistance to permit optimum heat transfer from the junction to the operating ambient.

4. High pressure sodium lamps shall be clear with medium or mogul base and wattage as indicated in the luminaire schedule.

5. Metal halide lamps shall be standard-line phosphor coated with wattage as indicated in the fixture schedule.

C. Drivers

1. General:

a. Drivers shall be matched for proper operation of lamps and shall meet the requirements for luminaire light output, reliable starting and operation.

b. Drivers shall have dimming capabilities and the lamps shall be corresponding suitable for dimming. Dimming requirements shall be listed in this Section or as shown on the Contract Drawings.

2. LED Drivers

   a. LED drivers shall be matched to their lamps such that the luminaire supply voltage and its likely site variations shall produce a level of performance indicated in this Section and as shown on the Contract Drawings

   b. LED Drivers in conjunction with the respective luminaire construction shall achieve the following:

      1) Specified lumen output with variation from specified voltage of plus or minus 10%.

      2) Rated life of not less than 100,000 hours.

      3) THD of less than 10% across the specified voltage range and full power.

      4) Power factor of not less than 95% and over the full range if dimming specified.

      5) Consistent performance over the range of temperatures expected at the installation location either indoors or outdoors.

      6) Cooling shall be achieved with static arrangements. Active cooling, thermal foldback or thermal sensing to achieve temperature control are not permitted.

   c. Electrical connections between LED Drivers and all components of the luminaire shall be polarized and color coded to permit trouble free connection and reconnection. A connection diagram shall be imprinted on the Driver or the internal of the luminaire.

3. Lighting Contactor Panels

   a. Lighting contactor panels shall be provided for the control of luminaires where specifically indicated on the Contract Drawings. The panel control and devices shall be arranged for proper operation in accordance with the control schematics shown on the Contract Drawings.

   b. The panel enclosures shall be steel, single door type. Enclosures shall be NEMA 12 for dry, indoor areas and NEMA 4X for corrosive areas. Each enclosure shall be equipped with a control fuse with mounting block and 300 volt screw type terminal blocks.

   c. Contactors shall be mechanically held type suitable for 120 volt operation. Contactor voltage, ampere, number of poles and quantities within each panel shall be as shown on the Contract Drawings.

   d. Where indicated on the Contract Drawings, the lighting contactor panels shall be provided with selector switches and control relays.

Selector switches and control relays shall be heavy duty industrial type.

4. Receptacle and Switches

   a. General:

      1) Receptacles and switches shall be provided in accordance with the Detailed Specification and as shown on the Contract Drawings. The receptacles and switches shall be complete and shall include all accessories for proper installation.

      2) Outlet boxes for receptacles and switches shall be in accordance with Section 26 05 33 – Raceway and Boxes for Electrical Systems.

5. Receptacles:

   a. Receptacles shall be duplex grounding type, two pole, three wire, 125 volt AC, 15 ampere. Where shown on the Contract Drawings, other special receptacles with number of poles, voltage and current rating shall be provided. Matching plugs shall be provided for each special receptacle.

   b. Receptacles for indoor dry, dusty locations shall be heavy duty, straight blade type, with reinforced polyester base and impact resistant nylon face.

   c. Receptacles for wet and corrosive locations shall be marine duty, straight blade type, with heat resistant melamine body. Special receptacles in wet and corrosive locations shall be Type 316 stainless steel.

   d. Receptacles for installation in floors shall be in accordance with the following:

      1) Floor receptacles shall comprise a watertight unit consisting of a cast iron box with an adjustable top, permitting permanent angular and vertical adjustment, brass cover plate and 3/4 inch brass floor extension. The extension shall be of an approved height and shall be surmounted with a brass head arranged for a duplex receptacle. Exposed metal parts shall be finished to match adjacent metal finish.

      2) For low voltage signal and telephone work, floor outlets shall be equal to those specified above for floor installation, except that the interiors shall be designed for cable extension as approved.

   e. Fan or clock outlets shall be single receptacles with molded composition or bakelite bodies. Rating shall be 15 amperes, 125 volts. Fan outlets shall be furnished with stud supports. Clock outlets

shall be of the recessed type and shall be furnished with yokes for clock support.

6. Switches:

a. Switches shall be industrial-heavy duty, AC toggle quiet type. Switches shall be rated 120/277 volt, 20 ampere. Poles and switching shall be as shown on the Contract Drawings.

7. Plates and Covers:

a. Stainless steel plates shall be furnished for devices in indoor dry, dusty locations. They shall have beveled edges and shall be made of Type 302/304, stainless steel.

b. Plates shall have satin finish. Attachment screws shall have matching head finish.

c. For wet and corrosive locations neoprene gasketed covers shall be used. Covers shall be galvanized ferrous or cast ferrous metal. Covers shall be PVC-coated in corrosive locations. Covers shall be equipped with gasketed spring doors for receptacles and an external operating mechanism for switches.

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. Luminaires

1. Luminaires shall be installed at locations shown on the Contract Drawings. Luminaire locations shall be adjusted where necessary to clear conflicts and obstructions.

2. All luminaires shall be installed complete with all hardware, and supporting devices necessary to make a safe complete and fully operative installation.

3. The Contractor shall obtain from the manufacturer for each luminaire, diagrams, illustrations and other installation instructions. The Contractor shall install in strict conformance with such instructions and the requirements of NYCEC.

4. Recessed fixtures shall be installed in suspended ceiling openings in conformance with manufacturer's recommendations and to suit the architectural details of the area involved. Independent supports from structural members of the building shall be provided.

5. Pendent mounted fixtures shall be installed with pendants 1/2 inch for stems up to 5 feet and 3/4 inch for longer lengths.

6. All pendant stem hangers shall be furnished with suitable aligner canopies or outlet box covers so that the luminaires hang vertical to the finished floor irrespective of the angle of the surface from which they are suspended. When luminaires or hanger canopies are mounted flush to the ceiling or wall, and where raceways and outlet boxes serving the luminaires are surface mounted to the ceiling or wall, finishing rings shall be provided to conceal the outlet box. All visible hanging devices and appurtenances shall have the same finish as the luminaire.

7. Reflectors, lenses, diffusers, louvers and decorative elements of luminaires shall not be installed until completion of plastering, ceiling tile work, painting, and general clean-up in the area.

B. Emergency Inverter System:

1. Equipment shall be installed in accordance with manufacturer's instructions and recommendations.

2. Equipment shall be installed on concrete pads at locations indicated on the Contract Drawings so that sufficient access and working space is provided for ready and safe operation and maintenance.

3. Install system nameplates for identification of equipment.

C. Lighting Contactor Panels:

1. Panels shall be mounted rigidly and securely to the building structure or to supporting devices which are rigidly and securely supported to the building structure.

2. Panels shall be fastened with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units and with machine screws or welded studs on metal.

3. All panels shall be mounted parallel or perpendicular to walls, such that panels are installed in a neat and professional manner.

D. Receptacles and Switches:

1. Receptacles and switches shall be installed within outlet boxes at locations indicated on the Contract Drawings and in accordance with code requirements.

2. Receptacles shall be mounted 2 feet above the finished floor

3. Switches shall be mounted 4 feet 6 inches above the finished floor.

4. Where devices are grouped they shall be mounted under a common plate. Where directed or where space conditions limit gang mounting, tandem or tandem gang arrangement shall be provided.

5. Where four or more switches controlling fixtures that are not visible from the switch location are grouped, the switch plate shall be engraved and filled with colored material or otherwise suitably marked to designate the control of each switch.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Tests

1. After installation, the completed lighting system and receptacle devices shall be field tested for operation and conformance. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide testing consisting of the following:

a. Wiring continuity test shall be performed.

b. Branch circuit load balance test shall be performed.

c. Fixture and control operation test shall be performed.

d. Emergency inverter system operation and functionality test shall be performed.

e. Receptacle polarity and grounding.

B. Reports

1. The Contractor shall provide a field test report. The report shall identify the test performed and the results obtained.

C. Manufacturer's Field Services

1. A qualified manufacturer's service representative shall assist in the installation of the emergency inverter system, check the installation before it is placed into operation, assist in the performance of field tests, observe the initial operation and train the plant operations and maintenance staff in the care, operation and maintenance of the system.

2. The Contractor shall provide equipment start-up services and training in accordance with this Section and the Specifications.

3. The Contractor shall provide a field report from the manufacturer's representative for each visit to the site. The report shall include complete information on time, schedule, tasks performed, persons contacted, problems corrected, tests results, training instruction and all other pertinent information.

4. The service representative shall sign in with the Engineer on each day they are at the site.

3.04 STARTUP / DEMONSTRATION

A. The Contractor shall use calibrated light meters to measure footcandle illumination levels at the working plane of the dock. Measurements shall be taken at critical locations, including walkways, 4 feet above the floor on panel screens, and at operating/metering devices. The recorded illumination levels shall be compared against specified lighting requirements to ensure compliance with applicable design standards.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Cleaning of Luminaries

1. Luminaires shall be cleaned inside and out to remove construction dust prior to the start of Field Tests and again prior to substantial completion at the direction of the Engineer.

2. Fixtures shall be relamped prior to substantial completion.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes excavation Work to be performed at mudline to seal bottom of caisson jackets and ice breaker pile splice encasements. Excavated materials will be stored temporarily next to caissons and piles at mudline to be reused to restore the mudline back to its original form after installation of jackets and encasements. No excavated material shall be brought up to the surface and hauled away.

B. Excavation Work includes stripping and stockpiling of topsoil; sheeting and bracing; excavation over the Site; excavation for roads, pipelines and structures; removal and control of water in and around excavations; segregation and stockpiling of excavated material; disposal of unsuitable material and excess excavated material; reuse of suitable material; and trimming, shaping and grading of excavations.

C. The following index of this Section is presented for convenience:

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D. The following attachments, attached after the End of Section designation, are a part of this Section:

1. Attachment A, Minimum Load Diagram for Non-Water Tight Sheet Sheeting Design During Excavation (refer to Article 1.05)

2. Attachment B, Minimum Load Diagram for Water Tight Sheeting Design During Excavation (refer to Article 1.05).

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 01 35 45 - Hazardous Materials Control

B. Section 31 23 23 - Fill

C. Section 31 25 10 - Dust, Soil Erosion and Sediment Control

1.04 REFERENCES

A. Reference Standards:

1. New York City Building Code

1.05 DESCRIPTION

A. Design Requirements:

1. In designing the sheeting, take note of the minimum load diagram requirements of the DEP, shown in Attachments A and B (located after the "End of Section" designation), unless otherwise shown on the Contract Drawings. However, when it is anticipated that heavier crane or equipment loads will fall within the influence line of the excavation, increase design loads accordingly.

2. The Contractor's operations shall conform to the requirements of Section 31 25 10 - Dust, Soil Erosion and Sediment Control.

3. Site Conditions:

a. Actual Conditions: Perform any investigations deemed necessary to determine actual Site conditions, including but not limited to hardness of material to be excavated at mudline and water depths where excavations shall be performed.

b. Coordination with Other Work and NYCDEP: Contractor shall coordinate excavation work with other trades performing work at or around the area where excavation is to be performed and NYCDEP.

B. Regulatory Requirements:

1. General: Contractor shall comply with any and all project local, state, and federal permit requirements regarding excavation and turbidity controls during excavation.

1.06 QUALITY ASSURANCE

1.07 SUBMITTALS

A. Excavation Means and Methods: Contractor shall submit a means and methods statement for excavation to be performed at mudline prior to the start of the Work.

B. Health and Safety Plan: Excavation shall be performed at mudline, underwater by divers. Contractor shall submit a Health and Safety Plan for dive operations and safe excavation prior to the start of the Work.

1. Notification to the NYSDEC must be made prior to the first load greater than 10 cubic yards is planned to be transported from the site of excavation directly to the site of reuse.

a. At least five days in advance of transfers of Fill Types 2, 3, 4 and 5 generated in, imported to, or relocated within the City of New York.

b. At least five days in advance of transfers of Fill Type 4 and Fill Type 5 anywhere in the State of New York.

c. The Notification of Fill Transfer for Reuse form (NYSDEC Division of Materials Management, version 03/24 or latest) will be sent to the NYSDEC Regional Office in which the destination is located. The form must be certified by a Qualified Environmental Professional (QEP). In the event the QEP is not a Professional Engineer or Geologist licensed in New York State, the QEP's basis for credential must be attached to the form.

C. Annual Reporting Requirements: NYSDEC requires annual reports for specific uses of Beneficial Use Determination (BUD) materials. The reports will capture information from each calendar year and are due by March 1st.

1. All projects granted a Case-Specific BUD shall complete the Case-Specific Beneficial Use Determination Annual Report form specific to the reporting year to submit the annual report to NYSDEC. The form provides instructions for submittal.

2. Projects with materials distributed pursuant to pre-determined beneficial uses as described in 6 NYCRR Part 360.12(c) (i.e. excavated material used as fill or cover) that equal or exceed 10,000 tons shall complete the Pre-Determined BUD Large Quantity Annual Report form specific to the reporting year to submit the annual report to NYSDEC. The form provides instructions for submittal.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. General: All excavation work covered herein will be performed underwater and mudline level to expose existing caissons and steel piles. Contractor shall examine overall condition of the mudline for characterization of the soils to be excavated and water depths.

B. Unforeseen Material:

1. The contractor shall stop the Work upon the discovery of any unforeseen materials until otherwise directed by the Engineer.

2. The QEP will provide a written determination for what testing or controls are required in accordance with Section 02 24 20 - Soil Sampling and Analysis and Section 01 35 45 - Hazardous Materials Control.

3. Obtain written approval from the Engineer before continuing the excavation.

3.02 IMPLEMENTATION

A. Excavation for Jackets and Encasements:

1. Excavations shall be of the size and depth shown on Contract Documents. Excavation should stay stable until jackets and encasements are installed. Contractor may need to perform additional excavation, or excavation greater in size and depth than that shown on Contract Documents to ensure stability until installation. Excavated material shall be stockpiled nearby and shall be used to fill the excavation back upon completion of installation.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 31 23 23 - FILL
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Fill Work includes filling the excavation performed at the mudline for caisson jackets and ice breaker pile splice encasements with the excavated material. There is no imported material to be used for the fill work.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 31 29 - Marine Concrete

B. Section 31 25 10 - Dust, Soil Erosion and Sediment Control

C. Section 31 23 16 - Excavation

1.04 REFERENCES

A. Reference Standards

1. NYC Building Code

1.05 DESCRIPTION

A. Fill material is the native material excavated from mudline to install pile encasements and caisson jackets. No imported soils or other types of materials shall be used in the filling work.

1.06 QUALITY ASSURANCE

A. All materials used in construction, whether brought to the site or developed from on-site sources, shall be tested for optimum moisture-maximum density curve, and reports of the test results for each source shall be submitted promptly. The tests shall be as follows:

Test	ASTM Standard	Tests Per Volume Delivered
Gradation	D422	1 per 200 C.Y.
Compaction or Density	D1557	1 per 200 C.Y.

B. The Contractor shall engage the services of a testing laboratory, with the qualifications required by Section 03 31 29 – Marine Concrete, and experienced in design and testing of flowable fill materials and mixes, to perform material evaluation tests and to design mixes for flowable fill. A trial mix shall be performed to verify the flowable fill mix design. The trial mix shall also report slump, air content, yield, cement content, and dry unit weight per ASTM C143 and ASTM D6023.

1. Notification to the NYSDEC must be made prior to the first load greater than 10 cubic yards is planned to be transported from the site of excavation directly to the site of reuse.

a. At least five days in advance of transfers of Fill Types 2, 3, 4 and 5 generated in, imported to, or relocated within the City of New York.

b. At least five days in advance of transfers of Fill Type 4 and Fill Type 5 anywhere in the State of New York.

c. The Notification of Fill Transfer for Reuse form (NYSDEC Division of Materials Management, version 03/24 or latest) will be sent to the NYSDEC Regional Office in which the destination is located. The form must be certified by a Qualified Environmental Professional (QEP). In the event the QEP is not a Professional Engineer or Geologist licensed in New York State, the QEP's basis for credential must be attached to the form.

1.07 SUBMITTALS

A. The Contractor shall submit the following for the approval of the Engineer:

1. Health and Safety Plan covering diver safety, excavation, and backfilling operations.
2. Mudline profile measurements (survey) before excavation and after filling.

B. Prior to the transfer of fill, the Contractor shall submit the Notification of Fill Transfer for Reuse form for review prior to being sent to the NYSDEC. The form must be certified by a Qualified Environmental Professional (QEP). In the event the QEP is not a Professional Engineer or Geologist licensed in New York State, the QEP's basis for credential must be attached to the form. NYSDEC must receive notification at least five days in advance of transfers of Fill Types 2, 3, 4 and 5 generated in, imported to, or relocated within the City of New York and at least five days in advance of transfers of Fill Type 4 and Fill Type 5 anywhere in the State of New York.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Fill:

1. Fill material is the soils excavated at the mudline around the ice breaker piles and caissons.

B. Equipment

1. Hand tools will be used for the filling operation. It is not anticipated that power tools will be needed.

C. Drainage Fill

1. Use clean gravel, crushed stone, or other suitable material conforming to the gradation specified for drainage fill. Clay and fine particles are unacceptable in drainage fill. Provide drainage fill that complies with the following gradation limits:

U.S. Standard Sieve	Percent Passing By Weight
1-1/2 inch	100
1 inch	95-100

U.S. Standard Sieve	Percent Passing By Weight
1/2 inch	45-65
#4	5-15
#16	0-4

D. Select Fill

1. Use gravel, crushed stone, limestone screenings or other granular or similar materials, as approved, which can be readily and thoroughly compacted to not less than 95 percent of the maximum dry density obtainable by ASTM D1557. Very fine sand, uniformly graded sands and gravels, or other materials that have tendency to flow under pressure when wet are unacceptable as select fill. Provide select fill that complies with the following gradation limits:

U.S. Standard Sieve	Percent Passing By Weight
2 inch	100
1-1/2 inch	90-100
1 inch	75-95
1/2 inch	45-70
#4	25-50
#10	15-40
#200	5-15

E. Pipe Bedding

1. Gradation for Small Piping: For pipe 18 inches or less in diameter, use pipe bedding material of which 90 percent will be retained on a No. 8 sieve and 100 percent of which will pass a 1/2-inch sieve and be well graded between those limits.

2. Gradation for Large Piping: For pipe larger than 18 inches in diameter, use the same pipe bedding material as specified for smaller pipe or use a similar well graded material of which 90 percent will be retained on a No. 8 sieve, 100 percent will pass a 1-inch sieve, and will be well graded between those limits.

F. Lightweight Fill

1. Lightweight fill shall be a lightweight aggregate produced by the rotary kiln method and meeting the requirements of ASTM C330. No byproduct slags or cinders are permitted.

2. The material shall meet the grading requirements of ASTM C330, Table 1, Coarse Aggregate: 3/4 inch to No. 4.

3. Dry loose unit weight shall be maximum of 55 pcf. Dry compacted unit weight shall be a maximum of 60 pcf when measured by a one-point test performed in accordance with ASTM D698.

4. Maximum Los Angeles Abrasion Test loss of 50 percent when tested in accordance with ASTM C131 (B grading).

G. Flowable Fill

1. Flowable fill (also known as controlled low strength material) shall be a uniform mixture of sand, Type II Portland cement, fly ash, slag, admixtures, and water. The mix design shall produce a flowable material with little or no bleed water which produces a minimum compressive strength of 50 psi and maximum compressive strength of 100 psi at 56 days. The cured material shall be excavatable and have a maximum dry unit weight of 100 pounds per cubic foot. Slump shall be from 7 inches to 10 inches.

2. Admixtures specifically designed for flowable fill shall be used to improve flowability, reduce unit weight, control strength development, reduce settlement and reduce bleed water. Admixtures shall be:

a. Rheocell-Rheofill manufactured by BASF;

b. DaraFill manufactured by W.R. Grace Construction Products;

c. Or an approved equal.

3. All other materials shall be as specified in Section 03 30 00 - Cast-in-Place Concrete.

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. Contractor shall deploy turbidity control measures described in Section 31 25 10 – Dust, Soil Erosion and Sediment Control.

3.02 IMPLEMENTATION

A. Backfill all excavations to the original mudline surface.

B. Remove from all backfill, and from the space being backfilled, any compressible, putrescible, or destructible rubbish and refuse before backfilling is started. Dispose of the rubbish and refuse in accordance with the requirements of Section 01 74 20 – Construction Waste Management.

C. Leave sheeting and bracing in place or remove as the Work progresses, as shown in the Contract Drawings, specified or directed by the Engineer.

D. Do not permit backfilling construction equipment to travel against or over cast-in-place concrete structures until the specified concrete strength has been obtained, as verified by concrete test cylinders. In special cases where conditions warrant, the above restriction may be modified provided the concrete has gained sufficient strength, as determined from test cylinders, to satisfy design requirements for the removal of forms and the application of load.

E. Electrical Duct and Structure Bedding

1. All electrical ducts and precast manhole bases shall be bedded in well graded, compacted, select fill material. Select fill shall be placed in uniform layers not greater than 9 inches in loose thickness and compacted in place with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as determined by ASTM D1557. Bedding thickness shall be not less than 6 inches after compaction. Bedding below electrical ducts shall extend the full width of the trench.

2. Existing underground structures, tunnels, conduits and pipes crossing the excavation shall be bedded with compacted select fill material. Place bedding material under and around each existing underground structure, tunnel, conduit or pipe and extend underneath and on each side to a distance equal to the depth of the trench below the structure, tunnel, conduit or pipe.

3. Cast-in-place manhole bases and other foundations for structures shall be cast against a concrete work mat in clean and dry excavations, unless otherwise shown, specified or required.

F. Pipe Bedding and Initial Backfill

1. Place select fill by hand for initial pipe backfill from top of bedding to 1 foot over top of pipes in uniform layers not greater than 6 inches in loose thickness. Tamp under pipe haunches and thoroughly compact in place the select fill with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

2. Do not place stone fragments larger than 2-inch size in the pipe bedding or in the backfill to 1 foot over the top of pipes, nor any stone fragments larger than 3-inch size nearer than 2 feet from any pipe, conduit or concrete wall.

3. Pipe bedding containing very fine sand, uniformly graded sands and gravels, or other materials that have a tendency to flow under pressure when wet is unacceptable.

4. Bed pipelines or electrical ducts placed in short tunnels in select fill, flowable fill, or 2500 psi concrete. Completely fill the remainder of the annular space between the outside of the pipe wall and the tunnel wall with select fill, flowable fill, suitable job-excavated material, or 2500 psi concrete, as approved. Pipes and ducts in short tunnels shall be supported to permit placing and compaction of backfill.

G. Placement of Flowable Fill

1. Flowable fill shall be batched and premixed by an approved producer, dispensed from ready-mix trucks, and placed by approved methods and equipment.

2. Flowable fill shall be placed so as to completely fill the space to receive it with no trapped air pockets or other voids. Positive means of allowing air to escape shall be provided where necessary. Where placed against and around existing structures, lift heights shall be limited so as not to overload the structure. Lift heights shall be as approved by the Engineer.

3. Where flowable fill is placed around piping and other elements subject to floating within the fill, positive means shall be taken to provide temporary balancing loads to prevent uplift, or fill lift heights shall be limited to prevent uplift.

4. Application of loads or placement of other fill materials or concrete on top of flowable fill shall not occur until the flowable fill surface is determined to be suitable for loading per ASTM D6024.

H. Trench Backfill

1. Backfill trenches from 1 foot over the top of the pipe, from the top of electrical duct bedding or as shown to the bottom of pavement base course, subgrade for lawns or lawn replacement, to the top of the existing ground surface or to such other grades as may be shown or required. Backfill trenches as soon as, in the opinion of the Engineer, it can be done without injury to the concrete or pipe lines.

2. Provide select fill, suitable job-excavated material or other material, as specified and as approved for trench backfill.

3. Depth of Placement - General: Except under pavements, walkways, railroad tracks, and street or highway appurtenances, or as otherwise specified, place trench backfill in uniform layers not greater than 9 inches in loose thickness and thoroughly compact in place using suitable mechanical or pneumatic equipment. Compact backfill to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

4. Depth of Placement - Traffic Areas and Under Utilities: Where pavements, walkways, railroad tracks and street or highway appurtenances are to be placed over trenches and under utilities or utility services crossing the trench, provide trench backfill using select fill placed in uniform layers not greater than 9 inches in loose thickness and thoroughly compacted in place with equipment as specified above. Compact backfill to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

5. Depth of Placement - Undeveloped Areas: In undeveloped areas and where select fill material or hand-placed backfill are not specified or required, place suitable job-excavated material or other approved backfill in lifts not exceeding 12 inches in loose thickness. When the trench is full, consolidate the backfill by jetting, spading, tamping or puddling to ensure complete

filling of the excavation. Mound the top of the trench approximately 12 inches to allow for consolidation of backfill.

6. Backfill trenches in such a way as to prevent dropping material directly on top of any conduit or pipe through any great vertical distance. Do not allow backfilling material from a bucket to fall directly on a structure or pipe and, in all cases, lower the bucket so that the shock of falling earth will not cause damage.

7. Break up lumps and distribute any stones, pieces of crushed rock or lumps which cannot readily be broken up, throughout the mass so that all interstices are solidly filled with fine material.

8. Retain backfill in trenches by temporary bulkheads only and remove them as the backfilling progresses. Do not make bulkheads of stone.

9. Do not cover sewers, drains, basin connections, ends of sewers and branches until the Engineer orders or gives permission to backfill.

10. After completion of backfilling in City streets, remove all surplus material, and regrade and leave free, clear, and in good order all roadways and sidewalks. Deposit and compact a temporary surface of asphalt, or other equivalent and suitable material to a depth of six inches on all backfilled areas where ordered by the Engineer in writing. Until areas are restored to their original condition, maintain the surface of the temporary pavement in good and safe condition and promptly fill all depressions caused by settlement of the backfill with the temporary surfacing materials and compact the same. Wet the temporary surface by spraying with water when necessary to prevent a dust nuisance.

I. Drainage Blanket

1. Provide a drainage blanket consisting of drainage fill where shown, specified, or required. Place drainage fill in uniform layers not greater than 8 inches in loose thickness.

2. Where drainage fill is required underneath structures or adjacent to structures where pipes, connections, electrical ducts and structural foundations will be located within the fill, compact the fill with suitable mechanical or pneumatic equipment to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

3. Where drainage fill is required in areas not specified in Paragraph 3.02.J.2, compact with suitable mechanical or pneumatic equipment to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

J. Earth Embankments

1. Make all earth embankments of approved cohesive common fill material.

2. Place fill in uniform layers not greater than 10 inches in loose thickness. Compact in place with suitable approved mechanical equipment.

3. Compact earth embankments to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

4. Do not use cohesionless, granular material as earth embankment backfill, unless otherwise shown or required.

K. Finish Grading

1. Perform finish grading in accordance with the completed contour elevations and grades shown on the Contract Drawings and blend into conformation with remaining natural ground surfaces.

a. Leave all finished grading surfaces smooth and firm to drain. Areas shall be finished to the degree obtainable by either blade or scraper operations and suitable for application of topsoil.

b. Bring finish grades to elevations within plus or minus 0.10 foot of elevations or contours shown.

c. Areas which are anticipated to be undisturbed for a period of more than 30 days shall receive temporary seeding of rye grass at a rate of three bushels per acre, weather and season permitting. This seeding shall be repeated as necessary to maintain a continuing ground cover.

2. Grade outside of building or structure lines in a manner to prevent accumulation of water within the area. Where necessary or where shown, extend finish grading to ensure that water will be carried to drainage ditches, and the site area left smooth and free from depressions holding water.

3.03 FIELD TESTING / QUALITY CONTROL

A. Sampling and Testing of Flowable Fill:

1. The Contractor shall provide all facilities as may be necessary for the ready procurement of samples of flowable fill from the Work or truck mixers as required by the Engineer for test purposes.

2. The DEP/QA/QC Consultant will provide personnel and equipment for making periodic determinations in the field of slump, air content, ambient and concrete temperature, unit weight and yield and for the preparation of compressive strength test cylinders as required in compliance with applicable ASTM tests and procedures. In compliance with ASTM D4832, a minimum of two cylinders will be tested at 7 days, two at 28 days, and three at 56 days. Tests shall be made on material at point of discharge into the work. Tests shall be made for each 200 cubic yards of material placed but not less than one test for each day flowable fill is placed.

3. The Contractor shall supply all equipment necessary to perform the required tests including, but not limited to, cylinder molds, tags, capping compound, slump cones, platform scale, two buckets (each 2 cubic feet in size), thermometers, pressure air meter, and roller meter.

B. Correction of Work:

1. Filled areas shall be inspected 6 months after completion of the filling. Areas showing depression/scour shall be corrected by adding more fill from previously excavated material stockpiled around caissons and piles.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 31 25 10 - DUST, SOIL EROSION AND SEDIMENT CONTROL
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required to assure adequate environmental protection including implementation of all dust, turbidity, erosion and sediment control measures and maintenance of storage areas as directed by the Engineer.

B. The Contractor shall provide a Turbidity, Erosion and Sediment Control Plan (TE&SCP) that establishes methods and procedures to prevent migration of turbidity, contaminated stormwater and sediment and to prevent erosion of features of the Work.

C. The Contractor shall minimize turbidity, erosion and prevent discharge of sediment to surface water features, watercourses, drainage systems, public streets or private property from construction activities. The Contractor shall provide methods to prevent construction activities from generating contaminated stormwater runoff.

D. The Contractor shall comply with all Federal, State, or local laws, codes, ordinances, and regulations which govern the control of sediment, erosion, and stormwater during construction activities.

E. The Contractor shall provide Best Management Practices (BMPs), including, but not limited to turbidity curtains, silt fences, straw bales, sedimentation basins/traps, and/or other means as a temporary structural practice to minimize turbidity, erosion and sediment runoff.

F. The Contractor shall implement dust, turbidity, erosion, and sediment control in accordance with the requirements of the current NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity, and, if applicable, in accordance with the approved Stormwater Pollution Prevention Plan (SWPPP) for this contract prepared by the Engineer.

G. The Contractor shall control dust caused by operation and movement of vehicles and equipment in accordance with the latest DEP and OSHA standards, and all other applicable Federal, State and local regulations.

H. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 31 23 16 - Excavation

1.04 REFERENCES

A. Comply with applicable provisions and recommendations of the following except as otherwise shown or specified.

1. NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-25-001, or latest version)
2. New York City Watershed Regulations (April 4, 2010, or latest version)
3. New York State Standards and Specifications for Erosion and Sediment Control (aka “Blue Book”) (NYSDEC, November 2016, or latest version)
4. New York State Stormwater Management Design Manual (latest version)
5. New York State Department of Environmental Conservation (NYSDEC)
   a. 6NYCRR Part 361-4 – Mulch Processing Facilities.

1.05 DESCRIPTION

A. Definitions

1. Best Management Practices: Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollution of water, and have been approved by DEP or NYSDEC.
2. Commencement of Construction: The initial disturbance of soils associated with excavation activities; or other construction related activities such as demolition,.

3. Erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as geological creep, detachment, movement of soil or rock fragments by water, wind, ice, or gravity.

4. Erosion/Sediment Control: Any temporary or permanent measures taken to reduce erosion, control siltation and sediment, and ensure that sediment-laden water does not leave the site.

5. Receiving Waters: Bodies of water or surface water systems receiving water from upstream manmade (or natural) streams

6. Sediment: Fragmented material that originates from weathering and erosion of rocks and unsolicited deposits, and is transported by, suspended in, or deposited in water.

7. Turbidity: Cloudiness of water caused by suspension of sediment in water column.

8. Turbidity Curtain: Barrier installed around the area of work that is intended to contain turbidity caused by construction activities.

B. Environmental Requirements

1. 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 Section 31 10 10 – Site Clearing. Stabilization practices shall be implemented as approved by the Engineer. Seeding and planting shall be in accordance with Section 32 90 00-Planting. Temporary seeding shall utilize methods and materials as specified in Section 32 90 00 – Planting and the Contract Drawings. 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 below, stabilization practices shall be initiated as soon as practicable, but no more than fourteen (14) days after construction activities have temporarily or permanently ceased.

   a. Unsuitable Conditions: Where the initiation of stabilization measures by the fourteenth 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.

   b. Non-Winter month Temporary Inactivity Less than 14 Days: Where construction activity will resume on a portion of the site within 14 days after it temporarily ceases, no stabilization practices will be required.

c. Winter months Temporary Inactivity Less than 3 days: In winter months, where construction activity will resume on a portion of the site within 3 days after it temporarily ceases, no stabilization practices will be required.

2. Turbidity, Erosion and Sediment Control: Turbidity, Erosion and Sediment control BMPs shall be operational at all times during the Work, specifically during excavation and backfilling and demolition operations.

3. Stormwater: At no time shall the Contractor allow stormwater runoff from construction operations, or effluent from decontamination operations to migrate off to waterways.

4. Concrete Washout Debris: In accordance with NYC Local Law 70 of 2011 concrete washout shall not be allowed to enter the sewer. Concrete washout muck and debris shall be removed and adequately disposed by the Contractor at no additional cost to the City.

C. Project Conditions

1. Existing Work: All BMPS (e.g., turbidity curtains, silt fences, etc.) and other sediment/stormwater controls shall be installed such that other aspects of the Work are not adversely impacted or endangered. All installations shall be subject to the approval of the Engineer.

2. Dust Control: The Contractor shall be responsible for controlling visible dust caused by Work operations and the moving of vehicles and equipment. Dust control shall be implemented when soils are exposed, before, during and after Work activity ceases. Dust control will also be required on the weekends. The Contractor shall utilize the application of water or other methods, subject to the Engineer's approval, when visible dust is present on-site, in accordance with the Health and Safety Plan. The use of chemicals for dust control, including calcium chloride, will not be permitted.

a. All excavation, loading and transport of materials shall minimize the formation of dust and shall conform to Section 31 23 16 - Excavation. To prevent dust generation, application of water to roadways and active work areas shall be utilized as required. The Contractor's operations shall include air monitoring and dust minimization measures, consistent with the Health and Safety Plan (HASP) Specifications.

3. Silt and Sediment Disposal: All silt and sediment which accumulates behind any BMPs used on the site shall be removed and disposed of off-site in accordance with all applicable Federal, State, and local regulations.

D. Installation and Maintenance

1. All installation of erosion and sediment control BMPs must be consistent with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, and the

New York State Stormwater Management Design Manual. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must submit modified practices as part of the Contractor's Erosion and Sediment Control Plan, demonstrate equivalence to the technical standard, obtain the Engineer's approval and update the project SWPPP accordingly.

2. Maintenance: The Contractor shall maintain erosion and sediment control measures, and other protective measures in good and effective operating condition at all times consistent with the most current version of the technical standards, New York State Standards and Specifications for Erosion and Sediment Control, and the New York State Stormwater Management Design Manual.

1.06 QUALITY ASSURANCE

A. Permits and Regulations:

1. The Contractor shall obtain all necessary construction work permits and be responsible for implementing the terms and requirements of these permits as needed and for payment of all fees.

2. The Contractor shall handle all material in compliance with applicable requirements of OSHA and other governing authorities having jurisdiction.

3. Inspections.

a. Maintenance Inspections: A trained contractor shall inspect the erosion and sediment control practices and pollution measures being implemented within the active work area daily to ensure that they are always being maintained in effective operating conditions. If deficiencies are identified, the Contractor shall begin implementing corrective actions within one business day and shall complete the corrective actions in a reasonable time frame.

b. Qualified Inspector Site Inspections: The Contractor shall coordinate inspections with the Construction Manager's Qualified Inspector. Qualified Inspector Site inspections are conducted a minimum of twice every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days. The Contractor shall begin implementing any corrective actions identified by the Qualified Inspector within one business day and shall complete the corrective actions in a reasonable time frame.

c. The Contractor must have a qualified inspector conduct an assessment of the site prior to the commencement of construction and certify in an inspection report that the appropriate turbidity, erosion and sediment controls have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction. Following commencement of construction, site inspections shall be conducted at regular intervals.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and other documentation, required to show conformance to the requirements of the Contract Drawings, for the approval to the Engineer. Shop Drawings shall show details of the Turbidity, Sediment and Erosion Control System. The Submittals shall include, but not limited to the following:

1. Plan locations of all components of the control System.
2. Details of all applicable BMPs (e.g., turbidity curtains, silt fences, etc.).
3. All of the planned components of the Turbidity, Erosion and Sediment Control Plan, as detailed below in Paragraph 1.07.B.
4. The Contractor shall submit manufacturer's descriptive literature and installation instructions.

B. Turbidity, Erosion and Sediment Control Plan (TE&SCP): The Contractor shall develop and submit to the Engineer for approval, prior to commencement of construction activities, an TE&SCP. The TE&SCP shall address schedules and measures that will be taken to prevent migration of contaminated stormwater/sediment, and to prevent erosion of features of the Work. The TE&SCP shall include the following at a minimum:

1. Measures to capture and mitigate stormwater runoff from active, disturbed areas.
2. Provisions for turbidity curtains, silt fences and other measures to limit migration of sediments.
3. Provisions for silt fences or other measures to prevent sediment migration.
4. Diversion of stormwater: The Contractor shall include provisions for controlling stormwater runoff in and around work areas where necessary.
5. Provisions for all other applicable Best Management Practices.

C. Inspection Reports: The Contractor shall conduct inspections and submit inspection reports consistent with requirements of the NYSDEC :

1. Site inspections shall be conducted by the Qualified Inspector.
2. Site inspections are conducted a minimum of once every seven (7) calendar days and twice every seven (7) calendar days for sites with greater than 5 acres of soil disturbance. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.
3. Site inspections are conducted at regular intervals.
4. Inspection reports shall be maintained in a logbook at the site with other required documentation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Materials

1. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must submit modified practices as part of the Contractor's Erosion and Sediment Control Plan, demonstrate equivalence to the technical standard, obtain the Engineer's approval and update the project SWPPP accordingly.

2. Stockpile cover and liner fabric shall be a composite structure of fiber-reinforced polyethylene (RPE) fabric (minimum 20-mils). The fabric shall be inert to biological degradation and naturally encountered chemicals, alkalis and acids. Its permeability coefficient shall be less than 10^{-3} cm/sec.

3. Erosion Control Blanket shall meet the following requirements:

a. Be a type of rolled erosion control product that is fully biodegradable with a functional longevity of a minimum of 12 months.

b. It shall be comprised of weed-and pest free wood fiber, straw, jute mesh or combination thereof, at a minimum unit weight of 10 ounces per square yard and a triple netted layer of biodegradable material.

c. Staples shall be used to anchor the blanket to the bare soil surface.

d. Erosion Control Blanket shall meet the following requirements:

1) Be of a uniform open plain weave of undyed and unbleached single jute yarn averaging 190 pounds per spindle of 14,400 yards. This yarn shall be of a loosely twisted construction having an average twist of not less than 1.6 turns per inch and shall not vary in thickness by more than one-half its normal diameter.

2) The width of the jute mesh shall be approximately 45" or as specified or approved. Jute mesh shall be woven as follows:

a) Approximately 60 warp ends per yard of width;

b) Approximately 40 weft ends per lineal yard.

3) Weight of Jute Mesh shall average 1.44 pounds per square yard (plus or minus 5%).

e. Wire staples: Shall consist of 12-inch lengths of No. 11 gauge wire bent to form a "U", or other wire staples as approved.

f. Wood Pegs: Shall be wedge shaped, approximately one inch by two inches by six inches (1" x 2" x 6”).

4. Compost shall meet the following requirements:

a. Be well decomposed, aerobically composted at least 3 months, with no objectionable odors;

b. Be weed-free, organic matter, containing less than 1%, by dry weight, of man-made foreign materials; and

c. Be in accordance with the Blue Book Table 5.2 - Compost Standards Table, except that the 100% of the material shall pass through the 1/2% sieve.

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 IMPLEMENTATION

A. Turbidity Curtains

B. Turbidity curtain details shown on the Contract Documents is for reference only. The Contractor shall design and submit their own turbidity curtain details to Engineer for review and approval prior to start of any construction activities that may result in turbidity. The Contractor shall provide winter stabilization in accordance with Section 2.38 of the NYS Standards and Specifications for Erosion and Sediment Control (Blue Book). The winter stabilization standards apply to all construction activities involved with ongoing land disturbances and exposure between November 15th to the following April 1st. The Contractor shall provide the following:

1. Snow Management Plan
2. 25 ft. perimeter buffers
3. Tall marker stakes for silt fence
4. 2 rows of silt fence if within 100ft. of a waterbody

5. Clear flow paths to drainage structures
6. Soil stockpiles shall be stabilized
7. Soil stabilization performed daily
8. Provide 2x normal mulching rate

C. The Contractor shall provide soil restoration in accordance with Table 4.6 Soil Restoration Requirements of the Blue Book to the subgrade soil, prior to placement of topsoil or planting materials. The soil restoration standard shall be applied to areas where heavy construction traffic has occurred, or as specified by the Contract Drawings prior to final stabilization. The Contractor shall:

1. Apply 3 inches compost, as specified in Section 2.02.A.4 above, over the subgrade soil.
2. Till compost into the subgrade to a depth of at least 12 inches using a cat-mounted ripper, tractor mounted disc, or tiller, to mix and circulate air and compost into the subsoil.
   a. No light-duty chisel plows shall be used.
3. All stone or rock material greater than four inches shall be removed from the subgrade.

3.03 FIELD TESTING / QUALITY CONTROL

A. Inspection of soil and material stockpiles shall be done daily to ensure the integrity of the cover and liner is maintained.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. The Contractor shall make necessary adjustments to Turbidity, Erosion and Sediment Control Plan as identified during the execution of the works.

END OF SECTION

SECTION 35 56 13.16 EXTRUDED AND MOLDED MARINE FENDERS
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Work to be performed includes providing and installing new marine fender systems as specified herein and as shown on the Contract Documents.

B. The complete assembly for the marine fender system unit shall be as shown on the Plans. Each complete marine fender system unit shall include, but not be limited to the following components:

1. Rubber Element Fender units.
2. Coated steel frontal panels with UHMW-PE protective facing and stainless steel attachment hardware.
3. Galvanized chain assemblies including tension and weight chains.
4. Anchor bolts including bolt templates and inserts for the fender unit, pad eyes, and chains.
5. Spare anchor bolts, nuts, washers, and such necessary hardware that facilitate continuity of the installation, in the case that any of the hardware is accidentally lost in the water while Work is being performed.
6. Coating and galvanizing of steel components per project specifications.

C. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Requirements from the following sections also apply to this Section:

1. Section 05 05 13.01 - Galvanizing
2. Section 05 12 00. - Structural Steel Framing
3. Section 09 91 00 - Painting

1.04 REFERENCES

A. Reference Standards:

1. American Society for Testing and Materials (ASTM) International:

a. ASTM A36 - Standard Specification for Carbon Structural Steel

b. ASTM A123/ A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

c. ASTM A153/ A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

d. ASTM A193/ A193M - Standard Specification for Alloy-Steel and Stainless-Steel Bolting for High-Temperature or High-Pressure Service and Other Special Purpose Applications

e. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength

f. ASTM A413 - Standard Specification for Carbon Steel Chain

g. ASTM A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

h. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

i.	ASTM D297	-	Standard Test Methods for Rubber Products—Chemical Analysis
j.	ASTM D570	-	Standard Test Method for Water Absorption of Plastics
k.	ASTM D638	-	Standard Test Method for Tensile Properties of Plastics
l.	ASTM D785	-	Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials
m.	ASTM D792	-	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
n.	ASTM D1894	-	Standard Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting
o.	ASTM D2000	-	Standard Classification System for Rubber Products in Automotive Applications
p.	ASTM D4020	-	Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
q.	ASTM D6370	-	Standard Test Method for Rubber - Compositional Analysis by Thermogravimetry (TGA)
r.	ASTM F1554	-	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
s.	ASTM F2192	-	Standard Test Method for Determining and Reporting the Berthing Energy and Reaction of Marine Fenders

2. ISO 2781, Rubber, vulcanized or thermoplastic — Determination of density.
3. PIANC MarCom WG33 Report – Guidelines for the design of fender systems.
4. Society for Protective Coatings (SSPC):

a.	SSPC-PS 13.01	-	Epoxy-Polyamide Painting System
b.	SSPC-SP 1	-	Solvent Cleaning
c.	SSPC-SP 10	-	Near-White Blast Cleaning
d.	SSPC-Paint 22	-	Epoxy-Polyamide Paints (Primer, Intermediate, and Topcoat)

1.05 DESCRIPTION

A. Not Used.

1.06 QUALITY ASSURANCE

A. Elastomeric Units:

1. The elastomeric units shall be tested in accordance with the manufacturer's standard practice prior to shipment. Contractor shall bear the cost of all sampling and testing. Test results shall conform to the catalog data within plus or minus 10 percent. The Engineer reserves the right to witness the tests.

2. Performance tests must be conducted on 10% of the fenders delivered but no less than 6 fenders to be selected at random by the Engineer or at the option of the Contractor and approved by the Engineer. A minimum of one fender shall be tested by an independent third-party testing facility with experience in testing rubber marine fenders.

3. The Contractor shall install fenders in accordance with recommendations of fender manufacturer.

4. The fender unit and accessories shall be manufactured by a company with at least 10 years of successful documented experience producing fender units of the type required for this Project.

5. Acceptable suppliers are as follows:

a. Trelleborg Marine & Infrastructure, www.trelleborg.com

b. Shibata Fender Team, https://www.shibata-fender.team/

c. Other approved vendors

B. Welding:

1. All welders shall be qualified by AWS D1.1 or approved equivalent welding code. The Engineer may require evidence of the qualifications of welders.

C. Fabrication:

1. The Engineer reserves the right to perform inspection during shop fabrication and galvanizing.

D. Energy Absorption/Reaction Force Verification (Constant Velocity Method):

1. A minimum of one fender unit of each size provided for this installation shall be selected at random and subjected to uniform axial compression in order to verify the performance specified.

2. The test protocol and temperature of the unit and ambient temperature, at the time of testing, shall be in accordance with ASTM F2192.

3. After at least three break-in cycles to the rated deflection and temperature stabilization of the element, deflect the fender unit once at a constant deflection velocity of 0.8 to 3.15 inches per minute to at least the rated

deflection. Adjust performance results to standard rated temperature of 73 ± 10 degrees F, if required, and to RPD standard velocity of 0.50 feet/sec.

a. The adjusted performance results shall be used to determine if at least the minimum energy and no more than the maximum reaction values specified are achieved within a production tolerance of 10 percent. Failure to meet the specified values shall be cause for rejection.

4. If there is any failure in the initial test lot, then all of the remaining fenders shall be tested and those failing to meet the specified values shall be rejected.

5. Test must be witnessed, and results certified by the fender manufacturer.

6. Test may be witnessed by the Owner's representative if the Owner so elects.

7. Submit test data, tabular and graphical, before delivery of fenders.

E. Break-in Deflection:

1. All fenders for this Project shall undergo break-in deflection. Compress each unit at 0 degree compression angle, three times, to the manufacture's rated deflection at a constant velocity of 2 to 8 cm per minute.

2. Break-in cycle must be witnessed and certified to have been performed by the fender manufacturer.

3. There is no requirement to measure or record the energy absorption or reaction force for this test.

F. Fender Endurance Testing:

1. Manufacturer shall demonstrate fender endurance by performing cyclic fatigue tests on full-size or scale model of each proposed fender type and rubber grade.

2. Test shall be made for axial compression to the rated deflection.

3. There shall be no damage to fender or to the rubber-encased end plates after 3,000 cycles to the rated deflection at a maximum period of 150 seconds.

4. Testing shall have been or must be witnessed by the fender manufacturer. Results must be certified by the fender manufacturer.

5. Submit certified test report with shop drawing submittal. Submittal shall include photographs of the tested fenders before, during, and at the completion of the test.

G. Contractor shall submit PIANC Type Approval Certificate for the type of fenders procured from the manufacturer.

H. One fender frontal frame, chosen at random by the Engineer, shall be pressure tested in the presence of the Engineer at the Project Site. A minimum of 3 psi pressure shall be maintained for 1 hour. If the frontal frame fails to hold this pressure, then all frontal frames shall be tested. All frontal frames that fail shall be

removed, repaired, and retested. Contractor shall provide all necessary plant, labor, materials, and gauges required to perform pressure tests. Cost of tests shall be borne by the Contractor.

I. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contract shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but not limited to) the following activities:

a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

b. Perform visual inspection of welding, as per applicable welding code.

c. Perform visual and dimensional inspection of completed work.

1.07 SUBMITTALS

A. Copies of the following shall be assembled and submitted in a single complete package and reviewed by the Engineer as set forth in Section 01 33 00 – Submittal Procedures. The review and/or approval by the Engineer do not relieve the Contractor of responsibility for compliance with the applicable standards and specifications. All submittals shall be in English with dimensions in U.S. Customary System of units (i.e. feet, inches, pounds). Metric units may be shown for convenience of the fabricator, in addition to the US units, but U.S. units shall control.

1. Design calculations for all fender components including hardware, steel frontal panel chain assemblies and their respective anchorage to concrete. All anchorage calculations shall be performed to ACI 318. Design calculations shall be stamped and sealed by a Professional Engineer licensed in the State of New York.

2. Assembly Plans showing the complete assemblies of fender units, frontal frames, front rubbing pads, chain assemblies, anchor bolts, and inserts.

3. Shop drawings showing the material, size, method of assembly, fabrication details, welding details, coating, and list of material parts for the complete assembly.

4. Welding procedures in accordance with AWS D1.1.

5. Fender unit physical properties and performance curves showing energy and reaction load versus deflection for axial compression and range of

angular loading. Submit test reports validating full-scale fender performance characteristics in accordance with ASTM F2192.

a. Reduction factors for horizontal deflection at design approach angle.

b. All data shall be supported by test results of a full-sized fender.

c. Velocity correction factor, if used, shall be based on the design berthing velocity as indicated on contract drawings.

6. Documentation of maximum coefficient of friction between front rubbing pads and steel.

7. Mill test certificate of the material supplied, including UHMW material certificates signed by material producer, certifying that each material item complies with or exceeds specified requirements.

8. Proposed coating, manufacturer, and product for any coating system element.

9. Safe working load, proof load and breaking load of the chain assemblies.

10. List standards and specifications of each material such as ferrous, elastomeric, plastic and coating.

11. Calculations verifying the design of fender chains, steel frontal panel, mounting hardware, assembly bolts, cast-in / drilled-in anchor sleeves and bolts, and any other load-carrying structural element.

12. Copies of QA/QC data indicating the testing protocol used and the acceptance value(s) of the tests, along with test results for the fenders supplied for this Project.

13. Manufacturer's procedures for installation.

14. Fender Break-in Certification: Submit certification that all fenders have been deflected three times according to these Specifications before delivery to the Project Site.

15. Panel Pressure Testing Certification: Submit certification that panels have been pressure tested according to these Specifications before delivery to the Project Site.

16. PIANC Type Approval certificates.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. The Contractor shall furnish a written warranty certifying that the fender systems furnished are free of defects in material workmanship, and further guaranteeing to

remove and replace, without cost to the Owner, any materials which develop defects within 5 calendar years from the date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fenders shall be provided by:

1. Trelleborg Marine and Infrastructure, www.trelleborg.com/marineandinfrastructure
2. Shibata Fender Team, www.sft.group
3. Or approved equal

2.02 MATERIALS / EQUIPMENT

A. The rubber for the proposed fender to be new vulcanized natural or synthetic rubber or a mixture of them. The fender(s) shall be reinforced with carbon black and resistant to aging, seawater, abrasion, and ultraviolet rays. A test report accompanied by a certificate of conformance showing compliance with the rubber properties shown below shall be provided before the fenders arrive on the jobsite.

B.

Test	Standard	Value
Density	ISO 2781	Max 73.7 lb/cu.ft.
Polymer (rubber)	ASTM D6370	Min 45%
Carbon Black	ASTM D6370	Min 20%
Inert oe extending filler	ASTM D297	Max 5%
Rubber filler ratio (ratio of polymer% to (ash content % + carbon black %)		> 1: 2

C. The rubber is to be homogenous in quality and free from foreign materials, bubbles, tears, cracks, and other harmful defects. The unvulcanized rubber compound used to mold the fenders must be produced specifically for this project. No recycled, regenerated, or off-spec rubber shall be used for any part of the rubber used to manufacture the fenders. Manufacturer shall submit a certificate of conformance stating the unvulcanized rubber used meets this requirement.

D. The embedded fixing steel plates are to be firmly bonded into the rubber body through the process of vulcanization, and completely encapsulated so that no steel is exposed except where female bolting nuts are present.

E. It is the responsibility of the Contractor to verify that the fender system installed meets or exceeds the following criteria:

1. Fender unit shall be a single unit capable of absorbing the design energy and at a maximum reaction indicated. Fender size selection shall be based on the energy capacity at the rated deflection with the appropriate

corrections for the combined effect of angular berthing, temperature, horizontal deflection of the fender unit and manufacturing tolerance of -10%. The rated deflection of the fender unit shall be as specified in the manufacturer's submission.

2. Fender Standoff Dimension: Total standoff measured from face of wharf to face of UHMW fender panel shall be as indicated on contract drawings.

3. Mounting Footprint: Fenders must fit on the structural element indicated such that no anchor bolt is located closer than 12 inches from a free surface and no portion of the rubber unit is within 4 inches of a free surface.

4. Calculations for concrete anchor bolts and other mounting hardware shall take due consideration of concrete edge effects and other factors which may affect anchor performance.

F. Rubber Fender Unit:

1. Each fender unit system shall be capable of absorbing a horizontal shearing force equal to no less than 20 percent of its rated normal reaction while simultaneously absorbing minimum design impact energy without exceeding the specified maximum reaction.

2. Minimum Energy Absorbed: 84 kip-feet (114 kiloNewton-meter) per unit element fender.

3. Maximum Reaction: 104 kip (463 kiloNewton) per unit element fender at above rated energy.

4. Fender element rubber shall conform to one of the following line callouts as defined by ASTM D2000:

a. 3BA620 A14, B13, C12, F17, or;

b. 3BA720 A14, B13, C12, F17.

5. Metal insert plates for bolting shall be embedded in and bonded to the elastomer, being completely encased in rubber for corrosion protection.

G. Structural steel shapes and plates shall conform to ASTM A572 Grade 50.

H. Chain shall be of welded steel conforming to ASTM A413.

I. High-strength bolts shall conform to ASTM A325, unless noted otherwise.

J. Stainless steel bolts shall conform to ASTM A193, Grade B8M.

K. The rubbing pads for single unit fender shall consist of standard sizes, engineered synthetic resin material (UHMW polyethylene), optimized for minimum friction, abrasion, and gouging.

1. The UHMW panels shall be detailed for easy removal for maintenance purposes.

2. Pads shall be comprised of virgin ultra-high molecular weight (UHMW) polyethylene resin and/or ground UHMW polyethylene chips complying with ASTM D4020 standards.

3. Properties of UHMW shall conform to the following:

Property	Test Method	Value
Color	B	Black
Specific gravity	ASTM D792	0.93 mm
UV stabilization		2.5% carbon black and stabilizer
Impact strength with V-notch	ASTM D256	Method A, 20 ft-lbs/notch minimum
Coefficient of friction	ASTM D1894	0.20 maximum
Tensile strength	ASTM D1894	2,760 psi minimum
Ultimate strength	ASTM D638	5,600 psi maximum
Elongation at break	ASTM D638	350% minimum
Shore hardness	ASTM D785	64 to 66 Shore D
Water absorption	ASTM D570	0.1% maximum

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Fabrication

1. Frontal Frame and Front Rubbing Pads:

a. Design and fabrication of the frontal frame shall conform to AISC 360. Frontal frame shall be designed to withstand the maximum reaction developed by the fender unit including the simultaneous application of a friction force (no less than 30 percent of the maximum fender reaction) in either vertical or horizontal direction and the actual hull pressure at the basic allowable stress levels as specified in AISC 360. No increase in allowable stresses is permitted. The design shall consider the full range of vessel at the dock at different loading conditions and tide levels. The panel design shall take into account any crushing (line) forces that are generated by beltings of a vessel. Fender panels shall be coped to present snagging or catching due to the presence of beltings.

b. Frontal frame shall consist of structural steel shapes and plates continuously welded at all joints. All welding and welded joint details shall conform to AWS D1.1. All faying surfaces shall be seal

welded. Steel framework shall be fully enclosed utilizing box construction, with no framing members exposed to the atmosphere.

c. Pad eyes shall be provided for lifting and chain attachment and shall be designed in accordance with the requirement of AISC standards. Sufficient lifting pad eyes shall be provided to allow easy handling and the frame shall have sufficient rigidity and strength to avoid damage during handling and installation.

d. Structural steel shall have a minimum thickness of 3/8-inch.

e. Frontal frame shall include front rubbing pads to be attached to the frame by stainless steel bolts, nuts and washers. Bolt head shall be countersunk a minimum of 3/4 inch from the face of the pad. Rubbing pads at the perimeter of the frame shall be chamfered. The size of the rubbing pad sections shall be such that they can be handled easily by one worker for future replacement. If closed, water tight panel assembly is used, a water sealant compound shall be applied on all bolt thread connections.

f. Minimum fillet weld size shall be 3/8 inch.

2. Tension Chains and Weight Chains:

a. The chain assemblies shall consist of shackles, turnbuckles, and chain. The Contractor shall furnish all hardware required for attaching the chain assemblies to the fender frontal frame, and the concrete edge beam. All links and connecting hardware shall have the capacity exceeding 125 percent of the ultimate strength of the chains.

b. Chain assemblies shall be designed to satisfy the following requirements:

1) Working loads shall be within the rated capacities for safe working loads or within allowable AISC stresses. No increase in allowable stress is permitted. The proof load shall be greater than 2 times the required working load. The breaking load shall be greater than 3 1/3 times the required working load.

2) The working load of each pair of weight chains shall be designed to support half the weight of the fender unit and the full weight of the frontal frame with all attachments, plus the downward friction due to 30 percent of the maximum reaction.

3) The working load of each pair tension chain shall be designed to support a maximum force generated by a vessel contacting the panel at lowest part of the fender panel. Tension chains shall be arranged such that the fender unit will not be subjected to excessive tension.

4) The Contractor shall verify that chains, pad eyes, bolts, pins, and shackles are consistent and compatible.

3. Other Hardware:

a. Fender unit concrete anchors shall be designed to remain intact when any other component fails.

b. Inserts shall not interfere with the reinforcing steel or other attachments provided for other purposes. The anchors shall be located to maintain a minimum clearance of 12 inches from the nearest edge of the concrete.

B. Protective Coating

1. Galvanizing:

a. All hardware including chain assemblies, except stainless steel items, shall be hot dip galvanized to ASTM A123 or ASTM A153, except that threaded parts may be mechanically galvanized in accordance with the materials standard for the part.

b. Welded assemblies shall be galvanized after welding. Bolted assemblies shall have all components galvanized separately prior to assembly.

2. Coating:

a. All exposed steel surfaces other than stainless steel and galvanic surface shall be painted in conformance with the project specifications, subject to approval by the Engineer.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Installation - General

1. Installation methods shall be in accordance with the fender supplier's recommendations. Fender supplier shall supply a minimum of eight wooden or four steel templates to the Contractor. The templates shall locate all items embedded in the concrete.

2. The use of canvas slings, wood cradles, or other protective devices, or other means recommended by the fender unit manufacturer shall be used. Hoisting and slinging by the rubber section may be permitted only when approved by the fender unit manufacturer, but caution is required to avoid

cutting or wearing the rubber. Any unit damaged shall be replaced at the Contractor's expense. Repair of torn rubber is not permitted.

3. After installation, all lifting pad eyes shall be completely removed and the resulting exposed metal surface shall be coated in conformance with Section 05 05 13.01 – Galvanizing.

B. Installation of Fenders

1. Install fender units as indicated on approved shop drawings and in accordance with manufacturer’s instructions.

2. As indicated on the drawings, fender cast-in anchors (threaded inserts and studs for fenders and associated hardware) are intended to be cast into the CIP concrete. Post-installed anchors are intended to be installed into existing concrete.

3. Under no circumstances shall critical reinforcing bars be cut to allow anchor installation for the fenders. Reinforcing steel shall be located using a pachometer or similar device prior to drilling holes. Drill holes using a bit which will not damage reinforcing steel.

C. Fender Supplier’s Services

1. A representative from the fender supplier shall perform the following work at the jobsite.

a. A minimum of 2 days to provide technical direction to work on proper installation techniques and procedures, during or just prior to installation of the first fender units.

b. A minimum of 1 day to provide visual inspection of completed installations for conformance with installation procedures.

c. Within 5 working days after the completion of fender installation, submit written documentation to confirm that all fender system and components have been installed in accordance with all Contract Documents and to the satisfaction of the supplier.

2. Contractor shall bear the cost of transportation, meals, lodging, and other associated costs of the representative.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 35 59 33 – MOORING BOLLARDS AND CLEATS
CONTRACT NR-107

PART 1 GENERAL

1.1 SUMMARY

A. The Contractor shall furnish all equipment, materials, and services for the safe removal of existing mooring bollards and cleats from facility, shipment of bollards to paint shop, cleaning of rust and existing paint from bollards, inspection for cracks and other defects on bollards, documenting condition of bollards, re-painting per Section 09 91 00 “Painting”, protection of re-painted bollards for transportation, delivery of repainted bollards to the site, supplying anchor bolts, nuts, and washers as indicated on the contract drawings, drilling bolt holes on concrete pedestals, installation of anchor bolts per chemical anchor manufacturer’s specification, and grouting bollard base. The Contractor shall install new mooring cleats as shown on the Contract Drawings complete with shop paint, anchor rods to be post installed using adhesive anchorage system, nuts and washers.

B. Unless otherwise shown, specified, or required, work shall conform to or exceed the applicable requirements of the documents listed hereinafter in Article “References” included in this Section to the extent that the provisions of such documents are not in conflict with the requirements of this Section.

C. The following index of this Section is presented for convenience:

D.

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1.2 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.3 RELATED SECTIONS

A. Requirements from the following sections also apply to this Section:

1. Section 03 60 00 - Grouting
2. Section 05 05 13.01 - Galvanizing
3. Section 05 05 23.02 - Miscellaneous Metal Fastenings
4. Section 09 91 00 - Painting

1.4 REFERENCES

A. Reference Standards:

1. ASTM:
   a. ASTM A27 - Standard Specification for Steel Castings, Carbon, for General Application
   b. A36 - Carbon Structural Steel.
   c. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   d. A143 - Standard for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
   e. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   f. A563 - Carbon and Alloy Steel Nuts.
   g. F436 - Hardened Steel Washers, Inch and Metric Dimensions.
   h. F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
2. F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners New York City Building Code (NYCBC)
3. American Concrete Institute (ACI)
   a. ACI 318 - Building Code Requirements for Structural Concrete and Commentary

4. American Institute of Steel Construction (AISC):
   a. Steel Construction Manual
5. Steel Structures Painting Council (SSPC)
   a. SSPC SP 10 - Near White Blast Cleaning
   b. SSPC QP3 - Shop Painting

1.5 DESCRIPTION

A. Products
   1. Items for incorporation in the Work, purchased by Contractor for the Project.
   2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
   3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

B. Bollard: A cast steel product installed on marine facilities to enable tying of mooring lines from vessels to the structure to secure them against vessel movements due to winds, waves, and currents. In this Section, bollard refers to mooring bollards that are currently installed on the Sludge Dock.

C. Anchor Bolt: Threaded or plain steel bars with threads for nuts installed in concrete to secure equipment and items.
   1. Cast-in-place anchor: Anchors installed when concrete is fresh.
   2. Post-installed anchor: Anchors installed in hardened concrete by drilling and grouting.

1.6 QUALITY ASSURANCE

A. Paint shop performing bollard cleaning and re-painting shall be SSPC QP3 certified.

1.7 SUBMITTALS

A. Product Data:
   1. Grout, including compressive strength test data.
   2. Mill certificates for all anchor bolts and anchorage hardware.
   3. Coating system data sheets.
   4. Product data sheets for anchor bolt epoxy grout.

B. Mooring Cleat Shop Drawings and Certifications

1. Submit complete bills of materials. Provide plans, elevations, sections, and details necessary for anchorage, installation details, and procedures so work can be accomplished without reference to contract documents. Indicate thicknesses and dimensions; and show construction details, reinforcement, anchorage, and installation details relative to the Sludge Dock where the cleats will be installed. Include complete details of cleat coating systems per Section 09 91 00.
2. Submit manufacturer's calculations and certification showing mooring cleat is suitable to meet or exceed nominal working capacity of 35 tons, applied 0 to 90-degrees horizonal and -30 (down) to +30-degrees (up) vertical with respect to the Sludge Dock.
3. Submit manufacturer's certification for mooring cleats showing grade of casting and compliance with ASTM A27/A27M

1.8 DELIVERY, STORAGE, AND HANDLING

A. Structural members shall be loaded in such a manner that they may be transported and unloaded without being over-stressed, deformed or otherwise damaged.

1.9 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Provide 10% spares for anchor bolts, nuts, and washers.

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. Not Used

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Mooring cleats shall be as shown on the Contract Documents and manufactured by one of the following manufacturers:
1. ShibataFenderTeam Inc., 44084 Riverside Parkway, Lansdowne, VA 20176
2. Trelleborg Marine and Infrastructure, 532 Jack Enders Blvd, Berryville, VA 22611
3. J.C. MacElroy Company Inc., 91 Ethel Road West Piscataway, New Jersey 08855
4. Approved Other.

2.2 MATERIALS / EQUIPMENT

A. Anchor bolts for both mooring bollards and cleats shall conform to ASTM F1554, Grade 105.
1. Anchor bolts and hardware shall be hot dipped galvanized conforming to ASTM A153.

B. Heavy Hex Nuts shall conform to ASTM A563, and zinc coated by the hot dipped process conforming to ASTM F2329.

C. Washers shall confirm to ASTM A36 or ASTM F436, and hot dipped galvanized conforming to ASTM A123.

D. Grout: Grout used under and about the bollard base shall be a shrinkage compensated non-metallic, non-gas liberating, flowable, prepackaged aggregate cementitious grout requiring only the addition of water. Comply with Section 03 60 00 “Grouting”.

E. Mooring Cleats

1. Mooring cleats shall be fabricated from ASTM A27 Grade 65-35 minimum.

2. Mooring cleat anchorage to concrete based shall be per cleat manufacturer’s guidelines. Cleat anchor bolts shall be made from ASTM F1554 Gr 105 steel meeting Supplementary Requirements S2, S3, and S4, and hot dip galvanized. Provide heavy hex nuts conforming to ASTM A563/A563M Grade DH, and round hardened washers conforming to ASTM F436 unless other nuts and/or washers are recommended by the fitting manufacturer.

2.3 FABRICATION / ASSEMBLING / FINISHES

A. Comply with Section 09 91 00 “Painting”.

B. Bollard and cleat color shall be “Safety Yellow”.

2.4 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.1 EXAMINATION / PREPARATION

A. Field Measurement

1. 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.

2. The Contractor shall review the Contract Drawings and any discrepancies shall be reported to the Engineer for clarification prior to starting fabrication.

3.2 IMPLEMENTATION

A. Removal of Bollards

1. Remove bollard anchor bolt nuts and lift bollards off deck.

2. Cut embedded anchor bolts flush with bollard pedestal and grout per details provided in contract drawings

3. Repair any defects to bollard bases per details provided on Contract Drawings.

4. Protect removed bollards from damage during shipment to the paint shop.

B. Painting of Bollards

1. Bollard coating shall be per Section 09 91 00 “Painting.”

2. Bollards shall be cleaned of any paint and rust to bare metal. Follows SSPC SP 10.

3. The Contractor shall correct such work as found to be defective under this Article of the Sections.

C. Installation of New Anchor Bolts for Bollards

1. Use mooring bollard bolt holes to make a template of bolt pattern to install new anchor bolts precisely.

2. Drill holes to diameter and size shown on Contract Documents on repaired bollard concrete base. Avoid drilling on embedded remnants of anchor holts.

3. Roughen drilled hole surface with mechanical tools.

4. Clean drilled hole with compressed air. Remove all dirt and dust. Drilled hole shall be dry prior to installation of anchor rod.

5. Fill anchor hole with epoxy and insert anchor bolt in rotating manner to ensure epoxy fills threads.

6. Protect anchor bolt from movement until epoxy sets.

7. Follow epoxy manufacturer’s instructions for proper installation.

D. Placement of Re-painted Bollards

1. Slowly place mooring bollard on anchor bolts. Avoid pulling, pushing anchor bolts during placement.

2. If any anchor bolt is damaged during placement of bollard, re-install damaged anchor bolt.

E. Grouting of Bollards

1. Bollard base shall be accurately set to the designated levels on steel wedges or angle screeds in preparation for grouting under this Section.

2. Prior to the placement of non-shrink grout beneath bollard, the bottom surface of the bollard shall be cleaned of all foreign materials, and concrete bearing surface shall also be cleaned of all foreign materials and roughened to improve bonding.

3. Anchor bolts shall be tightened after the bollard has been positioned and plumbed and the non-shrink grout has attained its specified strength.

4. Bollards shall be grouted with non-shrink grout to assure full uniform bearing.

F. Galvanizing

1. Anchor bolts, nuts, and washers shall be galvanized.

G. Installation of Mooring Cleats

1. Anchorage of mooring cleats to concrete deck shall be with adhesive anchors and per cleat manufacturer's directions for anchorage. Use an anchor bolt template to drill for anchor bolts on concrete deck accurately. Drilling, cleaning, and application of adhesive anchorage system shall be per adhesive anchor manufacturer's directions. Refer to Section 05 05 23.02 - Miscellaneous Metal Fastenings.

2. Install cementitious grout completely under each mooring cleat. Refer to Section 03 60 00 – Grouting cementitious grouting.

3. Check and tighter nuts snug tight, and nick threads to lock the nuts in place.

4. Fill anchor rod and nut recesses in the cleat base with epoxy grout, finished flush with the fitting surface. Refer to 03 60 00 - Grouting for epoxy grouting.

5. After installation is complete, clean and touch-up paint per Section 09 91 00 - Painting.

3.3 FIELD TESTING / QUALITY CONTROL

A. Epoxy anchor bolts shall be tested according to the contract technical specifications of section 05 05 23.02 – "Miscellaneous Metal Fastenings".

3.4 STARTUP / DEMONSTRATION

A. Not Used

3.5 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to install all exposed piping complete and operational.

B. The following index of this Section is presented for convenience:

C.

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 12 00 – Structural Steel Framing.

B. Section 40 05 05.30 – Leakage Testing for Exposed Piping.

C. Section 40 05 06 – Couplings, Adapters, and Specials for Process Piping.

D. Section 40 05 07 – Hangers and Supports for Process Piping.

E. Section 40 05 53 – Process Valves Four-inch Diameter and Larger.

F. Section 40 06 01 – Schedule for Exposed Piping.

1.04 REFERENCES

A. Definitions:

1.	Buried Piping:	Includes all piping beginning at the outside face of a structures or foundation and extending away from structures. Buried piping includes piping beneath structures or foundations.
2.	Exposed Piping:	Includes all piping beginning at the outside face of a structures or foundation and extending inside. Exposed piping includes interior piping. Exposed piping also includes all piping embedded in concrete, as well as all piping that is permanently or intermittently submerged and/or installed in a subaqueous environment. This includes installation of the temporary sludge line.

B. Reference Standards:

1.	ANSI/SMACNA	Seismic Restraint Manual.
2.	ASME	Boiler and Pressure Vessel Code.
3.	ASME B1.1	Unified Inch Screw Threads.
4.	ASME B31.1	Power Piping.
5.	ASME B31.3	Process Piping.
6.	ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
7.	ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.
8.	ASTM B32	Standard Specification for Solder Metal
9.	ASTM D2564	Standard Specification for Solvent Cements for PVC Plastic Piping Systems.
10.	ASTM D2855	Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining PVC or CPVC Pipe and Piping Components with Tapered Sockets.

11.	ASTM F493	Standard Specification for Solvent Cements for CPVC Plastic Pipe and Fittings.
12.	ASTM F656	Standard Specification for Primers for Use in Solvent Cement Joints of PVC Plastic Pipe and Fittings.
13.	AWWA C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
14.	AWWA C206	Field Welding of Steel Water Pipe.
15.	AWWA C600	Installation of Ductile-Iron Mains and Their Appurtenances.
16.	AWWA C606	Standard for Grooved and Shouldered Joints.
17.	AWWA M11	Steel Pipe: A Guide for Design and Installation,
18.	AWWA M23	PVC Pipe – Design and Installation.
19.	AWWA M41	Ductile-Iron Pipe and Fittings.
20.	DIPRA	Installation Guide for Ductile Iron Pipe.
21.	NSF61	Drinking Water System Components Health Effects.

1.05 DESCRIPTION

A. This scope of this Section includes the requirements for the installation of exposed piping, except where installation requirements for exposed piping are shown or specified elsewhere in the Contract Documents. In addition:

1. The scope of this Section includes requirements for:

   a. The jointing of exposed piping

   b. The installation of gasket materials, specials, flexible couplings, mechanical couplings, harnessed and flanged adapters, sleeves, and tie rods.

   c. Modifications and/or adjustments to existing exposed piping.

   d. The installation of supports, restraints, and other anchors.

   e. The cleaning, disinfecting, and field testing of all exposed piping.

2. The extent of exposed process piping is shown on the Contract Drawings. The Contractor shall provide additional exposed pipe as necessary and/or required to complete the Work as shown and specified. Exposed pipe service, pipe diameter, coating, lining, pressure rating, joint type, and testing requirements are specified in the following section(s):

   a. Section 40 06 01 - Schedule for Exposed Piping.

3. Where shown on the Contract Drawings, the Contractor shall provide all labor and materials for making connections between exposed piping and

existing lines(s) installed under other contracts, including all specials required to connect exposed pipe to pipe of dissimilar material(s).

1.06 QUALITY ASSURANCE

A. Ductile Iron Pipe:

1. Refer to the latest edition of the DIPRA Installation Guide for Ductile Iron Pipe and the ductile iron piping manufacturer recommendations.

a. Where requirements from the manufacturer, requirements specified by the DIRPA Installation Guide, and requirements specified herein differ, apply the most stringent requirement of the three.

B. Steel Pipe:

1. Welding of steel pipe and fittings:

a. Welding procedures and welder qualifications shall conform to ASME Boiler and Pressure Vessel Code Section IX.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. Exposed piping submittals shall be submitted under the specification section number corresponding to the exposed piping material. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Shop Drawings:

1) Catalog cuts and data sheets, including but not limited to:

a) Specifications for all components of the exposed piping.

b) illustrations in sufficient detail to serve as a guide for assembly and disassembly

c) A parts schedule that identifies the materials to be used for the various piping components and accessories.

d) Weights of all component parts.

e) Details on joining methods.

f) Details of pipe lining, coating, wrapping, insulation and painting.

g) Copy of pipe coupling, special, and adapter details (pipe couplings, specials, and adapters shall be submitted for approval under Section 40 05 06 - Couplings, Adapters, and Specials for Process Piping).

h) Copy of expansion joint details (expansion joints shall be submitted for approval under the specification section in which they are specified)

i) Copy of pipe hanger details (pipe hangers shall be submitted for approval under Section 40 05 07 - Hangers and Supports for Process Piping).

b. Layout and Installation Drawings:

1) Shall include plans, sections, and details showing location, elevations, and clearly marked dimensions.

2) Piece numbers which are coordinated with the tabulated pipe layout schedule shall be clearly marked.

3) The scale used shall be the greater of the following two (2):

a) The scale used on the Contract Drawings that depict the process pipe for which the submittal pertains, or

b) A minimum scale of ¼-in = 1-ft - 0-in.

4) When special designs or fittings are required, the work shall be shown in large detail and the special or fitting completely described and dimensioned.

5) Include a north arrow.

6) Information on pipe supports, including:

a) Pipe support location.

b) Pipe support type.

c) hanger rod size.

d) Insert type.

e) All loads on the support (in either lbs. or kips.)

7) Locations where pipe and valve identification signs will be placed.

8) Location of pipe couplings, specials, and adapters.

9) Location of expansion joints.

10) Locations of pipe hangers and supports.

11) Extent of pipe insulation and heat tracing.

12) Extent of lining, wrapping, and coatings.

c. A tabulated pipe layout schedule for each exposed process pipe system. Submit a separate schedule for each pipe system and/or service. The pipe layout schedule shall include the following

information for each pipe section, fitting, and appurtenance that comprises that system:

1) Service.

2) Pipe size.

3) Working pressure.

4) Weight (in lbs.)

5) Joint type.

6) Wall thickness.

7) Piece number.

8) Laying length.

d. Calculations for the design of the support structures.

1) Design calculations shall be signed and sealed by a Professional Engineer registered in the State of New York.

2) Calculations shall include a summary of design criteria used in the design, including a description of each load case and load combination considered.

3) A tabulation shall be provided indicating vertical and horizontal deflections for the supports and individual members, determined for each load combination identified above.

4) A tabulation shall be provided giving the column vertical and horizontal reactions for each load combination.

e. For each exposed process piping system that contains expansion and swing joints, submit EMA calculations. Submit separate calculations for each pipe system and/or service.

f. For each exposed process piping system that contains valves, submit a tabulated valve schedule. Submit a separate schedule for each pipe system and/or service. The valve schedule shall include the following information for each valve:

1) Valve tag number.

2) Valve size.

3) Whether the valve is manual or actuated. If actuated, the type of actuator.

4) 100% open Cv value for control valves.

5) Upstream pressure (units of psig).

g. For steam piping, submit a trap schedule that includes:

1) Trap size.

2) Location and service.

3) Equipment tag number.

4) steam pressure (units of psig).

5) capacity required (units of lbs/h).

6) maximum capacity with safety factor.

7) Model number.

2. Information Submittals:

a. Certified Letters of Compliance:

1) Certificate of compliance with the requirements of the Contract Documents for pipe, fittings, couplings, sleeves, cleanouts and harnessing.

2) Certificate from an independent testing laboratory, approved by the City, for each welder assigned to the welding of pipe, fittings, and pipeline equipment.

3) Linings and Coatings:

a) Manufacturer shall submit a certificates or copies thereof attesting to the fact that the applicator met the requirements of the corresponding piping specification, adherence to all standards and testing specified therein, and that the material used was as specified therein.

4) Materials Certificates of Conformance: Submit certificates of conformance with Referenced Standards specified in the corresponding piping specification section.

b. Welding Procedures and Qualifications:

1) Certificates shall be of current issue and conform to the requirements of the applicable reference standards. In addition:

a) Certificates that all welders and welding operators have been qualified in accordance with ASME Boiler and Pressure Vessel Code Section IX.

b) Certificates stating that the welding of steel and stainless steel shall conform to the requirements of ASME B31.1.

2) Copies of qualified procedures and list of names and identification symbols of qualified welders and welding operators, prior to welding operations.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Structural Attachments:

1. Structural steel brackets required to support piping and appurtenances but not shown on the Contract Drawings shall be provided under this section.

2. Material for structural attachments shall be as specified under Section 05 12 00 - Structural Steel Framing.

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. All pipe coating injured in any way during transit or laying shall be satisfactorily repaired prior to placing the backfill.

1. Ample provision shall be made for the prompt and efficient repair of all abrasions and injuries.

B. Certificates of welding qualifications conforming to the requirements of ASME B31.1, Section 6 and its Supplements, shall be submitted to the Engineer for approval prior to proceeding with any pipe welding.

3.02 INSTALLATION

A. General:

1. All piping shall be erected to accurate lines and grades, permanently supported as shown, specified, or required.

2. Where temporary supports are used during construction, sufficient strength and rigidity shall be provided to prevent shifting or distortion of the pipe.

3. All work shall be accomplished using the best methods and procedures of recognized pipe fabrication in a good and workmanlike manner in accordance with the latest edition of the applicable standards referenced in the Contract Documents, including (but not limited to):

    a. For ductile iron pipe:

        1) AWWA C600.

        2) AWWA M41.

    b. For steel and stainless steel pipe:

        1) ASME B31.3.

        2) AWWA C206.

        3) AWWA M11.

    c. For thermoplastic pipe:

        1) AWWA M23.

4. All exposed pipe, fittings, and appurtenances shall be installed in accordance with all of the following:

    a. The manufacturer's printed instructions and recommendations.

    b. The approved shop drawings.

    c. As specified in the Contract Documents.

5. Routing:

    a. Install piping in a neat manner with lines straight and parallel or at right angles to walls or column lines, unless otherwise shown on the Contract Drawings.

        1) Install horizontal lines true to line and elevation.

        2) Install vertical lines truly plumb in all directions.

    b. Where practicable, install piping in groups and parallel to building walls.

    c. Avoid installing piping through ductwork or directly under electric light outlets, or interfering with other pipe, lines, conduit, etc.

    d. Leave all corridors, walkways, work areas, and similar spaces unobstructed.

    e. Clearance:

        1) Clearances shall be measured from the outermost edge of piping, flanges or other type of joint that extends beyond the nominal outside diameter of piping.

2) Provide a minimum clearance of 1-in. between pipe and other work.

3) Avoid installing pipe beyond furring lines as determined by the Architectural Drawings.

4) Provide a minimum headroom clearance under piping and pipe supports of 7.5 ft.

f. Small diameter piping and/or piping not shown on the Contract Drawings:

1) If specific locations and elevations are not shown on the Contract Drawings, install small diameter piping as specified herein, and as necessary and required to avoid ducts, equipment, beams, and other obstructions.

g. Multiple Pipe Runs:

1) In the support of multiple pipe runs on a common base member, a clip or clamp shall be used where each pipe crosses the base support member.

2) Spacing of the base support members shall not exceed the hanger and support spacing required for any individual pipe in the multiple pipe run.

6. Placing:

a. Install bell and spigot pipe so that bells face the direction of laying, unless otherwise shown on the Contract Drawings.

b. For coated pipe, care shall be exercised in laying and cradling the pipe to prevent injury to the coating.

7. Cuts:

a. Use cutting methods and machines specially designed for cutting the pipe material and approved by the manufacturer. The following cutting methods are not acceptable:

1) "Squeeze" type pipe cutters

2) Cutting torches

3) Diamond points

4) Dog chisels.

b. Pie Lengths:

1) Full standard lengths of pipe shall be used in each pipe run in so far as possible.

2) Shorter lengths than standard shall be used only to complete a straight run of pipe, to connect to established locations of valves, equipment, bends, and the like.

3) Random lengths of pipe or cuttings from standard lengths shall not be coupled together when a full standard pipe length will fit in the pipe run.

c. Pipe shall be cut square, and not upset, undersized, or out of round, except as follows:

1) Cut ends of push-on joint type pipe shall be tapered and sharp edges filed off smooth.

d. Ends shall be carefully reamed and cleaned before being installed.

e. Make cuts carefully without damage to coatings or linings.

8. Jointing:

a. Thoroughly clean all pipe, fittings, valves, specials, and accessories before jointing.

1) Remove all cuttings and foreign matter from inside of pipe and tubing.

2) Clean joining area of pipe, fittings, and appurtenances as necessary and required and as per manufacturer instructions.

a) For cleaning pipe ends, solutions such as detergents and solvents, when required, shall be used in accordance with manufacturer's recommendations.

b. Use jointing methods recommended and approved by the pipe manufacturer.

c. Unions:

1) Provide a union downstream of each valve with screwed connections.

2) Provide screwed or flanged unions at each piece of equipment, where shown, and where necessary to install or dismantle piping.

d. Transitions from One Type of Pipe to Another:

1) Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

2) Connections between Dissimilar Metals:

a) Provide dielectric couplings, insulating couplings, unions, or other approved dielectric insulating devices, at all connections to pipelines or equipment of dissimilar metals, regardless of whether devices are shown on the Contract Drawings.

9. Bends and Turns:

a. Do not spring or deform piping to make up joints.

b. Bending of pipe is not permitted.

1) Use fittings for all changes in direction.

c. Bends shall be of 45° or 90° unless otherwise shown on the Contract Drawings.

10. Plugs:

a. Shall match the materials, linings, and coatings of the process piping, and shall have a square head.

11. Transitions:

a. Reducing fittings shall be used for all changes in pipe sizes, even when not specifically shown on the Contract Drawings.

1) Unless otherwise shown or specified, use eccentric reducing fittings.

b. Do not use bushings, except where specifically shown on the Contract Drawings.

c. Nipples shorter than 4-in in length shall be Schedule 80.

d. Between pressure ratings:

1) Where lines of lower service rating tie into services, appurtenances, or equipment of higher service rating, the equipment, valve, or appurtenance between the two shall conform to the higher rating.

12. Drainage:

a. The Contractor shall provide all pipelines with a means for drainage at all low points in the lines.

1) Provide appurtenances for condensate drainage, regardless of whether such means is shown on the Contract Drawings and/or the approved shop drawings.

2) Drainage from gas lines shall be provided through an approved, double-valved, manually operated condensate trap.

b. Drainage valves and appurtenances shall be:

1) A minimum of 1-in. nominal diameter, unless otherwise shown on the Contract Drawings.

2) Adequately sized.

3) Of the same size as the drain pipeline specified herein.

c. Where drainage valves or appurtenances are located so that liquids can discharge and cause damage to a structure or equipment, the Contractor shall provide drain pipe to the nearest gutter or drain.

1) Provide a single drain pipe, matching the size of the drain valve and appurtenances, for each drain valve on the carrier pipe.

2) Unless otherwise shown on the Contract Drawings, the drain pipe shall be of Schedule 80 CPVC conforming to the requirements of Section 40 05 31, Thermoplastic Process Pipe and the installation requirements for thermoplastic piping specified herein.

3) A quick connect coupling shall be provided at the end of the drain line for attachment of a hose.

13. Venting:

a. The Contractor shall provide all pipelines for liquids with vents at all high points in the lines.

1) Provide vents regardless of whether vent valves are shown on the Contract Drawings and/or the approved shop drawings.

b. Vents shall consist of the following three (3) components:

1) An automatic air release/vacuum relief valve.

a) The valve shall have a cast or ductile-iron body and cover, stainless steel internals, and Viton or Buna N seal, unless otherwise specified.

2) An outlet vent line.

a) The outlet vent line from the valve shall be of Schedule 80 CPVC conforming to the requirements of Section 40 05 31, Thermoplastic Process Pipe and the installation requirements for thermoplastic piping specified herein.

b) Vent line shall terminate at a point approximately 3 ft above the floor.

3) An isolation ball valve:

a) A ball valve shall be provided between the carrier pipe and the automatic air/vacuum release valve to allow removal of the automatic air/vacuum release valve for repair or replacement.

b) The body of the isolation valve shall be:

(1) For vents < 4-in.: Type 316 Stainless Steel.

(2) For vents ≥ 4-in.: The same material as the body of the automatic air/vacuum release valve.

c. Sizing:

1) For carrier pipelines ≤ 1-in.: Vents shall be the same size as the carrier pipe.

2) For carrier pipe > 1-in.: Vents shall be the size shown on the Contract Documents or 1-in., whichever is greater.

d. Vent valves (both the automatic air/vacuum release and isolation valve) shall meet the requirements of one (1) of the following Sections, depending on the size of the vent valve:

1) Section 40 05 53 - Process Valves Four-inch Diameter and Larger.

14. Drip Pans:

a. The Contractor shall provide drip pans under all pipelines installed over electrical equipment and motors and conduct drainage to the nearest floor drain, gutter, or other drainage system with ¾-in. red brass pipe and installed as specified herein.

b. Make the connection between the drip pan and the brass drain pipe leak-tight.

c. Pitch the drip pan uniformly toward the drain pipe at a slope not less than ⅛-in. per lineal ft.

15. Insulation:

a. Refer to Section 40 06 01 - Schedule for Exposed Piping, and the Contract Drawings for the extent of insulated exposed piping.

b. Insulation shall be installed after the installation and testing of exposed piping.

16. Hangers and Supports:

a. Install pipelines with supporting devices in accordance with requirements of Section 40 05 07 - Hangers and Supports for Process Piping.

b. No piping shall be supported from metal stairs, ladders and walkways.

17. Restraints, Supports, and Thrust Blocks:

a. Provide concrete and metal cradles, collars, kickers, and blocks as shown on the Contract Drawings.

18. Seismic Requirements:

a. All piping and attached valves shall be supported and braced to resist seismic loads and in accordance with the SMACNA Seismic Restraint Manual.

19. Expansion and Contraction:

a. The Contractor shall provide ample provisions for flexibility in all pipelines to compensate for expansion and contraction.

1) Unless other forms of expansion compensation are shown or specified, the Contractor shall:

a) Provide lengths of pipe shorter than the theoretical length to the extent of one half of the expansion, and install said lengths of pipe such that they may be free to expand without increasing the stresses imposed when cold.

2) Otherwise, the Contractor shall install all piping with expansion devices to allow for proper expansion and contraction.

a) Expansion devices shall allow the pipe to expand and contract freely without damage to any part of the piping system.

b) Expansion devices shall include, but not be limited to: expansion joints, expansion couplings, swivel or swing joints or pipe bends, including such anchors as may be shown, specified, or required to make the devices effective.

b. Cold sprung pipe:

1) Install with metal filler pieces bolted between flanges or tack welded between weld joints.

2) After the pipe, anchors, hangers and supports have been installed, the spacers shall be removed and the joint made.

c. Swing Joints:

1) For pipelines 2-in. nominal diameter or smaller, rated at working pressures up to 150 psig:

a) Screwed end swing or swivel joints may be used.

b) Otherwise expansion shall be taken up with nipples and fittings as required.

2) A sufficient number of fittings and pipe lengths in connection with swing joints shall be provided to assure the absence of distortion of either the pipelines or branches.

d. Branch Tees:

1) Install branch tees on risers in locations that will allow the branch lines, when expanded by heat, to drain properly.

e. Pipe Expansion Bends:

1) Pipe bends of approved design for compensating thermal expansion when shown, specified or required shall be fabricated and furnished as herein specified.

2) In pipelines operating under high pressures or high temperatures in which offsets occur in alignment that may be subject to bending stresses excessive for the fittings, or where otherwise deemed necessary, use appropriate pipe bends to make the offset.

3) Where possible, all bends shall have radii equal to a least six diameters ($r = 6 \times d$) of the pipe and tangents or straight lengths of the pipe shall be neatly made, true to radius, free from buckles and flat surfaces.

f. Application guide and anchor requirements for expansion joints shall be in accordance with the recommendations of the manufacturer or the Standards of the EJMA.

g. The Contractor shall adjust all expansion devices after installation (but prior to operation) so that the pipelines shall be fluid-tight through the full range of operating conditions.

20. Wall Sleeves:

a. Where piping passes through walls, partitions, floors, roofs, or structures, provide wall sleeves of wearing material to prevent abrasion damage to piping.

1) Pipe sleeves shall be Schedule 40.

2) Sleeves through walls shall be flush with wall face.

b. Anchor sleeves to concrete and masonry walls as shown on the Contract Drawings.

c. All annular spaces in exterior walls or walls subjected to hydrostatic pressure shall be completely watertight.

d. Do not install sleeves and pipes through structural members unless specifically shown on the Contract Drawings.

21. Temporary Blind Flanges, Plugs, Caps, and Bulkheads:

a. At the end of each day of work or other interruption of pipe installation, the Contractor shall provide temporary blind flanges, plugs, caps, or bulkheads as necessary and required.

1) Plug all bells at dead ends, tees, and crosses.

2) Cap all spigot and plain ends.

b. To perform the testing of exposed piping as specified herein, or as per the sequence of work specified in the Contract Documents, the Contractor shall provide temporary blind flanges, line stops, plugs, and bulkheads suitable for and capable of withstanding the services and pressures for which they are intended.

1) Refer to Section 40 06 01 - Schedule for Exposed Piping, for service and test pressures.

2) Temporary blind flanges, line stops, plugs, and bulkhead shall be compatible with and shall not damage the piping materials, coatings, and linings specified in Section 40 06 01 - Schedule for Exposed Piping.

c. The Contractor shall uninstall all temporary blind flanges, plugs, caps, and when they are no longer needed for the Work.

22. Flow Measuring Devices:

a. If not shown on the Contract Drawings, position flow measuring devices in pipe lines so that they have the amount of straight upstream and downstream runs recommended by the manufacturer, unless specific location dimensions are shown.

B. Ductile Iron Pipe:

1. Cutting:

a. Where field cutting of ductile iron pipe is permitted by the Engineer, ductile iron pipe shall be cut only by means of abrasive saws, hack saws, wheel type cutters or milling type cutters.

2. End Connections:

a. Mechanical Joint:

1) Ensure that cut ends are tapered and sharp edges are filed off smooth. Thoroughly clean the plain end (spigot) and the socket of the pipe or fitting.

2) Brush the socket, spigot end, gasket, and adjacent areas immediately before making joint with soapy water in accordance with AWWA C111.

3) Slip the gland and gasket over the spigot with the small side of the gasket facing the socket and the lip side of the gland facing the socket.

4) Insert the spigot into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly.

5) Slide the gland towards the socket and center it around the pipe with the gland lip against the gasket.

6) Insert bolts and tighten nuts by hand.

7) With an ordinary ratchet wrench, tighten bolts evenly and alternately around. The pattern for tightening bolts shall be as per the manufacturer's recommendations. The bolt torque for mechanical joints shall be as per the DIPRA Installation Guide.

8) Do not deflect mechanical joint pipe after installation.

b. Push-On Joint:

1) Ensure that the spigot (plain) end is beveled as per the manufacturer's recommendations and that sharp edges are filed off smooth.

a) Use a heavy file or grinder to bevel the plain end.

b) Do not use a saw blade to bevel the plain end.

2) Thoroughly clean the groove and the bell socket of the pipe or fitting. Also clean the plain end of the mating pipe or fitting.

3) Except for pipe lined or coated, use a wire brush to clean the exterior surface of the spigot and the interior surface of the bell.

a) Use a method for cleaning coated or lined portions of the pipe recommended by the coating or lining manufacturer.

4) Insert gasket into joint recess and smooth out entire circumference of gasket to remove bulges and to prevent interference with proper entry of spigot of entering pipe.

a) Use a rubber gasket recommended by the pipe manufacturer.

(1) Do not use gaskets that have been scored or otherwise damaged.

b) Wipe clean rubber gaskets and flex gaskets until resilient. follow the manufacturer instructions for gasket resiliency when assembling joints in cold weather.

c) As per the DIPRA Installation Guide, make at least one (1) small loop and then insert the gasket into the socket.

(1) For pipe sizes larger than 20-in. nominal diameter, it may be necessary to make

two loops in the gasket opposite each other.

(2) Make sure the gasket faces the correct direction as per the manufacturer's instructions and that it is properly seated.

5) Apply lubricant as per the manufacturer recommendations to the surface of the gasket that will come in contact with the entering spigot. Also apply lubricant to the outside of the entering spigot.

(1) As per the DIPRA Installation Guide, do not apply lubricant to the bell socket or the surface of the gasket in contact with the bell socket.

6) Push the spigot end into the bell socket of the mating pipe or fitting, ensuring the joint remains straight.

a) Pause insertion when the spigot end just makes contact with the rubber gasket.

b) After the gasket is compressed and before the pipe is inserted completely, carefully check the gasket for proper position around the full circumference of joint.

c) Final assembly shall be made by inserting the spigot end of the entering pipe past the gasket until it makes contact with the base of the bell.

7) Deflect push-on joint pipe only after the joint is assembled and not exceeding the deflection shown on the Contract Drawings and the maximum deflection specified in the DIPRA Installation Guide for the nominal diameter of pipe in question.

c. Grooved / Shouldered End Joints:

1) Grooved and shouldered end joints and their installation shall conform to the requirements of AWWA C606.

2) Thoroughly clean the joint ends to remove foreign matter. Except for coated pipe, use a wire brush to clean the exterior surface of the joint ends.

a) Use a method for cleaning the coated portion of the pipe recommended by the coating manufacturer.

3) Remove the bolts from the coupling.

4) Apply lubricant to the rubber gasket or inside of the coupling housing and joint ends as per the manufacturer recommendations.

5) Position and install the gasket over the gap between the joint ends.

6) Install the coupling housing around the gasket and over the grooved or shouldered joint ends. Insert bolts and install nuts tightly by hand.

7) Tighten the bolts uniformly and according to the manufacturer's instructions.

d. Flanged Connections:

1) All flange faces shall be in perfect alignment with the holes straddling the vertical center line of the piping.

2) Properly center the gasket. Use full-face gaskets for flat-face flanges.

3) Gaskets shall be suitable for the service conditions referenced in Section 40 06 01 - Schedule for Exposed Piping.

4) The gasket thickness shall be as recommended by the pipe manufacturer, with the exception that:

5) The minimum gasket thickness for raised face flanges shall be ⅛-in.

6) Bolts shall be of sufficient length so that when fully tightened, a minimum of two full threads shall extend beyond the nut.

7) Bolts shall be well lubricated over the entire thread length with a heavy graphite and oil mixture prior to the tightening operation.

8) Bolts shall be tightened with proper wrenches, care being taken to secure uniform pressure on the bolts and gasket and to avoid over stressing of the bolts, dishing of the flanges and compression of the gasket beyond its proper limits.

a) Commercial grade carbon steel bolts, ASTM A307, Grade B shall be tightened to obtain approximately 15,000 psi stress based on the root area of the thread.

b) Alloy steel bolts, ASTM A193, Grade B7 shall be tightened to obtain a stress of 45,000 psi.

c) The pattern for tightening bolts shall be as per the manufacturer's recommendations.

3. Support:

a. Provide supports for exposed ductile iron piping, fittings, appurtenances, and specials in accordance with the requirements of Section 40 05 07 - Hangers and Supports for Process Piping. In addition:

1) Where shown on the Contract Drawings, ductile iron pipe beneath the ground floors of buildings or structures shall be encased in concrete to form an integral part of the floor slab.

a) This piping shall be included in the definition of exposed piping.

b) The reinforcement in the floor slab shall be placed and bent so that the pipe encasement is an integral part of the concrete structure.

c) Concrete for encasement:

(1) Shall be class 40.

(2) Provide a 3-in. minimum depth of concrete between reinforcement and pipe or hanger components, and a 3-in. minimum depth covering on reinforcement.

C. Steel and Stainless Steel Pipe:

1. General:

a. Install in accordance with the best piping practice with a minimum exposure to the elements and to other corrosive conditions.

b. Before erection, all uncoated pipes shall be placed on end and hammered to remove scale and loose particles.

c. Pipe compounds:

1) For general service: Use an approved mastic metallic compound, Teflon tape, or approved equal shall be used.

2) For oil service: Use an approved compound resistant to oil.

3) For potable water: Use a NSF61 approved pipe compound.

2. End Connections:

a. Threaded Joint:

1) Pipe ends shall be reamed after pipe is cut to final length.

2) Threads shall be cleanly cut to the dimensions of the American Standard for Pipe Threads, ASME B1.1.

3) All burrs, dirt and foreign matter shall be removed and an application of pipe compound given to the threads of both pipe and fittings before assembly.

4) Apply a manufacturer's recommended joint compound prior to installation. Apply joint compound to male threads only.

5) Compound shall be eliminated at the inside of the joint.

6) Once a joint has been tightened, it shall not be backed off unless all threads are re-cleaned and new compound applied.

b. Flanged Connections:

1) All flange faces shall be in perfect alignment with the holes straddling the vertical center line of the piping.

2) Properly center the gasket. Use full-face gaskets for flat-face flanges.

3) Gaskets shall be suitable for the service conditions referenced in Section 40 06 01 - Schedule for and Exposed Piping.

4) The gasket thickness shall be as recommended by the pipe manufacturer, with the exception that:

5) The minimum gasket thickness for raised face flanges shall be ⅛-in.

6) Bolts shall be of sufficient length so that when fully tightened, a minimum of two full threads shall extend beyond the nut.

7) Bolts shall be well lubricated over the entire thread length with a heavy graphite and oil mixture prior to the tightening operation.

8) Bolts shall be tightened with proper wrenches, care being taken to secure uniform pressure on the bolts and gasket and to avoid over stressing of the bolts, dishing of the flanges and compression of the gasket beyond its proper limits.

a) Commercial grade carbon steel bolts, ASTM A307, Grade B shall be tightened to obtain approximately 15,000 psi stress based on the root area of the thread.

b) Alloy steel bolts, ASTM A193, Grade B7 shall be tightened to obtain a stress of 45,000 psi.

c) The pattern for tightening bolts shall be as per the manufacturer's recommendations.

c. Welded Joints:

1) All welding of the following shall be in strict conformity with the Code for Pressure Piping, ASME B31.1, Section 6 and its Supplements:
   a) Steel and stainless steel pipe.
   b) Steel and stainless steel butt-welding fittings.
   c) Steel and stainless steel fabricated fittings.
2) Welding shall not be done when the atmospheric temperature is less than 32°F or when surfaces to be welded are wet.
3) The surface to be welded shall be free from loose scale, slag, rust, paint, oil and other foreign material. Joint surfaces shall be smooth, uniform and free from fins, tears and other defects which might affect proper welding.
4) Backing rings shall be used for all pipe welding butt joints unless otherwise specified.
   a) Backing rings shall be of carbon steel with spacer nubs that strike-off or melt with the weld.
5) Field Welding of Stainless Steel:
   a) No field welding of any stainless steel pipe or fittings shall be permitted unless otherwise shown on the Contract Drawings.
6) Welding of Cement Lined Steel:
   a) Welding of cement lined steel pipe will be permitted only with the approval and under the observation of the Engineer where such welding is shown on the Contract Drawings.
7) The ends of the lined pipe for pipe-to-pipe joints shall be machine cut to provide an approximate bevel of 27½°.
   a) Bevels shall be accurately cut by machining or by a mechanically guided cutting torch.
   b) Ends may be chipped provided there is no damage to the cement lining.
8) Where fittings already having a bevel of 37½° are to be welded to pipe, pipe ends shall be beveled to a 17½° angle, making a total angle of bevel between joints approximately 55°. A ⅛-in. land shall be provided where possible.
9) Parts to be joined shall be approximately $^{1}/_{32}$-in. apart before tacking.
   a) Backing rings shall not be used at welded joints.

10) Piping shall be carefully aligned before welding and maintain alignment.

11) Small tack welds shall be made using a ⅛-in. electrode.

    a) Defective tack welds shall be removed before the final weld is made.

12) The first bead or layer of welding shall be laid by bridging across from bevel to bevel at the bottom of the groove just at the top of the land. A suitable crown reinforcement layer shall be made on the top of the joint to finish off.

    a) All layers of welding shall be of the same quality as the final welds and shall be fused thoroughly therein.

13) Direct current (dc) shall be used for welding, with the base material on the negative side.

14) Passes:

    a) The first pass shall be a stringer bead using a ⅛-in. electrode with a current of 80A to 90A at 50V to 55V.

    b) The second and succeeding passes shall be woven beads using a ⅛-in. electrode and a current of 90A to 100A at 55V to 58V.

    c) All passes shall be made slowly and with care not to burn through the land or the shoulder into the lining of the pipe.

    d) The joint shall not be hotter than 100°F.

    e) For large size pipe, a $^{5}/_{32}$-in. electrode may be used, provided the temperature of the joint is held within this limit.

    f) The surface of the finished welds shall have a bright metallic luster after cleaning, a fairly smooth and uniform contour with regular ripples and be free from overlaps, undercuts and excessive convexity.

15) No stress-relieving of welded joints is necessary unless the pipe wall thickness warrants it.

16) Welds shall be sound throughout, fused thoroughly and free from gas pockets, oxide, slag inclusions and surface porosity. The inside of the pipe shall be free from globules of weld metal, spacers or other material which would restrict the pipe area or become loose to enter the fluid stream.

17) Defective or unsound welds shall be corrected by removing and replacing the welds. Pipe or fittings which cannot be re-welded satisfactorily shall be replaced with new pipe or fittings at the Contractor's expense.

18) All welded joints will be visually inspected by the Engineer for defects beyond those acceptable in ANSI B31.1. Method of repair shall be in accordance with instructions as received from the Engineer.

19) Filling of Cement Lined Joints:

a) After the weld is completed, the joints in the lining shall be filled with a special compound of a wet slurry mix of the same cement used for the lining.

b) Where accessible from the end of the pipe, the welded joint shall be swabbed with cement using a paint brush thoroughly wetted with the cement slurry.

20) Repairing of Cement Lined Joints:

a) Any defects causing leaks in welded joints shall be repaired by welding without damaging the cement lining using the procedures specified herein.

3. Hangers and Supports:

a. In addition to the requirements of Section 40 05 07 - Hangers and Supports for Process Piping, install steel and stainless steel pipelines in accordance with the applicable provisions of the Code for Pressure Piping, ASME B31.1, Section 6.

D. Copper and Brass Pipe:

1. End Connections:

a. Soldered Joints:

1) Cleaning:

a) After cutting, all surfaces to be soldered shall be thoroughly cleaned to a metal-bright finish, free from dirt, grease or other material before fluxing and soldering.

b) This cleaning shall be performed by using emery cloth, sandpaper, or steel wool.

c) Clean the outside end of the tubing for a length of ½-in. greater than the depth of the fitting. The inside of the fittings shall be cleaned in a similar manner.

d) Apply non-corrosive flux to both the outside of the tubing and the inside of the fitting.

(1) Acid solder or acid flux will not be allowed.

2) Assembly:

a) Assemble the joint by inserting the end of tube into full depth of fitting socket.

3) Solder:

a) Solder shall be 95-5 tin-antimony solder conforming to ASTM B32.

4) Joining:

a) The surfaces to be joined shall be heated up slowly and uniformly to the melting point of the solder.

(1) Heating torches of sufficient size shall be used for heating of large fittings prior to soldering.

(2) Multiple tips or ring burners for use on combination torches may also be used.

b) The surface being soldered shall be maintained above the melting point of the solder for sufficient time to draw the solder completely into the joint.

c) Form continuous solder bead around entire circumference of joint starting at the bottom.

d) When the solder congeals to a plastic state the excess metal shall be removed with a cloth brush, leaving a fillet around the end of the fitting.

e) Full penetration of the solder uniformly throughout the entire socket is required.

f) The soldered joints shall be allowed to cool in still air until only warm to the hand after which the work may be quenched.

5) Inspection of Joints:

a) Any type of crack, pinhole, area of incomplete penetration, or similar defect will not be accepted.

b) Peening for closing up defects shall not be permitted.

6) Cleaning:

a) Remove all external and internal loose solder and flux after joint cools.

b. Threaded Joints:

1) Use threaded joints for copper process piping any of the following locations:

a) When open flames for soldering are impractical

b) At unions and connections to equipment and appurtenances.

c) Where shown on the Contract Drawings .

2) Flaring for Threaded Joints:

a) Cut the end of the copper tube square and ream to remove burrs.

b) Tubing to be flared shall be soft temper or annealed prior to flaring.

c) Tube that is out of round prior to flaring should be resized back to round..

d) Clean and polish contact surfaces of joints using an abrasive cloth.

e) Place flare nut over end of tube with threads closest to end being flared.

f) Insert appropriate length of copper tubing between flaring bar of flaring tool and position yolk with flaring cone over tube end and clamp yoke in place.

g) Ends of tubing shall be flared at an angle of 45°.

h) Turn the handle of the yolk clockwise without over-tightening.

(1) Use a flaring tool recommended by pipe manufacturer in accordance with the pipe manufacturer's instructions.

i) Pipe joint compound (nor any other material) shall be applied to the mating surfaces of the flare fitting and the flared tube end before attaching the flare nut to the fitting body.

3) Inspection of Flared Joints:

a) Cracked or deformed tubes will be rejected.

c. Unions:

1) Regardless of whether shown or indicated on the Contract Drawings, runs shall contain unions at all connections to valves and equipment, and at distances that permit

convenient disassembly of piping and removal of equipment.

2. Pipe Flexibility

a. Make ample provisions for flexibility in all copper and brass pipelines.

E. PVC and CPVC Pipe Installation

1. End Connections:

a. Solvent-Welded Joints:

1) Make all solvent-welded PVC and CPVC joints in accordance with ASTM D2855 and the solvent manufacturer's approved instructions.

2) For PVC pipe, use primers and solvent cements meeting the requirements of ASTM F656 and ASTM D2564, respectively.

3) For CPVC pipe, use solvent cements meeting the requirements of ASTM F493.

4) Do not make solvent cement joints if temperature is below 40°F.

5) Do not make solvent cement welded joints in wet conditions.

6) The following procedure shall be followed to ensure proper gluing of PVC and CPVC pipe.

a) Ensure the end of the pipe is beveled.

b) Apply primer to the female end.

c) Apply primer to the male end.

d) Reapply primer to the female end; the primer must not dry.

e) Apply glue to the male end using an appropriately sized brush.

f) Apply glue with the brush to the female end.

g) Reapply glue to the male end.

h) Join the male and female ends with a quarter turn twist and hold for 30 sec.

7) After joint assembly, wipe excess cement from the pipe. A properly made joint will show a bead around the entire circumference. Any gaps in this bead indicate a defective joint, and the Contractor shall remake such joints at no additional cost to the City.

b. Threaded Joints:

1) Cut the end of the thermoplastic pipe square and smooth with a knife or a file.

2) Thread the pipe in accordance with the pipe manufacturer's recommendations. Brush threads clean.

3) After threading pipe, starting with second full thread, and continuing over the thread length, wrap 100% virgin Teflon thread tape in the direction of the thread. Overlap each wrap by one-half width of tape.

4) After application of the Teflon thread tape, screw fitting or coupling onto the pipe end to be joined. Hand tighten. Then tighten the connection an additional one or two threads past the point of hand tightness.

F. Additional requirements for exposed steam service piping:

1. For steam service, adhere to the requirements for piping materials as specified in this Section. In addition, exposed piping for steam systems shall adhere to the following additional requirements.

2. End caps on pre-cleaned pipe shall not be removed until immediately before assembly. All open ends shall be capped immediately after completion of installation.

3. Steam systems piping shall have only threaded, welded, or flanged joints, as applicable and as specified.

a. Grooved or shouldered end joints shall not be used for steam service.

b. Welded End Connections:

1) All weld connections shall be in perfect alignment.

2) Use long radius elbows except at expansion bends where elbow radius shall be equal to six times the pipe diameter ($r = 6 \times d$) as specified herein.

a) Mitering of pipe to form elbows is not permitted.

3) Welding tees shall be used wherever the branch line diameter is equal to or one size smaller than the main line diameter. Otherwise the branches shall be fabricated using fittings of or equal to the Weldolet® or Sockolet® type.

4) Reinforced welded tees will be used only where shown on the Drawings. Tapped connections in welded lines shall be provided using fittings of or equal to the Thredolet® or Latrolet® type, welded to the piping.

c. Flanged End Connections:

1) All flange faces shall be in perfect alignment. Where steel flanges are bolted to flat face cast-iron flanges the raised face shall be removed.

2) Where flanges are to be connected directly to the welded fittings, only welding neck flanges will be allowed.

d. Threaded End Connections:

1) All threaded connections shall have full thread of true taper, accurate to gauge and conform to ANSI.

4. The use of bushings or close nipples is prohibited.

5. Screwed joints shall be made with an approved joint compound applied to the male thread only.

a. Caulking of screwed joints for steam service piping shall not be allowed.

6. In horizontal steam lines, reducing fittings shall be the eccentric type to maintain the bottom of the lines at the same elevation.

7. Slope:

a. All horizontal lines shall be pitched to facilitate draining.

b. Steam piping shall pitch down in the direction of flow at a rate of not less than ¼-in. per 10 ft.

c. All low points shall be provided with ¾-in. hose bibbs properly located so that the entire system may be drained.

d. Drain lines shall not have a pitch less than ⅛-in. per ft.

8. Risers:

a. The location of risers is approximate.

b. Exact locations of the risers shall be as approved.

c. Steam supply downfeed risers shall terminate in a dirt pocket and shall be dripped through a trap to the return line.

9. All closures should be suitable to withstand the hydrostatic test.

3.03 FIELD TESTING / QUALITY CONTROL

A. Test all exposed piping in accordance with the requirements of Section 40 05 05.30 - Leakage Testing for Exposed Piping.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 05 05.30 – LEAKAGE TESTING FOR EXPOSED PIPING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to test all exposed piping complete and operational.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 40 05 05 – Exposed Piping Installation.

B. Section 40 06 01 – Schedule for Exposed Piping.

1.04 REFERENCES

A. Definitions:

1. Buried Piping: Includes all piping beginning at the outside face of a structures or foundation and extending away from structures. Buried piping includes piping beneath structures or foundations.

2. Exposed Piping: Includes all piping beginning at the outside face of a structures or foundation and extending inside. Exposed piping also includes all piping embedded in concrete, as well as all piping that is permanently or intermittently submerged and/or installed in a subaqueous environment.

B. Reference Standards:

1. AWWA C600-10 Installation of Ductile-Iron Mains and Their Appurtenances

2. Section 312 of The New York City Plumbing Code.

1.05 DESCRIPTION

A. This scope of this Section includes the requirements for the testing of exposed piping, except where testing requirements for exposed piping are shown or specified elsewhere in the Contract Documents.

B. All exposed pipelines for which testing requirements are specified in this Section shall be watertight or airtight, including, but not limited to:

1. All exposed piping and appurtenances installed under Section 40 05 05 - Exposed Piping Installation.

2. All exposed piping and appurtenances installed under other Sections, but that specify testing under this Section.

C. Piping and structures which fail leakage tests shall be repaired or replaced at the Contractor's expense and to the satisfaction of the Engineer. These repaired piping and structures shall then be retested at the Contractor's expense until leakage test results meet the requirements specified herein.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. Exposed piping testing submittals shall be submitted under the specification section number corresponding to the exposed piping material. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Testing Procedures:

1) Submit proposed testing procedures, methods, apparatus, and sequencing.

2) Testing procedures shall be submitted for approval at least 30 ccd prior to the test.

b. Testing Report:

1) Prior to placing the piping system or structure in service, submit for review and approval a detailed bound report summarizing the leakage test data, describing the test procedure and showing the calculations on which the leakage test data is based.

2. Informational Submittals:

a. Certificate signed by manufacturer of each product certifying that product conforms to applicable referenced standards.

b. Results of each specified field quality control test.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. The Contractor shall provide all labor, equipment, air, water and materials, including meters, gauges, blower, pumps, compressors, hoses, fuel, water, bulkheads, temporary bracing and restraints, valves, plugs, and accessory equipment necessary and required to complete the testing as specified herein.

B. Testing medium:

1. The Contractor shall provide all air or gasses necessary or required for testing.

2. Unless otherwise specified, the existing facility shall provide all water required for testing.

a. The Contractor shall provide all means to convey the fluid into the piping being tested.

3. Refer to the Contract Drawings for availability of water to be used for testing.

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. Notification:

1. Provide the Engineer with written notice at least 14 ccd prior to the date of testing.

a. No tests shall be conducted without an approved written procedure.

b. The Engineer shall respond in writing to the Contractor within 7 ccd of receiving the written notification.

B. All leakage tests shall be conducted in the presence of the Engineer.

1. All leakage tests shall be conducted in the presence of local authorities having jurisdiction, if required.

C. Remove or protect devices and appurtenances that could be damaged by testing.

D. Concealed pipelines:

1. Test all pipelines prior to concealment.

3.02 IMPLEMENTATION

A. General:

1. Perform leakage testing for all exposed piping in accordance with the requirements of Section 40 06 01 - Schedule for Exposed Piping, except piping explicitly shown or specified as exempted from testing. For pipelines not listed in Section 40 06 01:

a. Test all pipelines not listed in Section 40 06 01 via a hydrostatic test with clean water.

b. Test vents and drains in plumbing systems and plumbing pipe lines in accordance with Section 312 of the New York City Plumbing Code, unless otherwise specified. Unless specified otherwise, test all vents and drains on process piping as for plumbing systems.

2. Operation of Existing Facilities:

a. Conduct all tests in a manner to minimize interference with operations of existing facilities or other contractors working on the site.

B. Hydrostatic Testing:

1. Application:

a. Exposed pipelines:

2. Test Procedure:

a. Maintain the testing medium at the specified pressure for a period of 4 hrs.

1) Unless otherwise specified, the testing medium shall be clean water.

2) Do not use air for hydrostatic testing of pipelines intended for liquid service – use compressed air (or gas) only for the hydrostatic testing of air (or gas) pipelines.

b. Test the piping as a whole or in sections.

1) The Contractor shall use valves or install temporary bulkheads at the ends of each section.

2) Remove temporary bulkheads at the conclusion of the hydrostatic testing.

c. Apply the specified hydrostatic test pressure to the piping through a tap in the pipe by means of a pump, compressor, or other approved method.

3. Test Pressures:

a. Test the pipeline at the pressure specified in Section 40 06 01 - Schedule for Exposed Piping.

b. If no test pressure is specified for a hydrostatic test, submit a test pressure of 1.5 times the maximum possible operating pressure of the pipeline, for approval by the Engineer

4. Leakage:

a. The allowable leakage shall not exceed the testing allowance given by the following formula from AWWA Standard C600:

$$L = \frac{S \cdot D \cdot \sqrt{P}}{148{,}000}$$

Where: L = testing allowance (makeup water) (gph).
S = length of pipe tested (ft).
D = nominal diameter of the pipe, (in.).
P = average test pressure during the hydrostatic test (psig).

5. Repair:

a. Replace broken pipe or joint assemblies found to leak.

b. When leakage occurs in excess of the specified amount, locate and repair defective valves, pipe, cleanouts or joints.

c. If defective portions cannot be located, remove and reconstruct as much of the original work as necessary to obtain piping that meets the leakage requirements specified herein and retest, all at no additional cost to the DEP.

C. Hydrostatic Testing of Valves:

1. Test Procedure:

a. Prior to the application of the test pressure, operate the valve(s) through the number of complete cycles of closing and opening recommended by the manufacturer.

b. Next, apply the test pressure to one side of the valve (i.e., the first side).

1) The valve shall be in the closed position.

2) Introduce the liquid testing medium to the first side only and apply the test pressure.

a) The other side of the valve(s) (i.e., the second side) shall be dry and unpressurized (0 psig).

3) Maintain the testing medium at the specified pressure for a period of 4 hrs.

c. Then, reverse the side to which the test pressure is applied.

1) The valve shall still be in the closed position.

2) Now apply the test medium and pressure to the other side of each valve (i.e., the second side).

3) The side tested first (i.e., the first side) shall now be unpressurized (0 psig).

4) Maintain the testing medium at the specified pressure again for a minimum period of 4 hrs.

d. Hydrostatic testing of valve(s) may be concurrent with hydrostatic testing of pipeline section(s) to the extent permissible by the testing requirements specified herein.

e. The Contractor shall be responsible for draining and disposing of the test medium in accordance with the requirements of the Contract Documents, as necessary and required to test both sides of each valve in this manner.

2. Test Pressure:

a. Hydrostatic test each valve such that the differential pressure across the valve at the same test pressure specified for the pipe in which the valve is installed.

3. Leakage:

a. Stop all external and internal leakage through the valves.

b. No leakage across the valve shall be acceptable.

4. Movement:

a. Stop all valve movement or structural distress.

b. No movement of the valve is acceptable.

D. Leakage Testing of Tanks:

1. Application:

a. Unless otherwise shown or specified, all steel, polyethylene, and fiberglass-reinforced plastic tanks.

2. Test Procedure:

a. Perform test before the installation of mechanical equipment and before applying any waterproofing coatings to the outside surfaces.

3. Bulkhead the openings and fill the structure with water to 6 in. below the overflow water level.

a. The tank shall be kept full until the water temperature has stabilized, but not less than 24 hrs. before the start of the leakage test.

4. Measure the water surface elevation from a fixed point on the tank at two locations 180° apart.

5. Where environmental conditions could lead to changes in water level due to evaporation or precipitation, measurement of these factors shall be made as specified for testing concrete structures.

a. A clear plastic calibrated open-top container not less than 18 inches in diameter and depth shall be partially filled, floated in the tank, and held in position near each measurement location.

b. The container shall be located so as not to be shaded by tank walls and away from any items passing over it such as beams or pipes.

6. The following measurements shall be recorded at each test location at the start of the test period and 24 hours later:

a. Distance from reference point to test water surface.

b. Depth of water in the floating container.

c. Temperature of the test water at 18 inches below water surface.

d. Temperature of the water in the evaporation-precipitation container at mid-depth.

7. The exterior surface of the structure shall be inspected for leakage, especially in areas around joints.

8. Leakage:

a. The change in water surface elevation at each test location shall be averaged.

b. The total change in test water surface elevation shall then be adjusted by the average change in water surface elevation in evaporation-precipitation containers, if applicable.

c. Where averaged water temperature measurements vary by more than 3° F from start to completion of the test period, adjustment in tank volume shall be determined by change of water density resulting from the change in the average water temperature.

9. The leakage test shall be considered failed if there is any measurable drop in the water surface (after adjusting for evaporation and precipitation) during the 24-hour test period or if there is any visible leakage.

10. If visible leaks appear or if leakage exceeds the allowable limit, the structure shall be repaired by removing and replacing the leaking portions of the structure, waterproofing the inside, or by other approved methods. After repairs are complete, the test shall be repeated.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 05 06 – COUPLINGS, ADAPTERS, AND SPECIALS FOR PROCESS PIPING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required to furnish, install, and test all couplings, adapters, and specials in pipelines, complete and operational.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 09 91 00 – Painting.

B. Section 40 05 05 – Exposed Piping Installation.

C. Section 40 05 19 – Ductile Iron Process Pipe.

D. Section 40 05 22 – Steel and Stainless Steel Process Pipe

E. Section 40 06 01 – Schedule for Exposed Piping.

1.04 REFERENCES

A. Reference Standards:

1.	ASTM A47	Ferritic Malleable Iron Castings.
2.	ASTM A193/A193M	Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
3.	ASTM A194/A194M	Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
4.	ASTM A276	Stainless and Heat-Resisting Steel Bars and Shapes.
5.	ASTM A283/A283M	Low and Intermediate Tensile Strength Carbon Steel Plates.
6.	ASTM A513	Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
7.	ASTM A536	Ductile Iron Castings.
8.	ASTM A635	Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for.
9.	ASTM A744	Corrosion-Resistant Iron-Chromium-Nickel and Nickel-Base Alloy Castings for Severe Service.
10.	ASTM B26	Aluminum-Alloy Sand Castings.
11.	ASTM D2000	Classification System for Rubber Products in Automotive Applications.
12.	ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form).
13.	ASME B18.2.2	Fasteners in Customary Uses - Hex Nuts.
14.	ASME B31.1	Power Piping.
15.	AWWA	C606 Joints, Grooved and Shouldered Type.
16.	AWWA Manual M11	Steel Pipe - A Guide for Design and Installation.

1.05 DESCRIPTION

A. This Section includes requirements for providing couplings, adapters, and specials in accordance with applicable standards and regulations. In addition:

1. The scope of this Section shall include all buried and exposed process pipe.

2. The extent of process piping is shown on the Contract Drawings. Process pipe service, pipe diameter, pressure rating, joint type, and testing requirements are specified in the following section:

   a. Section 40 06 01, Schedule for Exposed Piping.

1.06 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

1. The manufacturer(s) shall have a minimum of five (5) years of experience in the design and fabrication of coupling, adapter, and specials of similar size, capacity, and type to those shown on the Contract Drawings and specified in the Contract Documents and shall show evidence of at least five (5) substantially similar installations in satisfactory operation.

B. Supply and Compatibility:

1. Couplings, adapters, and specials shall be designed, fabricated, and installed in accordance with the latest standards referenced herein.

C. Regulatory Requirements:

1. Use only NSF61-approved materials in potable water lines.

2. Pipe couplings for making field joints between plain end, grooved end, and shouldered end pipe and fittings shall meet the requirements of ASME B31.1.

D. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contract shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but not limited to) the following activities:

   a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

   b. Perform visual and dimensional inspection of completed work.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition:

1. Action Submittals:

a. The Contractor shall submit the following Shop Drawings and material specifications for the approval of the Engineer:

1) Location of couplings, adapters, and specials in pipeline.

2) Catalog data showing dimensions, materials, and component parts of each type of coupling, adapter, or special.

3) Harnessing and restraints where required.

4) Associated pipeline materials.

5) Working and test pressures.

6) Additional product data sufficient to demonstrate compliance with the Contract Documents.

2. Information Submittals:

a. Manufacturer instructions for handling, storing, installing, and adjusting of products.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver equipment and materials provided under this Section in accordance with the requirements of the Contract Documents.

B. The Contractor shall store equipment and materials provided under this Section in accordance with the requirements of the Contract Documents.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sleeve type couplings shall be as manufactured by:

1. For steel pipelines:

a. Style 38, as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

b. Style 128W, as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

c. Type 411, as manufactured by Smith-Blair Co., Texarkana, AR.

d. Or approved equal.

2. For ductile iron pipelines:

a. ≤ 12-in.:

1) Style 138, as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

2) 12" and smaller - Type 441, as manufactured by Smith-Blair Co., Texarkana, AR.

3) Or approved equal.

b. > 12-in.:

1) Style 38 , as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

2) Larger than 12" - Type 411, as manufactured by Smith-Blair Co., Texarkana, AR.

3) Or approved equal.

3. For joining dissimilar piping materials:

a. Style 162, as manufactured by Dresser Manufacturing, a Division of Dresser Industries, Bradford, PA.

b. Type 441, as manufactured by Smith-Blair Co., Texarkana, AR.

c. Or approved equal

B. Groove and shoulder type couplings shall be as manufactured by:

1. For steel pipelines:

a. Groove Type Coupling:

1) Flexible Type:

a) Victaulic® Style 77, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

2) Rigid Type:

a) Victaulic® Style 07, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

b. Shoulder Type Coupling:

1) Victaulic® Style 44, as manufactured by Victaulic Co., Easton, PA.

2) Or approved equal.

c. Welded steel collars for steel pipe > than 24-in.

1) Victaulic® Vic-Ring® Type C or Type E, as manufactured by Victaulic Co., Easton, PA.

2) Or approved equal.

2. For ductile iron pipelines:

a. Groove Type Coupling:

1) Flexible Type:

a) Victaulic® Style 31, with flexible radius grooves, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

2) Rigid Type:

a) Victaulic® Style 31, with rigid radius grooves, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

b. Shoulder Type:

1) Victaulic® Style 31, as manufactured by Victaulic Co., Easton, PA.

2) Or approved equal.

3. For stainless steel pipelines:

a. Grooved Type Coupling:

1) Flexible type:

a) Victaulic® Style 77S, , as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

2) Rigid Type:

a) Victaulic® Style 008, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

4. For copper pipelines:

a. Grooved-type coupling:

1) Rigid Type:

a) Victaulic® Style 606, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

5. For PVC pipelines:

a. Grooved Type Coupling:

1) Flexible type:

a) Victaulic® Style 775, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

6. For High Density Polyethylene (HDPE) pipelines:

a. Couplings for Plain End Piping:

1) Rigid Type:

a) Victaulic® Style 995, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

C. Groove and shoulder type full flow fittings shall be as manufactured by:

1. Victaulic Co., Easton, PA.
2. American Cast Iron Pipe Co., Birmingham, AL.
3. U.S. Pipe and Foundry Co., Bessemer, AL.
4. Or approved equal.

D. Bolted split sleeve type couplings shall be as manufactured by:

1. Non-flexible couplings:

a. Victaulic® Depend-O-Lok® Type 1 or 2, as manufactured by Victaulic Co., Easton, PA.

b. Or approved equal.

2. Flexible couplings:

a. Victaulic® Depend-O-Lok® EXE Type 1 or Type 2, as manufactured by Victaulic Co., Easton, PA.

b. Or approved equal.

E. Thread Lubricant:

1. G-N paste (Molycote), as manufactured by Dow-Corning Industries, Auburn MI.
2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Coupling design and construction shall facilitate easy assembly in the field.

2. Flexible couplings shall be designed and constructed to ensure permanently tight joints under all conditions of expansion, contraction, shifting and settlement to which the pipelines may be subjected as a result of the operation and layout of the process system in which they are installed.

3. Rigid couplings shall be designed and constructed to provide a tight joint and prevent pipe movement at the joint.

4. Only 316L Stainless Steel shall be used for this Project.

B. Couplings shall be either one of the following three types:

1. Sleeve Type:

a. Sleeve type couplings shall be solid (axially un-split/unbolted) and have a middle ring or sleeve placed around the pipe joint.

b. The middle ring shall be sealed by two wedge-shaped gaskets evenly compressed by follower flanges or rings tightened by bolts and nuts.

2. Groove and Shoulder Type:

a. Groove and shoulder type couplings shall have a C-shaped (cross section) sealing gasket placed around the joint.

b. The gasket shall be enclosed in a split-type housing which shall engage shoulders or grooves in the pipe.

c. The housing shall be assembled by bolts and nuts.

3. Bolted Split Sleeve Type.

C. Sleeve Type Couplings:

1. General:

a. The maximum working pressure of the sleeve-type couplings shall not be less than:

1) For pipe sizes ≤ 54 in.: 250 psig.

2) For pipe sizes > 54 in. 200 psig.

2. For Steel Pipe Lines:

a. Materials of Construction: steel.

b. The middle ring or sleeve and the follower rings or flanges shall be steel, ASTM A 283/A 283M (Grade A).

c. The middle ring or sleeve shall have flared or beveled ends.

d. The follower rings or flanges and the middle ring or sleeve shall be true circular sections free from irregularities, flat spots or surface defects.

e. The middle ring or sleeve shall not have a center pipe stop, unless otherwise specified, and shall have the minimum dimensions specified in Table 40 05 06-1.

TABLE 40 05 06-1
MINIMUM DIMENSIONS FOR SLEEVE TYPE COUPLING MIDDLE RING

Nominal Pipe Diameter: (in.)	Middle Ring Thickness: (in.)	Middle Ring Length: (in.)
≤ 8	¼	5
10 - 30	⅜	7
> 30	½	10

f. After welding, welded steel follower rings shall be sized and tested by cold expanding a minimum of 1% beyond the yield point.

3. For Ductile Iron Pipe Lines:

a. Materials of Construction:

1) For pipe sizes ≤ 12 in.: ductile iron or steel.

2) for pipe sizes > 12 in.: steel.

b. The middle ring or sleeve shall be steel, ASTM A513 or ASTM A635.

c. The middle ring or sleeve shall have flared or beveled ends.

d. The follower rings or flanges shall be of ductile iron, ASTM A536, or malleable iron, ASTM A47 (Grade 32510), for pipe sizes 12-in. and smaller, and shall be of steel ASTM A283/A283M (Grade A) for pipe larger than 12-in.

e. The middle ring shall not have a center pipe stop, unless otherwise specified, and shall have the same minimum dimensions as specified above for couplings for steel pipe.

4. Gaskets:

a. Gaskets shall be resilient, wedge-shaped gaskets with a maximum angle of 40° at the wedge end.

b. Gasket material shall be compatible with the type and temperature of the fluid in the pipeline and shall be the material recommended by the manufacturer for the service specified in Section 40 06 01, Schedule for Exposed Piping.

D. Groove and Shoulder Type Couplings:

1. General:

a. Couplings shall be of the following types:

1) For steel pipe ≤ 24-in.: grooved type

2) For steel pipe > than 24-in.: suitable welded steel collars shall be welded to the pipe ends, furnished by the same manufacturer as the groove and shoulder type coupling.

b. Unless otherwise specified, groove-type couplings shall conform to the requirements of AWWA C606.

2. Materials and Construction:

a. Housing:

1) Housing shall be in two or more parts, closely fitting the pipe and gasket.

2) Housing material shall be ductile iron, ASTM A536 (Grade 654512), except for stainless steel and aluminum pipelines, which shall have housings of Type 316 stainless steel, ASTM A744 Grade CF-8M, and aluminum, ASTM B26, Alloy 356-T6, respectively.

b. Gaskets:

1) Gaskets shall be of materials compatible with the type and temperature of the fluid in the pipeline, and shall be of the material as recommended by the coupling manufacturer for the service specified in Section 40 06 01, Schedule for Exposed Piping.

2) Gaskets shall be molded so that internal pressure tightens the seal. All gaskets shall be continuous, uniform in texture, and free from surface blemishes and defects.

E. Groove and Shoulder Type Fittings:

1. For steel and ductile iron pipe ≤ 24-in.:

a. Grooved end fittings shall be cast of ductile iron with working pressure ratings not less than shown in Table 40 05 06-2.

2. For steel and ductile iron pipe > 24-in.:

a. Fittings shall be provided with shoulders.

b. Working pressure ratings shall not be less than 150 psig.

c. Fabricated steel fittings shall be provided with extra-long end pieces to suit the coupling.

3. For stainless steel pipe:

   a. Grooved end fittings shall be Type 304 matching the thickness or schedule of the stainless steel pipe shown in the pipe schedule Section 40 06 01, Schedule for Exposed Piping.

TABLE 40 05 06-2
WORKING PRESSURE RATINGS FOR GROOVED END FITTINGS

Nominal Pipe Diameter: (in.)	Working Pressure: (psig)
¾ - 6	1,000
8 - 12	800
14 - 22	300
24	250

4. For Copper Pipe:

   a. Grooved end fittings shall be provided with rolled grooves and shall be designed for a working pressure not less than 300 psig.

F. Bolted Split-Sleeve Type Couplings:

1. General:

   a. Couplings for large diameter steel piping shall be bolted, split-sleeve type.

   b. Bolted split sleeve type couplings shall consist of four (4) basic components: two-piece housing, gasket assembly, bolts and nuts with restraining end rings as required for pipe restraint.

   c. The selected couplings shall be designed for the type, size and working pressure of the pipe with which they are to be used.

2. Materials and Construction:

   a. For stainless steel pipe: Coupling housing shall be manufactured from Type 316 stainless steel.

   b. For carbon steel pipe: Coupling housing shall be manufactured from carbon steel.

3. The split-sleeve coupling shall be constructed with a double arch cross section which closes around either:

   a. pipe section ends that have been smoothed for expansion or contraction, or

b. pipe section ends with steel end rings affixed for restraining purposes.

4. The coupling shall confine an elastomeric gasket beneath the sleeve arches to create a radial seal as the coupling closes.

5. Elastomeric gasket materials shall have properties as designated by ASTM D2000 suitable for air service up to 240°F with intermittent exposure to 280°F.

6. Gasket sealing members shall consist of two O-ring gaskets and an elastomeric sealing pad bonded to an integral sealing plate. Internal pressure shall not be a requirement for fully completing the sealing function.

7. Restraining rings shall be furnished with the couplings and shall be of the same material as the coupling housing.

   a. Restraining rings for fixed type couplings shall be shop welded to the piping by the piping fabricator.

   b. The restraining rings shall be forwarded to the piping fabricator for shop mounting and welding in place.

   c. The coupling manufacturer's recommendation for size and amount of welding required for properly attaching the restraining rings shall be followed without exception.

8. When deflection is required at a pipe joint, a flexible coupling shall be provided.

   a. Minimum deflection for basic, lighter duty split sleeve (non-shouldered) design (e.g., Victaulic® Depend-O-Lok® Type 1) couplings shall be as specified in Table 40 05 06-3:

TABLE 40 05 06-3
MINIMUM DEFLECTION FOR BASIC, NON-SHOULDERED SPLIT SLEEVE COUPLINGS

Nominal Pipe Diameter: (in.)	**Minimum Deflection: (deg.)**
8 - 14	4.50
16-24	4.00
30 and 36	3.00
42 - 54	2.00
60	1.75
66 and 72	1.50

≥ 84	1.00

b. Maximum deflection for heavier duty (shouldered) design (e.g., Victaulic® Depend-O-Lok® Type 2) couplings shall be as recommended by the manufacturer.

c. Coupling width shall not be less than 10-in. for pipe sizes 8-in. through 84-in., and not less than 12-in. for larger size pipe.

d. Minimum wall thickness of couplings shall be computed by the following formula:

$$t = \frac{P \cdot d}{2s}$$

Where: P = Design pressure in psig.
d = Pipe O.D. in in..
s = 18,000 psig design stress.

9. Bolts, nuts and miscellaneous hardware shall be furnished by the coupling manufacturer and shall be Type 316 stainless steel conforming to ASTM A276 and having a minimum tensile strength of 85,000 psig.

G. Bolts and Nuts:

1. Bolts:

a. Bolts shall be Type 316 stainless steel, ASTM A 193/A 193M, Grade B8, Class 2.

b. Bolts shall have American Screw Threads, Coarse Thread Series, ASME B1.1.

c. For all sleeve-type couplings, bolts shall be double radius head or buttonhead track type. The collars under the heads shall fit oval or square holes in the follower rings.

d. For all groove-and shoulder-type couplings, bolts shall be track type oval neck bolts. The collars under the heads shall engage the oval slots in the housing.

2. Nuts:

a. Nuts shall be Type 316 stainless steel conforming to ASTM A194/A194M.

b. Nuts shall be American Standard Heavy Dimension Series, ASME B18.2.2.

H. All flexible couplings shall be harnessed.

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. Inspection:

1. The Contractor shall not install damaged items until repairs are made in accordance with manufacturer's written instructions and approval by Engineer.

a. All damaged items requiring remedial work shall be returned to the manufacturer for repair or replacement.

B. Preparation:

1. Ends of pipe, fittings and couplings shall be cleaned of all scale, dirt and thick outside coatings.

2. Before assembly, the ends of pipe and/or fittings and the outside of the coupling gasket shall be lubricated as recommended by the manufacturer.

3. Fasteners shall be assembled using a thread lubricant.

3.02 INSTALLATION

A. Install couplings, adapters, and specials for process piping in complete accordance with the manufacturer's printed installation instructions and the approved shop drawings. In addition:

1. Couplings shall be assembled by tightening diametrically opposite bolts evenly and progressively.

a. Bolts on sleeve-type couplings shall not be tightened beyond the point of stretching (when the mill scale on the shank begins flaking off).

b. Bolts on groove- and shoulder-type couplings shall be tightened only until there is metal to metal contact between housing segments and the pipe.

B. Field Assembly of Groove-type Couplings:

1. Field grooving of pipe shall not be done unless approved by the Engineer, and then shall be limited to steel pipe 24-in. or under nominal diameter and to ductile and cast-iron pipe 12-in. or under nominal diameter.

2. Field grooving shall be done only with special tools provided by the coupling manufacturer.

C. Harness for Sleeve-type Couplings:

1. In all pipelines under pressure, and elsewhere where shown, specified or required, sleeve-type couplings shall be harnessed.

a. On all pressurized steel pipe, cast steel "crow-foot" lugs shall be welded on diametrically opposite sides of the pipe, and the joint shall be harnessed with stainless steel tie-bolts and nuts.

1) The dimensions, sizes, spacing and materials for lugs, tie-bolts and nuts shall be based on the use of a minimum of two bolts and four lugs per joint, in conformity with Section 13 (Table 13.4) of AWWA Manual M11 or the standard specifications of the coupling manufacturer for the pipe size, wall thickness and test pressure specified.

2) Welding shall conform to the requirements specified under Section 40 05 22 - Steel and Stainless Steel Pipe.

b. On all pressurized ductile iron pipe, couplings shall be harnessed with stainless steel tie bolts and nuts connected to flanges or fittings installed on the pipe on each side of the coupling as shown, specified or required for the pipe sizes and specified test pressures.

1) The harnessed length from flange to flange shall not exceed 3 ft.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 05 07 – HANGERS AND SUPPORTS FOR PROCESS PIPING
CONTRACT NR-107

GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required to furnish, install, and test all hangers, supporting devices, and appurtenances shown, specified or required for pipes, fittings, valves, and other in-line equipment, complete and operational.

B. The following index of this Section is presented for convenience:

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1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete.

B. Section 03 60 00 – Grouting.

C. Section 05 05 13.01 – Galvanizing.

D. Section 05 50 00 – Metal Fabrications.

E. Section 09 91 00 – Painting.

1.04 REFERENCES

A. Reference Standards:

1.	ASTM A36	Standard Specification for Carbon Structural Steel.
2.	ASTM A48	Standard Specification for Gray Iron Castings.
3.	ASTM A276	Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
4.	ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars.
5.	ASTM A778	Standard Specification for Welded, Un-annealed Austenitic Stainless Steel Tubular Products.
6.	ASME - B31.1	Power Piping.
7.	N.Y. Spec 32-P-6	Pipe, Special Castings, Valve Box Castings: Cast-Iron.
8.	MSS SP-58	Pipe Hangers and Supports - Materials, Design and Manufacture.
9.	MSS SP-59	Short Radius Welding Fittings.
10.	MSS SP-69	Pipe Hangers and Supports - Selection and Application.
11.	MSS SP-89	Pipe Hangers and Supports - Fabrication and Installation Practices.
12.	MSS SP-90	Guidelines on Terminology for Pipe Hangers and Supports.
13.	ASTM A123	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

14. Latest Edition of the New York City Building Code.

1.05 DESCRIPTION

A. This Section includes requirements for providing hangers and supports for process piping in accordance with applicable standards and regulations.

1. Included are rod hangers; clevis hangers, spring hangers; stanchion, roller and pipe pole supports and saddle stands; supports of structural steel; concrete saddles, concrete anchor blocks and bases, and all necessary guides, restraints, fastening devices, anchor bolts, pipe anchors and appurtenances.

2. The Contractor shall provide all temporary pipe supports required during construction.

3. The Contractor shall provide hangers and supports of sufficient strength to maintain the pipelines and appurtenances in proper position and alignment under the maximum combination of peak loading conditions to include pipe weight, process fluid/gas weight, process fluid/gas movement and pressure forces, thermal expansion and contraction, vibrations, seismic forces, and all probable externally applied forces for all operating conditions.

4. The Contractor may retain the services of a pipe support designer for providing the design of all piping hangers and support systems in accordance with the requirements of this Section, unless otherwise shown or specified.

5. Stressors in hangers, rods and brackets shall be in accordance with Table 2 of MSS-SP-58.

1.06 QUALITY ASSURANCE

A. Qualifications of Manufacturer and Pipe Support Designer:

1. Pipe hangers, supports, and appurtenances shall be standard products of the manufacturer specified herein.

2. Each type of hanger and support shall be the product of a single manufacturer.

3. The pipe support designer, if retained by the Contractor, shall have a minimum of five (5) years of experience in the design of pipe supports and shall show evidence of having completed at least five (5) substantially similar, successful pipe support projects of equal complexity as the systems specified.

a. The pipe support designer shall be a New York State Registered Professional Engineer.

B. Supply and Compatibility:

1. All hangers and supports for process piping included in this section shall be provided by the Contractor through a single, qualified ductile iron process pipe manufacturer.

2. The pipe and fittings shall be designed, fabricated, and installed in accordance with standards referenced herein.

C. Regulatory Requirements:

1. All hangers and supports shall conform to the applicable requirements of ASME B31.1, MSS SP-58, SP-59, SP-69 and SP-90, except as modified herein, and be of standard manufacture wherever possible, and best suited for the service required.

2. Unless otherwise approved, all hangers, supports and concrete inserts shall be listed with Underwriters' Laboratory, Inc.

D. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.
2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.
3. The Contract shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.
4. Quality Assurance inspections shall include (but not limited to) the following activities:
   a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.
   b. Perform visual inspection of welding, as per applicable welding code.
   c. Perform visual and dimensional inspection of completed work.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:

1. Action Submittals:
   a. Shop Drawings shall include, but not be limited to:
      1) Detailed drawings showing all hangers and supports for each piping system. Drawings shall show:
         a) Location, installation, material, loads, forces, stresses, and deflections of all hangers and supports.
         b) Reaction forces imparted to structures to which hangers and supports are attached shall be shown.
         c) Contractor shall provide detailed drawings of each pipe support. Each drawing shall contain enough information to verify the pipe support design and to allow the manufacture of the device. At a minimum, the Contractor shall submit:
            (1) Scaled details of the device with dimensions.
            (2) A table of applied forces and moments.
            (3) A complete bill of materials.
            (4) An isometric showing the applied forces and moments.
            (5) Detailed connections to existing structure.
            (6) Shop and field welds.

2) Manufacturer's catalogs and engineering data on all hangers and supports.

3) Load ratings.

4) Materials.

5) Installation details.

b. Submit the name and qualifications of the support and hanger engineer.

c. All drawings and design calculations included in the shop drawings shall be signed and sealed by a New York State Registered Professional Engineer.

d. Pipe support design shall include detailed load and movement calculations:

1) In the design of hangers, supports and anchors, unless otherwise shown or specified, pipe pressures shall be the maximum test pressures specified for pipelines carrying gases and twice the maximum test pressures specified for pipelines carrying liquids.

2) The following loads shall be included in pipe support design and pipe stress analysis:

3) The gravity force, including the weight of the pipeline plus the weight of any appurtenances, contents, insulation, etc.

4) The thermal expansion force developed by the restraint of free end displacement of the piping.

5) Hydrostatic forces developed by internal pressure during operation of the piping system.

6) Loading due to expansion joint reaction forces.

7) Seismic forces, as required by the latest edition of the New York City Building Code.

8) Occasional load calculations and pipe stress analysis shall be provided where required by the Contract Documents, Building Codes, or Standards referenced herein. Occasional loads include:

a) Seismic forces.

b) Pressure waves produced by sudden changes in fluid momentum, commonly referred to as water hammer.

c) Wind, snow or ice loads.

d) Safety valve thrust loads.

e. Calculated forces shall be included in the pertinent shop drawings as called for by the submittal requirements specified herein.

2. Information Submittals:

a. When equipment or appurtenance manufacturers have indicated that piping loads shall not be transmitted to their equipment or appurtenance, certification that from said manufacturer(s) that the Contractor's hanger and support design complies with said manufacturer(s) requirements. Submit a separate certification for each equipment or appurtenance bearing piping loads supported, in whole or in part, by Contractor's hanger and support design.

B. Each submittal package for pipe hangers and supports shall have the stamp of a New York State Registered Professional Engineer experienced in pipe support design.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver equipment and materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. Hanger inserts which are to be embedded in cast-in-place concrete shall be delivered in ample time not to delay the Work.

B. The Contractor shall store equipment and materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. Hangers and supports shall be protected from condensation, corrosion, and deterioration.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. General:

1. The Contractor shall provide hangers and supports for all process piping and associated appurtenances, including, but not limited to valves, fittings, and specials, as follows:

a. Where shown on the Contract Drawings: Provide hangers and supports as shown and as specified herein.

b. Where not shown on the Contract Drawings: Provide hangers and supports in compliance with MSS SP-58 Table 2, and the requirements specified herein.

2. All hangers and supports shall allow minimum 3-in. of vertical adjustment.

B. Types:

1. Hangers for Single Pipes:

a. Single pipes shall be supported by hangers suspended by rods from structural steel members, inserts in concrete ceilings and beams, bottom of trapeze hangers and wall mounted steel angle brackets. The strength of the rod shall be based on its root diameter.

b. Except for piping subject to thermal expansion and contraction or as otherwise shown or specified, pipe hangers shall be adjustable clevis type MSS SP-58 Type-1.

c. Piping subject to thermal expansion and contraction shall be supported on rollers.

2. Hangers or Supports for Multiple Pipes:

a. Multiple pipes, running parallel in the same horizontal plane, and adjacent to each other, shall be suspended by trapeze type hangers or supported on wall brackets. Trapeze hangers shall consist of channel sections supported from threaded rods or attached to concrete walls, columns or structural steel support members.

b. Except as otherwise specified herein, pipe anchors used for attaching pipe to trapeze or multiple pipe wall brackets, shall be anchor or pipe chairs as required.

3. Supports for Single Pipe:

a. Single pipes located in a horizontal plane close to the floor shall be supported by one of the methods specified herein or as shown on the Contract Drawings.

b. Pipes shall be supported by adjustable stanchions, pipe saddle or roll supports with "U" bolts. Stanchions shall provide at least 4-inches adjustment and be flanged-mounted to floor.

c. Stanchions and saddle stands shall be of Type 316L stainless steel.

d. Pipe pole supports for pipe runs above ground, out-of-doors, and where otherwise required, shall consist of a suitable length of stainless steel pipe set upright in at least four feet of concrete; two stainless steel angles secured to the top of the pipe, at right angle and on each side; a stainless steel plate welded to the top of the angles to serve as a horizontal support for the pipes. Supports shall be provided with attachments in the form of stands, clamps, rolls,

rods or similar devices of the screw adjustable type in the vertical direction.

e. Where specified or shown, column supports of built-up welded stainless steel shall be provided, as approved by the Engineer.

f. Pipe rollers shall be cast ductile iron, unless otherwise shown or specified. Hardware and appurtenances shall be stainless steel.

4. Wall Supported Pipes:

a. Single or multiple pipes located adjacent to walls, columns or other structural members, and an excessive distance from ceilings or underside of beams, shall be supported using stainless steel wall brackets, MSS SP-58 Type 32 or 33.

b. Where pipes rest on top of bracket pipe supports, pipe anchors used for attaching pipe to trapeze or multiple pipe wall brackets shall be anchor or pipe chairs as required

5. Supports for Base Elbows:

a. Where pipes change direction from horizontal to vertical through a bend, a welded or cast base anchor support shall be installed at the bend to carry the load.

6. Supports for Vertical Pipes:

a. Pipe riser clamps shall be used to support all vertical pipes extending through floor slabs.

b. Riser clamps shall be MSS SP-58 Type 42 or 8.

c. Insulation shall be removed from insulated pipes prior to installing riser clamps.

7. Supports for Process Air Piping:

a. Air piping shall be supported on stainless steel saddle type supports in the locations shown on the Contract Drawings and as specified.

1) Fixed supports, as located on the Contract Drawings, shall hold the pipe firmly in place, preventing any movement.

2) Sliding supports, as located on the Contract Drawings, shall allow longitudinal movement of the pipe to account for thermal expansion.

3) Guides, as located on the Contract Drawings, shall allow for longitudinal pipe movement while preventing lateral movement and maintaining alignment.

b. Supports shall be fabricated Type 316L stainless steel.

1) Saddles shall support 120° of the pipe circumference and at least 12-in. along the length of the pipe.

2) Saddles shall be bolted to the structural steel or concrete slab supports.

3) Straps shall be of Type 316 stainless steel.

4) All sliding supports shall be provided with 8-in. wide hold-down straps.

5) Straps shall not clamp down on the pipe, but shall allow the pipe to slide on the saddle to permit thermal expansion.

c. All sliding supports shall have a resilient bearing pad of Teflon attached to the saddle to allow the pipe to slide on the saddle to permit thermal expansion.

d. All hangers from overhead supports shall be saddle or cradle-type hangers which shall support the lower 120° of pipe circumference and a minimum length equal to one quarter the pipe diameter, but not have less than 6-in. or more than 12 in.

1) Where pipe is supported from existing slabs, new through-slab hanger rods shall be used instead of expansion bolts, except where otherwise authorized by the Engineer.

8. Supports for Pipelines with Thermal Expansion:

a. Pipe rolls for single rod hangers: Stainless steel frame construction, ductile iron roller and stainless steel roller rod provided with threaded nuts; vertical adjustment permitted; for pipe sizes 6 in. or less unless otherwise approved.

b. Pipe rolls for double rod hangers: Ductile iron roller, stainless steel roller rod, malleable iron threaded sockets which permit vertical adjustment.

9. Supports for Pipelines Subject to Temperatures Greater than 300°F:

a. Spring hangers of heavy stainless steel construction.

10. Supports for Thermoplastic Pipes:

a. All thermoplastic pipe attachments shall have a continuous bearing cradle or saddle on the lower 120° of pipe circumference and a minimum length of one quarter pipe diameter, but not less than 6-in. nor more than 12-in.

11. Supports for Copper & Brass Pipes:

a. All copper and brass pipe supports shall be specifically manufactured for use with copper and brass pipe.

b. Hangers shall be provided with a copper finish.

12. Hangers for Radiators:

a. Support wall hung radiators on approved wall brackets or overhead hangers.

b. Support wall hung radiators by all-metal brackets and plates that are screw adjustable after erection.

1) Wall plates shall be made of stainless steel of size and shape to insure rigidity and strength and with a minimum resistance to expansion.

2) Plates shall be fastened directly to walls, columns or pilasters with at least one ½-in. bolt, and with spacing of brackets not in excess of 42-in.

c. Where rod hangers are specified or shown supporting wall radiators, supporting rods shall be not less than ⅝-in. in diameter.

13. Concrete Supports:

a. Where pipeline or mechanical equipment is shown, specified or required to be supported on concrete supports, supports shall be as specified herein.

b. Concrete supports for equipment shall be of a size and mass that will resist all forces, both static and dynamic, which may be developed by the equipment.

c. Concrete supports for pipe, fittings, valves and appurtenances shall be designed to carry the weight of the pipeline and appurtenances.

1) Cradles and anchor blocks shall safely withstand all stresses imposed by the pipelines, under all operating conditions.

2) Concrete cradles shall be shaped to fit the contour of the pipe.

d. Concrete supports shall be anchored to the floor of main structures by doweling or other approved means.

1) Anchor bolts, extension plates, saddle yokes and other hold-down devices in concrete bases shall be placed before pouring of concrete.

2) Expansion bolts shall not be used on new concrete supports except with the specific approval of the Engineer.

e. Concrete supports shall be not less than Class 25 as specified in Section 03 30 00, Cast-in-Place Concrete.

14. Protection Saddles for Insulated Pipe:

a. Contractor shall furnish steel protection saddles on all supports for insulated pipe.

b. For insulated pipes < 12-in. nominal diameter:

1) Provide saddles of No. 14 U.S. gauge stainless steel curved 180° for use with roller hangers or structural trapeze hangers.

2) Provide saddles of No. 16 U.S. gauge stainless steel curved 120° for use in clevis hangers.

3) Saddles shall be at least 12-in. long.

4) Saddle gripping side edges shall be turned up at least to the thickness of insulation.

c. For insulated pipe ≥ 12-in. nominal diameter:

1) Provide saddles of No. 12 U.S. gauge stainless steel with a welded centerplate to provide three-edge support.

2) Saddles shall:

a) Be at least as long as the pipe diameter.

b) Provide 120 degree coverage.

c) Have edge and centerplate depths equal to the insulation thickness.

C. Materials:

1. Hangers and supports shall conform to ASME B31.1.

2. Structural steel shall conform to ASTM A36 and ASTM A283.

3. Iron castings shall conform to ASTM A48 (Class No. 35).

4. Stainless steel shall conform to ASTM A 276:

a. Use type 316 stainless steel for non-welded items.

b. Use type 316L stainless steel for welded or fabricated items.

c. Tensile Strength: 70,000 psi, minimum.

d. Yield Strength: 25,000 psi minimum.

e. Elongation in 2-in.: 35%.

f. Reduction of area: 45%.

g. For stainless steel pipe and tube: Use type 316L stainless steel conforming to the requirements of ASTM A778.

5. Rollers:

a. Rollers, including stands and bases, shall be of cast iron, hot-dipped galvanized conforming to ASTM A123.

6. Expansion anchors for use in existing concrete structure:

a. Material shall be Type 316 stainless steel.

7. Hanger Rods:

a. Material shall be Type 316 stainless steel.

b. Maximum allowable working stress shall be 5,800 psi, calculated based on the root diameter.

c. Rods shall have a square head nut on top and running thread on bottom end.

8. Supports:

a. Material shall be Type 316 stainless steel.

9. Appurtenances:

a. Brackets, guides, restraints, rods, bolts, nuts and anchors shall be Type 316 stainless steel unless otherwise specified.

b. Concrete inserts shall be of malleable iron with galvanized finish.

D. Sizing:

1. Size single and double rods based on the nominal pipe diameter in accordance with the Table 40 05 07-1.

a. Hanger loads shall be calculated based on the weight of pipe filled with water plus 50 psf of dead load.

TABLE 40 05 07-1
MINIMUM PERMISSIBLE HANGER ROD DIAMETER FOR NOMINAL PIPE SIZES

Pipe Size (in.)	Single Rod (in.)	Double Rod (in.)	Max. Load per Hanger (lbs.)
¾ to 1½	⅜	⅜	300
2	⅜	⅜	325
2½	½	⅜	350
3	½	⅜	400
3½	½	⅜	450
4	⅝	½	850
5	⅝	½	950
6	¾	⅝	1,075
8	*⅞	⅝	1,350
10	*⅞	⅝	1,750
12	*⅞	¾	2,200

Pipe Size (in.)	Single Rod (in.)	Double Rod (in.)	Max. Load per Hanger (lbs.)
14	*1	⅞	2,500
16	*1	⅞	3,075
18	*1	⅞	3,700
20	*1¼	1	4,425
24	*1¼	1	6,050

* To be used subject to the Engineer's specific approval

E. Concrete Inserts, Attachment Plates, and Clamps:

1. Hanger Rods:

a. Hanger rods up to ⅞-in. diameter: Shall be attached to new concrete structures using concrete inserts of Type 18 in MSS SP-58.

1) Inserts shall be malleable iron with galvanized finish.

a) The use of steel inserts is prohibited.

2) Design of the inserts shall permit the rods to be adjusted laterally in one plane and to lock the rod nut or head to the body.

3) The inserts shall be provided with openings or recesses to receive reinforcing rods.

4) To facilitate installation, slots shall be provided in the exposed flanges of the insert.

5) Inserts shall be rated to safely carry the maximum load which can be supported by the hanger rod.

b. Hanger rods larger than ⅞-in. diameter: Shall be attached to new concrete by means of approved hook anchors as shown on the Contract Drawings.

c. All hanger rods shall be attached to existing concrete structures using stainless steel expansion anchors as specified in Section 05 50 00 - Metal Fabrications.

2. Steel beam clamps:

a. Shall be malleable iron.

b. For wide flange or I-beams: conform to MSS SP-58 Type 28 or Type 29.

c. For channel sections or where it is necessary to locate the hanger rod off the beam centerline: conform to MSS SP-58 Type 20.

3. Steel U-shape beam attachments welded to the underside of beams and welded steel brackets fastened to structural steel columns:

   a. Shall be subject to specific approval of the Structural Steel and Pipe Supports Shop Drawings.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Galvanizing:

1. Conform to the requirements of Section 05 05 13.10, Galvanizing, except as follows:

   a. Malleable iron and concrete inserts shall be galvanized in conformance with the manufacturer's specifications.

B. Painting:

1. Conform to the requirements of Section 09 91 00, Painting.

C. Surfaces Protection:

1. Surfaces of hangers and supports in contact with aluminum, brass, plastic and copper pipelines or pipeline equipment shall be protected with an approved plastic coating to prevent abrasion.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. The City may elect to conduct shop inspections. The inspections may include but not be limited to: mechanical and chemical testing, material sampling, material certifications, traceability of parts, blasting and painting, visual and dimensional inspection, and free iron contamination check on stainless steel parts.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. The Contractor shall coordinate the Work such that all process piping hangers, supports, and restraining systems shall be installed and secured prior to the testing or activation of the process pipeline on which they are installed.

3.02 INSTALLATION

A. Design:

1. Types of hangers and supports shall be kept to a minimum.

2. Wherever possible, pipe supports shall be designed using manufacturer's standard catalog products.

3. Hangers and supports shall be located to prevent vibration or swaying and to provide for expansion and contraction.

4. Hanger and support units installation methods shall be in accordance with manufacturer's recommendations.

5. Hangers and Supports for piping systems subject to thermal expansion and contraction, or to similar movements imposed by other sources, shall be designed to provide flexibility, and pipe stress analysis shall be provided.

   a. Hangers and supports shall provide for expansion and contraction throughout the full operating temperature range.

6. Where resonance with imposed vibration and/or shock occurs during operation, suitable dampeners, restraints, anchors, etc., shall be added to remove those effects.

7. Hangers' rods shall be straight and vertical. Chain, wire, strap or perforated bar hangers shall not be used. Hangers shall not be suspended from piping.

8. Contact between dissimilar metals shall be prevented by use of copper plated, rubber or vinyl coated hangers or supports.

B. Hangers and Supports Embedded in Concrete:

1. Concrete embedded items shall be installed before concrete placement.

2. Embedded items shall be fastened securely to prevent movement during concrete placement.

3. Hangers and supports shall be adjusted and grout placed as specified in Section 03 60 00, Grouting, to bring pipelines to specified elevations.

C. Supports and Hangers for Horizontal Pipes:

1. Supports and hangers for all piping shall be placed no farther apart than shown below, unless otherwise shown or specified:

   a. For ductile iron, steel, and stainless steel pipe:

      1) Maximum spacing in accordance with Table 3 of MSS-SP-69. The designer should check the capacity of the steel or building structure to which the hanger or support is attached, and adjust the maximum spacing accordingly.

      2) In addition, ductile iron pipe shall have a minimum of two supports per length and shall have a hanger or support adjacent to each end.

   b. For thermoplastic pipe, based on the following nominal pipe diameters:

      1) ≤ 1-in. dia.: 2 ft-6 in. center to center.

      2) 1½-in. to 3-in. dia.: 4 ft-0 in. center to center.

      3) 4-in. to 8-in. dia.: 6 ft-0 in. center to center.

      4) > 8-in. dia.: 8 ft-0 in. center to center.

   c. Tubing less than 1-inch diameter: In accordance with best piping practice and ASME B31.1, and as approved by the Engineer.

2. Hangers, supports, and accessories shall be located within maximum span lengths specified to support continuous pipeline runs unaffected by concentrated loadings.

3. Where hanger or support spacing does not correspond with joist or rib spacing, structural steel channels shall be attached to joists or ribs, and the pipes suspended therefrom.

D. Supports for Vertical Piping:

1. Spacing:

a. Vertical piping shall be supported at each floor and between floors by stays or braces to prevent rattling and vibration. Maximum spacing shall not exceed 25 ft.

2. Riser Clamps:

a. Riser clamp shall be placed under hub, fitting or coupling with approved solid bearing on steel sleeve.

b. Where riser clamps are used with plastic piping they shall be modified so as not to exert any compressive forces on the pipe.

3. Base elbows or welded equivalent shall be provided at vertical piping bases.

4. Top support shall have a horizontal connection, and provide for pipe expansion.

E. Pipelines installed under plumbing work shall be spaced in conformity with the requirements of the New York City Building Code or as specified herein.

F. Additional Supports:

1. In addition to any and all requirements for the placement of supports specified herein, the Contractor shall provide additional supports as follows:

a. Additional supports shall be placed immediately adjacent to any change in piping direction, at equipment, and on both sides of valves, expansion joints and couplings.

b. Suspended or supported ductile iron pipe shall have a hanger or support adjacent to each hub or flanged end.

c. Except where otherwise shown or required, horizontally valves 6-inches and larger shall be supported on each side of the valve, by pipe hangers or supports.

d. At all flexible couplings, supports shall be placed on each side and as close to the coupling as possible. Supports shall be the guide type which prevent axial movement from resulting in pipe deflection and misalignment.

e. Supports, anchorage and guidance for grooved end pipe shall be in accordance with the applicable sections of these specifications and the recommendations of the manufacturer.

G. Anchors and Sway Braces:

1. Anchors and sway braces shall be provided when required to hold the pipelines and equipment in position or alignment. Pipe anchors and braces for rigid fastening to the structures shall be attached to stainless steel anchor plates and anchor bolts set into the forms when placing concrete of new structures. Brackets and braces shall be attached to existing concrete structures with through bolts or expansion anchors.

2. Anchors, guides and restraints shall be provided for the proper operation of pipeline expansion joints.

3. Cast iron anchors shall be provided with stainless steel straps on piping, except where anchors form an integral part of pipe fittings and couplings or where an anchor of special design is required or shown on the Contract Drawings.

4. All pipe anchors, guides and restraints shall be designed to conform to ASME B31.1.

H. Expansion Joints and Flexible Couplings:

1. Supports, guides and anchors for flexible couplings and expansion joints shall be in accordance with the coupling and joint manufacturer's specification and the standards of the Expansion Joints Manufacturers Association.

I. Protection Saddles for Insulated Pipe:

1. Before placing the saddles, saddles shall be filled with either insulating cement or high density insulation cut to fit. For vapor barrier insulation, the barrier must be maintained; contact between hanger and support and bare pipe will not be permitted.

J. Adjustability:

1. Hangers and supports shall be capable of adjustment after placement of piping.

2. All points of adjustment for pipe and duct hanger rods shall be locked securely in place using double-nutting. Double-nutting means two nuts torqued directly against each other under each point of adjustment in addition to a third nut on top of the bracket. Damaging threads or tack welding as a method of locking adjustment is not permitted.

3. All threaded assemblies shall be double nutted or provided with pinned nuts. Alternately, tack welding of bolted assemblies may be acceptable unless provisions for vertical adjustment is required.

K. Any required pipe supports, for which the supports called for in this Section are not applicable, shall be fabricated or constructed from standard stainless steel shapes, concrete and anchor hardware, and shall be subject to the approval of Engineer.

3.03 FIELD TESTING / QUALITY CONTROL

A. Each pipe support system shall be tested in conjunction with the respective piping pressure tests.

1. Tests shall include cycling the piping system to duplicate operating conditions.

2. If any part of the pipe support system proves to be defective or inadequate, as evidenced by vibration or excessive movement, it shall be repaired or augmented at no additional cost to the City.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Touch-up shall be provided in the field, as required. Coating touchup shall be applied in accordance with the manufacturer's recommendations, and shall be free from spots and brush marks, to the satisfaction of the Engineer.

END OF SECTION

SECTION 40 05 19 – DUCTILE IRON PROCESS PIPE
CONTRACT NR-107

GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required to furnish, install, and test all ductile iron process pipe complete and operational.

B. The following index of this Section is presented for convenience:

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C. Schedules:

1. Refer to the following Section(s) for additional information on the piping that is to be constructed using the pipe materials and methods specified herein:

   a. Section 40 06 01 - Schedule for Exposed Piping.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 09 91 00 – Painting.

B. Section 40 05 05 – Exposed Piping Installation.

C. Section 40 05 06 – Couplings, Adapters, and Specials for Process piping.

D. Section 40 05 07 – Hangers and Supports for Process Piping.

E. Section 40 06 01 – Schedule for Exposed Piping.

1.04 REFERENCES

A.	AWWA C104	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
B.	AWWA C110	Ductile-Iron and Gray-Iron Fittings, 3-in. through 48-in., for Water and Other Liquids
C.	AWWA C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
D.	AWWA C115	Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
E.	AWWA C151	Ductile-Iron Pipe, Centrifugally Cast, for Water
F.	AWWA C153	Ductile-Iron Compact Fittings, 3-in. through 24-in. and 54-in. through 64-in., for Water Service
G.	AWWA C606	Grooved and Shouldered Joints
H.	ASTM B98	Copper Silicon Alloy Rod, Bar and Shapes
I.	ASTM C283	Resistance of Porcelain Enameled Utensils to Boiling Acid
J.	ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
K.	ASTM D714	Standard Test Method for Evaluating Degree of Blistering of Paints
L.	ASTM D5162	Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
M.	ASTM E96	Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
N.	ASTM G22	Antibacterial Test
O.	ASTM G95	Standard Test Method for Cathodic Disbondment Test of Pipeline Coatings (Attached Cell Method)
P.	ANSI/ASME B16.1	Cast Iron Pipe Flanges and Flanged Fittings
Q.	DIPRA	Handbook of Ductile Iron Pipe
R.	NY Spec 24-C-38	Caulking
S.	New York City Building Code	
T.	CEN-EN-598	Ductile iron pipes, fittings, accessories, and their joints for sewerage applications – Requirements and test methods

1.05 DESCRIPTION

A. This Section includes requirements for providing ductile iron process pipe and accessories in accordance with applicable standards and regulations. In addition:

1. The scope of this Section shall include all ductile iron process pipe, fittings, and specials.

2. The extent of ductile iron process piping is shown on the Contract Drawings. Ductile iron process pipe service, pipe diameter, coating, lining, pressure rating, joint type, and testing requirements are specified in the following section(s):

a. Section 40 06 01 - Schedule for Exposed Piping.

3. Ductile iron process pipe, fittings, appurtenances, and specials shall be furnished and installed complete with all necessary jointing materials, wall castings, wall sleeves, specials, adapters, and other appurtenances as shown on the Contract Drawings, as specified herein, and/or as necessary and required for a complete installation.

a. Couplings for ductile iron process pipe shall be provided as specified in Section 40 05 06 - Couplings, Adapters, and Specials for Process piping.

b. Hangers and support for ductile iron process pipe shall be provided as specified in Section 40 05 07 - Hangers and Supports for Process Piping.

4. Where shown on the Contract Drawings, the Contractor shall provide all labor and materials for making connections between ductile iron process pipe and existing lines(s) installed under other contracts, including all specials required to connect ductile iron process pipe to pipe of dissimilar material(s).

5. The scope of this Section shall include all painting, coating, lining, gaskets, harnesses, bolts, nuts, and other appurtenances and material required to provide and assemble the lines.

1.06 QUALITY ASSURANCE

A. Qualifications of Manufacturer:

1. The manufacturer shall have a minimum of five (5) years of experience in the design and fabrication of ductile iron process pipe, fittings, appurtenances, and specials of similar size, capacity, and type to those shown on the Contract Drawings and specified in the Contract Documents, and shall show evidence of at least five (5) substantially similar installations in satisfactory operation.

2. Linings and coatings:

a. Lining and coating manufacturer shall have a minimum of five (5) years of experience in protecting pipelines exposed to the service

conditions specified in the Contract documents, and shall show evidence of at least five (5) substantially similar installations in satisfactory operation.

3. When linings and coatings are not applied by the manufacturer, the lining and coating Subcontractor shall have a minimum of five (5) years of experience in the application of the specified linings and coatings for the specified service, and shall show evidence of at least five (5) substantially similar installations.

B. Supply and Compatibility:

1. All ductile iron process pipe, fittings, appurtenances, and specials included in this Section shall be provided by the Contractor through a single, qualified ductile iron process pipe manufacturer.

2. The pipe and fittings shall be designed, fabricated, and installed in accordance with standards referenced herein.

3. The Contractor shall bear responsibility for the quality of all factory-applied linings and coatings, regardless of the location of application.

4. The Contractor shall verify compatibility between the ductile iron process pipe, fittings, appurtenances, specials, and other Work.

C. Regulatory Requirements:

1. Ductile iron process pipe shall conform to the American National Standards Institute (ANSI) and American Water Works Association (AWWA) Standards specified herein and recommendations as given in the Ductile Iron Pipe Research Association (DIPRA) “Handbook of Ductile Iron Pipe.”

2. Ductile iron pipe for City water shall conform to the rules and regulations of the Bureau of Water Supply; requirements contrary to such rules and regulations specified herein shall be disregarded.

D. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer's facility.

2. Quality Assurance inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contract shall give ample notice to the Engineer prior to the beginning of any fabrication, so that Quality Assurance inspection may be made.

4. Quality Assurance inspections shall include (but not limited to) the following activities:

a. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer Certificates of Conformance.

b. Perform visual and dimensional inspection of completed work.

1.07 SUBMITTALS

A. Submittals for all ductile iron process pipe shall comply with the requirements of Section 40 05 05 - Exposed Piping Installation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. Pipes shall be loaded on properly padded saddles not less than 6-in. in width so that they do not bear against each other.

2. The whole load shall be securely fastened together as well as to any vehicle to prevent movement in transit.

B. The Contractor shall store, and handle materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. Special care in handling shall be exercised during delivery, storage and handling of pipe to avoid damage and setting up stresses. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.

2. The Contractor shall maintain the circular shape of the pipe and prevent distortion. Each length of pipe shall be temporarily braced with an approved type of internal spider in each end of the pipe during erection.

3. Handling Coated Pipe:

a. Coated pipe shall be protected at all times and handled with equipment designed to prevent damage to the coating, such as stout wide canvas slings and wide padded skids.

1) The use of bare chains, cables, hooks, metal bars or narrow skids in contact with the coating will not be permitted.

b. All pipe handling and hauling equipment shall meet the approval of the Engineer before use.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ductile iron process pipe and fittings shall be as manufactured by the following:

1. American Cast Iron Pipe Co., Birmingham, AL;

2. McWane Inc., Birmingham, AL;
3. U.S. Pipe and Foundry Co., Birmingham, AL;
4. Or approved equal.

B. Ceramic Epoxy Lining:

1. Protecto 401, as manufactured by Induron Protective Coatings, Birmingham, AL.
2. Or Approved Equal.

C. Expansion Joints:

1. Series 500, as manufactured by Mercer Rubber Company, Hauppauge, NY;
2. Or approved equal.

D. Flanged Adapters:

1. McWane Inc., Birmingham, AL;
2. Smith-Blair, Inc., Texarkana, AR;
3. Victaulic Co., Easton, PA;
4. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Pipe shall be in accordance with AWWA C151 for push-on or mechanical joint pipe and AWWA C115 for flanged pipe and shall be of grade 604210 ductile iron. The above standards cover ductile iron pipe with nominal pipe sizes from 3-in. up to and including 64-in. in diameter. Working pressure for the pipe shall be as called for in these Standards.

B. Pipe:

1. All pipe, including flanged pipe, for sizes up to and including 12-in. shall have a wall thickness equal to Special Thickness Class 56 as specified in AWWA C151.
2. All pipe, including flanged pipe, for sizes over 12-in. and up to 54-in. shall have a wall thickness equal to Special Thickness Class 54 as specified in AWWA C151.
3. All pipe sizes 60-in. and 64-in. shall have a wall thickness equal to pressure class 350.

C. Fittings:

1. Fittings shall be ductile iron and shall be in accordance with AWWA C110. Any other fittings, not included in AWWA C110, shall conform in design and performance to the requirements of this Standard.
2. Blind, filler, companion and reducing flanges shall conform to ANSI/ASME B16.1.

3. Where compact fittings are shown or indicated, items shall be in accordance with AWWA C153.

D. Flanged Joints:

1. Threaded Flanges: Shall be solid, threaded, ductile-iron, flanges meeting the requirements of AWWA C115. Threaded flanges and pipe shall be assembled and faced by the pipe manufacturer; field or shop assembly will not be accepted. Threaded flanges shall be screwed on tight without overstressing the threads and, when properly assembled, shall be concentric with the pipe.

2. The dimensions of all flanges for pipe fittings and specials and the number and sizes of bolts, up to and including 54-in., shall be in accordance with ANSI B16.1, Class 125 standard flanges.

3. For pipe larger than 54-in., flanged pipe shall have ANSI Class 125 flanges integrally cast solid and at right angles to the pipe axis, and accurately faced and drilled smooth and true. Flange bolt holes shall be backfaced or spot-faced as required by ANSI specifications.

4. Flanges shall be tapped where tap or stud bolts are required.

5. Bolts: Bolts shall be in accordance with Appendix A of AWWA C115 and as follows: Flanged joints shall be made with bolts or stud-bolts with a nut on each end. Bolts, stud-bolts and nuts shall be ANSI heavy dimension, semi-finish, with square heads and cold-punched hexagonal nuts. For bolts 1¾-in. in diameter and larger, stud-bolts shall be used. Bolt size shall be American Standard for ANSI Class 125 flanges. Where flanged joints are in manholes or submerged in tanks, bolts, stud-bolts, and nuts shall be silicon bronze, ASTM B98, Alloy A, of dimensions and sizes equal to steel bolts, stud-bolts, and nuts specified in Appendix A of AWWA C115.

6. Gaskets: Flange gaskets shall be in accordance with Appendix A of AWWA C115. They shall be full-face gaskets for flanged joints on 12-in. diameter and smaller pipe and shall be of the ring type for flanged joints on larger pipe.

7. After each flanged joint has been made, all bolt heads and nuts, and all surfaces of the flanges not to be painted shall be given two coats of asphaltic coating meeting the requirements of AWWA C151.

E. Grooved-Type Joints:

1. Shall be in accordance with AWWA C606 and Section 40 05 06 - Couplings, Adapters, and Specials for Process piping

F. Push-On Type Joints

1. Shall be in accordance with AWWA C111.

G. Expansion Joints:

1. Heavy Duty Rubber Expansion Joints shall be installed where shown on the Contract Drawings.
2. Each Expansion Joint shall be installed with minimum of two control rods and compression sleeves, and as shown on the Contract Drawings.

H. Mechanical Joints:

1. Mechanical joints shall be assembled in accordance with AWWA C600 where required or shown on the Contract Drawings. Joints shall be restrained or harnessed to withstand test and surge pressure.

I. Flanged Adaptors:

1. Bolt hole and bolt patterns shall conform to the mating flange patterns as specified in the piping paragraphs. Bolts, nuts, and flange gaskets shall conform to the specifications for the adjacent piping.
2. Shall have ductile iron bodies.
3. Shall have a rated working pressure of 175 psig.
4. Pipe shall be anchored by using anchor studs drilled into the coupling and connected pipe for nominal pipe size 12-in. and smaller. For nominal pipe sizes over 12-in., pipe shall be restrained by harnesses or pipe supports as specified for sleeve type couplings.

J. Harnesses:

1. Where shown, specified or required, harnesses for pipe with mechanical joints shall be provided.
2. For ductile-iron pipe and fittings with mechanical joints that require harnessing, restrained type mechanical joint pipe will be considered as an alternate upon submission to the Engineer for approval.
3. Joint Assemblies: Joint assemblies shall be designed to resist pullout of the joints at the test pressures specified for the piping system.

K. Sleeves:

1. Sleeves shall be in accordance with AWWA C110. They shall be of ductile iron and shall be provided at all points where pipes will pass through walls and floors and where wall or floor castings are not provided. Unless otherwise shown, sleeves shall have intermediate collars not less than ½-in. thick and 1½ to 2-in. high located at the center of the wall.
2. For exterior walls of structures, wall sleeves shall be plain ends and of flush wall design.
3. Where shown on the Contract Drawings, modular wall seals shall be installed in the annular space between the pipe and the sleeve. In all other locations, caulk shall be installed in the annular space between the pipe and the sleeve. Caulking materials shall be in accordance with N.Y. Spec 24-C-

38. For flanged pipe, sleeves shall be fabricated large enough to accommodate flanges.

L. Sleeve-Type Couplings:

1. Sleeve-type couplings shall be in accordance with Section 40 05 06 - Couplings, Adapters, and Specials for Process piping
2. Pipe and fittings for use with sleeve-type flexible couplings shall be plain end.
3. Sleeve wall thickness shall be the same as the associated ductile iron process pipe wall thickness.

M. Wall Castings, Connecting Pieces, and Special Fittings:

1. Wall castings and connecting pieces shall be in accordance with AWWA C110, 250 psi pressure rating, unless specified otherwise. Concrete encased wall castings connected to sluice gates and valves shall be cast from alloy iron, Ni-Resist Type 1, International Nickel Co. or approved equal. Wall castings and connecting pieces shall be furnished with ANSI Class 125 flanged ends, bell ends, flare ends and/or spigot ends where shown, specified or required.
2. Wall castings shall be of standard wall pipe dimensions, unless piping layout precludes their use, in which case special castings shall be furnished.
3. Design of Specials: Special fittings where required shall be of an approved design that meet the same specifications and have the same diameters and thicknesses as standard fittings. Any tees, crosses, elbows, laterals, reducers or other fittings of current ANSI or AWWA standard dimensions are not considered specials.
4. Intermediate Collar: Wall castings shall have an integrally cast intermediate collar not less than ½-in. thick and 1½-in. to 2-in. high located at the center of the wall unless otherwise shown.
5. Where space limitations prevent the use of through bolts for assembling flange connections, stud bolts shall be provided on wall casting flanges.

N. Cleanouts:

1. Cleanouts shall be furnished and installed where shown or specified.
2. Size: Cleanout openings shall be not less than 6-in. diameter for pipe 8-in. in diameter or larger. For pipe 6-in. in diameter or smaller, they shall be of the same diameter as the pipe.
3. Cleanout Covers: Cleanout covers which are blind flanges shall be in accordance with AWWA C110, except where conformation is required with the inside curvature of the pipe, in which case the covers shall be flanged plugs of proper shape with American Standard flange drilling.

4. Covers shall be fastened by means of Type 316 stainless steel studs, washers, and nuts, and shall be drilled and tapped for a 1½-in. diameter pipe connection.

5. Flange plugs shall be equipped with a dowel or other suitable means to provide proper setting.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Coatings and Linings:

1. General:

a. Ductile iron process pipe shall be lined and coated in accordance with the piping schedule(s) included in the following Section(s):

1) Section 40 06 01 - Schedule for Exposed Piping.

b. All bolts, nuts, couplings and the like shall be coated after the joint has been made.

c. Painting shall be in accordance with Section 09 91 00 - Painting.

d. Pipe and fittings that are to be encased in concrete shall not be painted.

2. Cement Lining:

a. All ductile-iron pipe and fittings shall be furnished with a cement-mortar lining not less than twice the standard thickness and seal coating meeting the requirements of AWWA C104.

3. Glass Lining Pipe and Fittings

a. Glass lining, pipe and fittings shall consist of a minimum of two (2) glass lining coats, one bonded or primer coat and one finish or gloss coat.

1) Each coating shall be applied in controlled thickness after the inside surface of the pipe has been prepared as required to assure a continuous and unbroken bond of the coating to the pipe.

2) The combined, finished coatings shall have a thickness from 8 to 12 mils, and a surface hardness of at least 6 on the Mohs scale.

3) The bond of the glass lining to the metal shall be sufficient to withstand a strain of 0.001-in./in. without damage to the glass.

4) Surface of glass shall have a dense, glazed finish nonadherent to grease, scum, wax or other sticky substances found in sludge.

b. Ensure that firing of pipe and applied coating layers shall provide a complete fusion to the pipe wall.

1) The compounding, firing and annealing technique shall assure a lining capable of withstanding thermal shock up to 260 °F without damage to the surface or structure of the coating or to its bond with the pipe material.

c. Finish coating shall be free from craters, porosity, crazing, scaling, or pinholes evident from visual inspection.

1) Pipe need not meet a spark test for continuity, but will be rejected for any faults detectable by visual inspection.

d. Finish coating shall be resistant to attacks from acids equivalent to a weight loss not greater than 3 mg /in^2 as determined by the procedure for testing against citric acid, ASTM C283. The coating shall protect against etching or loss of gloss when subjected to cleaning procedures employing a 200°F water-steam mixture.

e. Glass-lined pipe shall not deviate more than 0.0125-in./ft of length from a centerline perpendicular to the flange face or square end of the pipe.

4. Ceramic Epoxy Lining:

a. Lining applicator:

1) Lining shall be applied by a certified firm or manufacturer with a successful history of applying linings to the interior of ductile iron pipe and fittings.

2) Manufacturer must be independently inspected at least two (2) times per year with certification stating compliance with the requirements specified herein.

b. Lining materials: Amine cured novolac epoxy containing at least 20% by volume of ceramic quartz pigment, and shall have:

1) A permeability rating of 0.00 as per Method A of ASTM E 96, Procedure A (test duration of 30 days).

2) Results equal to 0.0 undercutting after two years as per ASTM B 117.

3) Results to equal no more than 0.5mm undercutting after 30 days as per ASTM G 95 cathodic disbondment 1.5 volts at 77°F.

4) Immersion testing rated using ASTM D 714, with the following results after two years' duration testing of:

a) 20% Sulfuric acid: No effect.

b) 140°F 25% Sodium Hydroxide: No effect.

c) 160°F Distilled Water: No effect.

d) 120°F Tap Water (scribed panel): 0.0 undercutting with no effect.

5) Results of only trace growth using ASTM G 22 at 30°C after 7 days.

6) An abrasion resistance of no more than 3 mils (.075 mm) loss after one million cycles using European Standard EN 598, Section 7.8.

c. Application:

1) Condition of pipe prior to application: Prior to application of the ceramic epoxy lining:

a) Interior: No other coating or lining shall have been applied to the entire interior of the pipe.

b) Exterior: No other coating or lining shall have been applied to the first six inches of the exterior of the spigot ends.

2) Surface preparation:

a) Inspect application area for oil, grease, etc. prior to abrasive blasting. Solvent clean if necessary or required for coating application.

b) Abrasive blast application area using sand or grit abrasive media to remove all rust, loose oxides, etc. Only slight stains and tightly adhering oxide shall remain on application surface. If rust reappears before application, or if more than 12 hours elapses before application, repeat blasting procedure specified herein.

3) Lining:

a) Pipe shall be lined within 12 hours of surface preparation.

b) Apply 40 mils nominal dry film thickness to interior of pipe.

c) Lining shall not take place when the substrate or ambient temperature is below 40°F.

d) Ensure surface is dry and dust free.

e) Do not apply lining to flange faces.

4) Coating of Bell Sockets and Spigot Ends

a) Apply joint compound as per Manufacturer's instructions to the gasket area and spigot end up to 6 in. back from the end of the spigot end.

b) Apply 6 mils nominal, 10 mils maximum even coverage.

c) Manufacturer's joint compound shall be applied by brush to ensure full and complete coverage.

d) Care should be taken that the joint compound is smooth without excess buildup in the gasket seat or on the spigot ends.

e) Coating of the gasket seat and spigot ends shall be done after the application of the lining.

5) Number of Coats

a) The number of coats of lining material applied shall be as recommended by the lining manufacturer.

b) In no case shall lining material be applied above the dry thickness per coat recommended by Manufacturer in printed literature.

c) The maximum or minimum time between coats shall be that time recommended by Manufacturer.

d) To prevent delamination between coats, no material shall be used for lining which is not indefinitely re-coatable with itself without roughening of the surface.

6) Touch-Up and Repair

a) Use Manufacturer's joint compound for touch-up or repair in accordance with Manufacturer instructions

d. Inspection:

1) All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge as per SSPC PA-2.

2) Test interior of all pipe and fittings for pinholes with a non-destructive 2500-volt test in accordance with ASTM D5162. Any defects found shall be repaired and re-inspected prior to shipment.

e. Mark each pipe joint and fitting with the date of application of the lining system along with its numerical sequence of application on that date. Numerical sequence shall correspond with records maintained by the applicator of the Work.

5. Exterior Primer:

   a. Pipe and fittings shall be shop coated on the outside in accordance with Section 09 91 00 - Painting, for use in exposed locations, such as inside buildings where finish painting or insulating is required.

6. Painting:

   a. Pipe and fittings shall be painted in accordance with the requirements of Section 09 91 00 - Painting.

7. Asphaltic Coating:

   a. Pipe and fittings that will not be exposed to view shall be coated with the standard asphaltic outside coating specified in AWWA C151, at twice the specified thickness.

   b. Unlined pipe shall be coated with the standard asphaltic inside coating specified in AWWA C151.

8. Epoxy and Urethane Coatings:

   a. Epoxy and urethane coatings shall be applied in accordance with Section 09 91 00 - Painting.

9. Concrete Encased Pipe:

   a. Pipe and fittings which are to be encased in concrete where water-tightness is to be obtained shall not be coated or painted on the outside.

10. Labels:

   a. In addition to the information required to be cast onto the pipe by AWWA C151, the letters "N.Y.C." shall be painted on the outside of each pipe, fitting, and special casting.

11. Pipe Couplings:

   a. Where flexible or rigid couplings are to be used, the exterior coating on the ends of pipe and fittings shall be left off for approximately 8-in., but the interiors shall be lined throughout.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Damaged pipe will be rejected and shall be replaced at the Contractor's expense.

3.02 INSTALLATION

A. Install ductile iron process pipe, fittings, and specials in accordance with the requirements of the following Section(s):

1. Section 40 05 05 - Exposed Piping Installation.

3.03 FIELD TESTING / QUALITY CONTROL

A. Perform field testing and quality control of ductile iron process pipe, fittings, and specials in accordance with the requirements of the following Section(s):

1. Section 40 05 05 - Exposed Piping Installation.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 05 53 – PROCESS VALVES FOUR-INCH DIAMETER AND LARGER
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to furnish, install, and test all process valves four-inch diameter and larger complete and operational.

B. The following index of this Section is presented for convenience:

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C. The following schedule(s), attached after the End of Section designation, are a part of this Section:

1. Schedule 40 05 53-1, Process Valves Four-inch Diameter and Larger.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 05 05 23.01 – Welding

B. Section 09 91 00 – Painting

C. Section 40 05 97 – Identification for Process Equipment

D. Section 40 06 01 – Schedule for Exposed Piping

1.04 REFERENCES

A. Abbreviations and Acronyms:

1.	NRS	Non Rising-Stem
2.	OS&Y	Outside Screw and Yoke
3.	FS	Federal Specification

B. Definitions:

1.	Non-ferrous metals:	All metal mixtures including copper, tin, zinc, lead, and/or other metals, in which iron does not predominate.

C. Reference Standards:

1.	ASME B16.1	-	Gray Iron Pipe Flanges and Flanged Fittings Classes 25, 125 and 250
2.	ASME B16.34	-	Valves-Flanged, Threaded, and Welding End
3.	API 594	-	Check Valves: Flanged, Lug, Wafer and Butt-welding
4.	API 598	-	Valve Inspection and Testing
5.	API 609	-	Butterfly Valves: Double-flanged, Lug- and Wafer-type
6.	ASTM A126	-	Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings
7.	ASTM A193	-	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
8.	ASTM A194	-	Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
9.	ASTM A240	-	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
10.	ASTM A276	-	Standard Specification for Stainless Steel Bars and Shapes

11.	ASTM A351	-	Standard Specification for Castings, Austenitic, for Pressure-Containing Parts
12.	ASTM A380	-	Standard Specification for Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems
13.	ASTM A536	-	Standard Specification for Ductile Iron Castings
14.	ASTM A564	-	Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes
15.	ASTM A743	-	Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application
16.	ASTM B62	-	Standard Specification for Composition Bronze or Ounce Metal Castings
17.	ASTM B138	-	Standard Specification for Manganese Bronze Rod, Bar and Shapes
18.	ASTM B164	-	Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire
19.	ASTM B265	-	Standard Specification for Titanium and Titanium Alloy Strip, Sheet, and Plat
20.	AWWA C500	-	Metal-Seated Gate Valves for Water Supply Service
21.	AWWA C501	-	Cast-Iron Sluice Gates
22.	AWWA C504	-	Rubber-Seated Butterfly Valves
23.	AWWA C507	-	Ball Valves, 6 In. Through 60-in.
24.	AWWA C508	-	Swing-Check Valves for Waterworks Service, 2 In. Through 24-in.
25.	AWWA C509	-	Resilient-Seated Gate
26.	AWWA C541	-	Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates
27.	AWWA C542	-	Electric Motor Actuators for Valves and Slide Gates
28.	AWWA C550	-	Protective Interior Coatings for Valves and Hydrants

29.	ASTM D1418	-	Standard Practice for Rubber and Rubber Latices—Nomenclature
30.	FS TT-C-494B	-	Coating Compound-Bituminous Solvent Type, Acid Resistant
31.	AISI 1144	-	Carbon Steel

1.05 DESCRIPTION

A. The scope of this Section includes requirements for all process valves, four-inch diameter and larger, in accordance with applicable standards and regulations. In addition:

1. All other valves referenced in Schedule 40 05 53-1, located after the "End of Section" designation, shall be for liquid service, unless otherwise explicitly indicated for air or digester gas service.

1.06 QUALITY ASSURANCE

A. Quality Assurance Inspections:

1. Quality Assurance inspections may be made by NYC DEP Bureau of Engineering Design and Construction, Quality Assurance Section or its representative at the manufacturer’s facility.

2. Quality Assurance Inspections shall be in accordance with the requirements of the Contract Documents.

3. The Contract shall give ample notice to the Engineer prior to the beginning of any fabrication, so that QA inspection may be made.

4. QA inspections shall include (but no be limited to) the following activities:

a. Obtain representative material samples of main components.

b. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer's Certificates of Conformance.

c. Perform visual and dimensional inspection of completed work.

d. Witness surface preparation and coating and lining operations, paint peel tests, and holiday tests.

e. Witness any required hydrostatic, shop leakage and performance tests.

B. Manufacturer's Qualifications:

1. Manufacturer shall have a minimum of 5 years of experience in the production of substantially similar valve equipment, and shall show evidence of satisfactory service in at least 5 installations.

C. Supply and Compatibility:

1. Each type of valve, inclusive of all sizes specified for that type of valve, shall be the product of one (1) manufacturer.

D. Welding Work:

1. All welding work, qualification, and inspections shall conform to the requirements of Section 05 05 23.01 - Welding, and is subject to Quality Assurance inspection.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Quality Assurance Requirements:

1) All information necessary and required to substantiate approval of a valve manufacturer in accordance with the quality assurance requirements of this Section.

b. Shop Drawings:

1) Associated valve tag number(s) as specified in Schedule 40 05 53-1, located after the "End of Section" designation.

2) Complete catalog information, descriptive literature, specifications, and identification of all materials of construction.

3) Product data sheets for make and model. The valve(s) with size(s) and option(s) being submitted for approval are specifically identified in the product data sheet(s).

4) Power and control wiring diagrams, including terminals and numbers.

5) Complete nameplate data of electric actuators.

6) Spare parts list.

7) Special tools list.

c. Calculations:

1) Sizing of electric actuators.

2) Sizing of operating mechanisms with extension stems.

3) Sizing of gear actuators.

4) Sizing of anchor bolts.

d. Operation and Maintenance Data: Submit complete manuals including:

1) Copies of all approved Shop Drawings, test reports, maintenance data and schedules, description of operation, and spare parts information.

e. Samples:

1) 1 ft. of chain for chain wheel operated valves.

2. Information Submittals:

a. Material test reports representing all major components of valves and operators shall be submitted. All such components shall be traceable to the original heat and/or lot numbers unless otherwise approved.

b. Certificates of compliance with AWWA Standards, if applicable.

c. Certificate of chemical composition and compliance with ASTM standard for anchor and miscellaneous mounting bolts.

d. Certificate of suitability of all valve materials for the specified service.

e. Certified copies of shop test results and inspection data.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials provided under this Section in accordance with the requirements of the Contract Documents.

B. The Contractor shall store, and handle materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. Valves and associated appurtenances shall be handled carefully. Valves which are dropped, dented, cracked, and/or otherwise damaged shall not be accepted.

2. Provide full-face protectors of waterproof material fastened to each side of the valve body to protect joints and the valve interior.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Contractor shall provide spare parts and special tools necessary to service, disassemble, repair, and adjust the equipment provided under this Section, and as per the requirements of the Contract Documents. In addition:

1. Provide spare part sets for the following types of valves:

a. Gate Valves: Each spare part set shall consist of the following:

1) One (1) set of gaskets.

2) One (1) set of glands.

3) One (1) set of bushings.

b. Butterfly Valves: Each spare part set shall consist of the following:

1) One (1) set of bearings.

2) One (1) set of bearing seals or O-rings.

3) One (1) set of packing.

4) One (1) disc seat (if replaceable).

c. Plug Valves: Each spare part set shall consist of the following:

1) One (1) set of gaskets.

2) One (1) set of packing.

3) One (1) set of upper and lower journal bearings.

d. Check Valves: Each spare part set shall consist of the following:

1) One (1) set of seat rings.

2) One (1) set of hinge bushings.

3) One (1) set of pins.

e. Ball Valves: Each spare part set shall consist of the following:

1) One (1) set of bearings.

2) One (1) set of bearing seals or O-rings.

3) One (1) set of packing.

2. The quantities of spare parts sets to be furnished as part of the Work are given in Table 40 05 53-1, below. Furnish the quantity of spare parts sets given in the table for each type and each size of valve included in this Section.

TABLE 40 05 53-1
QUANTITIES OF SPARE PARTS SETS TO FURNISH

Number of Valves Installed	Sets of Spare Parts Required
1 - 5	1
6 - 10	2
11 - 15	3
16 - 30	5
Greater than 30	5 + (1 for every 10 additional valves)

B. Tools: Provide standard and special tools and supplies necessary to service, disassemble, repair, and adjust the equipment, products. In addition:

1. The following tools shall be furnished:

a. T-Handle Operating Wrenches: As specified herein.

1.10 WARRANTY

A. Not Used.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gate Valves (Metal-Seated):
   1. J & S Valves, Huffman, TX.
   2. Or approved equal.

B. Gate Valves (Resilient-Seated):
   1. J & S Valves, Huffman, TX.
   2. Or approved equal.

C. Plug Valves (Liquid Service):
   1. DeZurik, as manufactured by DeZurik APCO Hilton, Inc., Sartell, MN;
   2. Or approved equal.

D. Ball Valves (Rubber Seated):
   1. Henry Pratt Co., Aurora, IL;
   2. Or approved equal.

E. Check Valves for Liquid Service:
   1. VAG USA LLC., Cranberry Township, PA;
   2. Or approved equal.

F. Automatic Pressure Reducing, Pressure Sustaining and Electric Check Valves:
   1. VAG USA LLC., Cranberry Township, PA;
   2. Or approved equal.

G. Motor-Operators (Open/Close and Modulating):
   1. AUMA Actuators, Canonsburg, PA;
   2. EIM Controls, Houston, Texas.;
   3. Limitorque, Irving, TX;
   4. Rotork, Bath, United Kingdom;
   5. Or approved equal.

H. Pneumatic Actuators (Open/Close):
   1. AUMA Actuators, Canonsburg, PA;
   2. Emerson Electric Co., St. Louis, MO;
   3. Limitorque, Irving, TX;
   4. Rotork, Bath, United Kingdom;
   5. Or approved equal.

I. Position Indicators:

1. Trumbull Industries, Inc., Youngstown, OH.

2. Or approved equal.

J. Stainless Steel Bracket for Position Indicators:

1. Trumbull Industries, Inc., Youngstown, OH.

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Materials of Construction:

a. Compatibility for Service:

1) All materials of construction of the valves shall be confirmed suitable for the application by the valve manufacturer.

b. Wetted parts of the valve shall be protected from galvanic corrosion.

c. Ferrous Metals:

1) Cast iron of the valves, unless otherwise specified, shall conform to ASTM A 126, Class B.

d. Non-Ferrous Metals:

1) Non-ferrous metals shall be provided with standard composition and physical properties conforming to ASTM standards except as otherwise indicated.

2) All non-ferrous metals shall be made from new metals of purest commercial quality. Scrap can be used only when it is the result of the processes of manufacture of articles of similar composition.

3) Bronze items shall have one of the following compositions as specified herein:

a) Composition "A" conforming to ASTM B 61 (Alloy UNS No. C92200) or B 62 (Alloy UNS No. C83600).

b) Composition "B" conforming to ASTM B 61 (Alloy UNS No. C92200) or an approved standard composition having good wear and corrosion resisting qualities and sufficiently ductile for peening into dove-tail grooves.

c) Composition "C" conforming to ASTM B 584, Copper Alloy UNS No. C86500 or C86400; or ASTM B 21, Copper Alloy UNS No. C46400; or ASTM B 124, Copper Alloy UNS No. 37700.

d) Composition "D" conforming to ASTM B 584, Copper Alloy UNS No. C86200 or C86700; or B 21, Copper Alloy UNS No. C46400.

e. Metal Castings:

1) Castings shall be true to pattern, sound, smooth, and without injurious cold shuts, swells, lump scabs, scoria, sand holes, and/or other defects and imperfections.

2) Weld repair will not be allowed without the written permission of the Engineer.

a) Map all defects over ¼-in. wide or ¼-in. deep.

(1) If such defects add up to ten percent or more of the total open surface area, then the casting will be rejected unless waived by the Engineer.

b) Map defects smaller than ¼-in. if they are densely concentrated, and report to the Engineer for approval or repair.

c) Conduct repairs permitted by the Engineer per approved procedures.

(1) Any acceptable casting defect that affects the paint integrity shall be plugged or filled using approved methods and only with the consent of the Engineer.

3) All castings shall be thoroughly, inside and outside, free from sand and dust.

a) Use wire brushes, scrapers or other approved mechanical appliances for this purpose.

b) Do not use acid or other corrosive liquids in cleaning castings.

4) Deviation in casting thickness (for each valve):

a) For valve body castings having a standard thickness < 0.8-in.:

(1) Maximum deviation from the standard thickness: < 0.08-in.

b) For valve body castings having a standard thickness ≥ 0.8-in.:

(1) Maximum deviation from the standard thickness: ≤ 10% of standard thickness.

c) Maximum area of casting over which deficiencies in thickness extend: ≤ 50% of surface area.

5) Identification and Pressure Rating:

a) All valves shall have manufacturer's name and rated pressure cast in raised letters on the valve body.

6) Direction to Open:

a) All valves shall have permanent markings for direction to open.

2. End Connections:

a. Unless otherwise explicitly shown or specified, valves shall be furnished with the following end connections:

1) For exposed valves:

a) Shall have flanged ends.

b) Flanges shall conform to:

(1) For Class 150 valves: ANSI B16.1, Class 125.

(2) For Class 250 valves: ANSI B16.1, Class 250 and Class 300.

c) Pressure class of valve flanges shall be based on pressure class of connected piping as specified in Section 40 06 01 - Schedule for Exposed Piping.

3. Operation:

a. Manual operators shall include hand wheel, chain, crank, lever and a T-handle operating wrench.

b. Direction: clockwise to close (unless otherwise specified in Schedule 40 05 53-1 - located after the "End of Section" designation).

c. Force required to open or close manual valves: ≤ 40-lbf.

1) Applies to all manual valves, with or without extension stems.

2) Shall apply to open or close against the specified criteria for the adjoining pipeline specified in:

a) Section 40 06 01 - Schedule for Exposed Piping.

d. Design pull force on manual operator: ≥ 200-lbf.

e. Design input torque on actuator nut: ≥ 300 ft-lbs.

4. All valves shall be constructed such that operation at the lower range of operating pressures specified shall not result in any leakage.

B. Gate Valves (Metal-Seated):

1. General:

a. Metal seated gate valves shall conform to the requirements of AWWA C500.

b. Types:

1) Unless double disc type (or another type) is specified in Schedule 40 05 53-1, located after the "End of Section" designation, valves shall be solid wedge gate type.

c. Design Working Pressures:

1) For valves ≤ 12-in.: 200 psig.

2) For valves > 12-in.: 150 psig.

d. Maximum Fluid Temperature: 150°F, unless a higher temperature is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

e. Where shown on the Contract Drawings, bypasses shall be provided for valves 16 in. and larger. Bypasses shall be of bolted construction and the bypass valves shall be similar to the main valves. Minimum size of the bypass valves shall be as specified in AWWA C500.

2. Materials:

a. All materials of construction shall conform to the requirements of AWWA C500.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body, Bonnet, Stuffing Box, and Discs: Gray iron or ductile iron.

2) Seat and Disc Rings: Bronze, Composition "A".

3) Stem and Stem Nut:

a) For valves ≤ 24-in.: Bronze, Composition "C".

b) For valves > 24-in.: Bronze, Composition "D".

4) Disc Pin and Side Spreader: Bronze.

5) Top and Bottom Wedge Nuts: Cast iron with integrally cast bronze bushing.

6) Guide Contacts for valves ≥ 16-in.: Bronze.

7) Rollers and Tracks: Bronze.

8) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

9) All Rubber Items: Acrylonitrile butadiene synthetic rubber.

3. Construction:

a. Provide NRS for:

1) Exposed valves: ≤ 48-in.

b. Provide OS&Y for:

1) Buried valves 4-in. through 12-in.

c. Tongue-and-groove guides:

1) Provided for all solid-wedge gate valves.

4. Appurtenances:

a. Gear Actuators for Manual Valves:

1) Each valve shall be provided with gear actuators conforming to the requirements of AWWA C500.

a) The gear actuators shall be sized for maximum differential pressures as specified herein.

b. Position indicators:

1) Provide all NRS valves for exposed service with position indicators.

C. Gate Valves (Resilient-Seated):

1. General:

a. Resilient seated gate valves shall conform to AWWA C509.

b. Design Working Pressures:

1) For valves ≤ 12-in.: 200 psig.

2) For valves > 12-in.: 150 psig.

c. Maximum Fluid Temperature: 150°F, unless a higher temperature is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

2. Materials:

a. All materials of construction shall conform to the requirements of AWWA C509.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body, Bonnet, and Stuffing Box: Cast iron

a) Shall conform to the requirements of ASTM A126, Class B.

2) Wedge:

a) Cast iron, symmetrically and fully encapsulated with molded rubber.

(1) Rubber thickness: ≥ ⅛-in.

3) Stem: Manganese Bronze.

a) Alloy: UNS C86500

b) Shall conform to the requirements of ASTM B 584.

4) All Rubber Items: Acrylonitrile butadiene synthetic rubber.

5) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. The valves shall be provided with fully encapsulated resilient wedges.

4. Appurtenances:

a. Gear Actuators for Manual Valves:

1) Each valve shall be provided with gear actuators conforming to the requirements of AWWA C500.

a) The gear actuators shall be sized for maximum differential pressures as specified herein.

D. Plug Valves (Liquid Service):

1. General:

a. All plug valves shall be of rectangular port, eccentric type unless otherwise specified.

1) Minimum Port Area: 100% of nominal pipe area.

a) Plug valves shall permit pigging with pigs equal to the interior diameter of the connected piping.

b. Design Working Pressures:

1) For valves ≤ 12-in.: 175 psig.

2) For valves > 12-in.: 150 psig.

c. Maximum Fluid Temperature: 180°F.

2. Materials:

a. The materials of construction for the various components of each valve shall be as follows:

1) Body: Ductile-iron, Grade 65-45-12.

a) Shall conform to the requirements of ASTM A 536.

2) Plug Core: Ductile-iron, Grade 65-45-12.

a) Shall conform to the requirements of ASTM A 536,

3) Plug Facing: Neoprene.

a) Hardness: ≥ 70 (Shore A) durometer.

4) Seats:

a) Overlay:

(1) Nickel content: ≥ 90%.

5) Stem Bearings: Type 316 stainless steel, that has been sintered and oil-impregnated.

6) Seal: Neoprene.

7) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. Plug:

1) Shall have a cylindrical seating surface eccentrically offset from the center of the plug shaft.

a) The interface between the plug face and body seat, with the plug in the closed position, shall be externally adjustable in the field with the valve in the line under pressure.

2) Shall be supported to top bearing by the use of spring that is externally adjustable.

3) For valves ≤ 6-in.:

a) Plugs shall be fully encapsulated with rubber.

4) For valves > 6 in.

a) Plugs with rubber facing shall be furnished, unless fully encapsulated plugs are specified herein.

5) Thickness of rubber lining: ≥ ⅛-in.

6) The rubber to metal bond shall withstand minimum 75 lbf. pull conforming to ASTM D 429, Method B.

b. Seats:

1) Shall have a welded overlay ≥ ⅛-in. thick.

2) Overlay shall cover all surfaces contacting the plug face.

c. Valves shall provide drip-tight bi-directional shutoff at the design working pressure, operating pressures, and test pressures.

d. Stem seal shall be multiple V-Ring type.

e. Stem bearings shall be permanently lubricated.

f. Packing and packing gland:

1) Shall be accessible without disassembly of the valve; and

2) Shall be externally adjustable; and

3) Shall be accessible for adjustment without requiring the removal of actuator from the valve.

4. Appurtenances:

a. Valves shall be tagged or marked by the manufacturer to indicate the proper mounting position as specified herein.

b. Gear Actuators for Manual Valves:

1) Each valve shall be provided with gear actuators as specified herein, except:

a) 4-in. valves located < 6 ft. above the operating floor.

2) The gear actuators shall be sized for the following differential pressures:

a) For valves ≤ 8-in.: 175 psig.

b) For valves > 8-in.: 100 psig, unless a greater pressure differential is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

E. Ball Valves (Rubber Seated):

1. General:

a. Rubber seated ball valves shall conform to the requirements of AWWA C507.

b. Design Working Pressure: 150 psig, unless a higher pressure is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

c. Maximum Gas Temperature: 180°F, unless a higher temperatures is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

d. Sizes: 6-in., up to and including 48-in.

2. Materials:

a. The materials of construction for the various components of each valve shall be as follows:

1) Body: Gray iron, ductile iron, or cast steel.

2) Ball: Gray iron, ductile iron, or cast steel.

3) Rubber Seats in Body, Bearing Seal O-Rings, and Packing: Acrylonitrile butadiene synthetic rubber, or another synthetic rubber suitable for the application.

4) Seating Surface on Ball: Type 316 stainless steel or nickel-chrome.

5) Shaft: Type 316 stainless steel.

6) Tapered Pins for Attachment of Shaft to Ball: Type 316 stainless steel.

7) Bearings: Polytetrafluoroethylene -lined with fiberglass backing, self-lubricating.

8) Thrust Collar and Stud Bolt of Thrust Bearing Assembly: Type 316 stainless steel.

9) Shaft Seals: Self-adjusting V-type chevron packing, material same as of rubber seats.

10) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. The body shall have full, unobstructed, circular inlet and outlet port diameters equal to the nominal size of the valve and the connected piping.

b. The valve bodies shall have support legs or pads to support the valve and actuator weight when installed in a horizontal pipeline.

c. The ball assembly shall be supported by a two-way thrust bearing assembly consisting of a stud and thrust collar in a grease packed cavity suitable for lifetime lubrication.

d. The valves shall provide drip-tight bi-directional shut-off at the design working pressure as well as operating pressure.

e. Valve seats shall seal a full 360° circumference without interruption.

f. Valve seats shall be field adjustable around the 360° circumference and replaceable without dismantling the operator, shaft or ball.

g. Packing shall be:

1) Self-adjusting, chevron type; and

2) Shall be accessible without having to dismantle the valve.

4. Appurtenances:

a. Gear Actuator for Manual Valves:

1) Gear actuators shall conform to the requirements AWWA C507.

2) The gear actuators shall be sized for the following differential pressures:

a) For valves ≤ 10-in.: Shall be sized for the differential pressure equal to the design working pressure of the valve and port velocity of 35 ft/s.

b) Fr valves > 10-in.: Shall be sized for maximum differential pressures and flow velocities as specified in Schedule 40 05 53-1, located after the "End of Section" designation.

F. Check Valves (Liquid Service):

1. General:

a. Check valves shall conform to the requirements of AWWA C508.

b. Design Working Pressure:

1) For check valves < 12-in.: 175 psig.

2) For check valves ≥ 12-in.: 150 psig.

c. Sizes: ≤ 24-in.

d. Type: Swing style, resilient-seated.

e. Check valves shall be suitable for horizontal or vertical mounting.

2. Materials of Construction:

a. All materials of construction shall conform to the requirements of AWWA C508.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body, Disc, Cover and Gland: Cast-iron.

2) Disc Arm: Ductile iron.

3) Hinge Shaft: Type 316 stainless steel.

4) Hinge Shaft Bushings: Bronze, ASTM B 62, Alloy UNS C83600.

5) Shaft End Plate: Type 316 stainless steel.

6) Body Seat and follower ring on rubber seat on disc: Type 316 stainless steel.

7) Disc Center Pin Assembly: Type 316 stainless steel.

8) Air Cushion Chamber:

a) Chamber and Plunger: Bronze, ASTM B 62, Alloy UNS C83600.

b) Linkages and Pins: Type 316 stainless steel.

c) Air Check Valve and Tubing: Brass.

9) All Rubber Items:

a) For service ≤ 180°F: Acrylonitrile butadiene synthetic rubber.

b) For service > 180°F: ASTM D1418 FKM fluoropolymer elastomer synthetic rubber.

10) All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

11) Gland Packing: Graphite and Kevlar.

3. Construction:

a. Check valves shall have a clear waterway with full open area equal to the pipe size.

b. Check valves shall be provided with outside adjustable weight and lever.

c. For check valves > 6 in.:

1) Provide hydraulic cushion chambers manufactured by Golden Anderson and APCO.

d. Check valve seats shall be:

1) Field replaceable; and

2) Valve seats shall be mechanically attached.

G. Automatic Pressure Sustaining Valves:

1. General:

a. Automatic pressure sustaining valves shall maintain a minimum set point upstream pressure regardless of variations in flow demand and/or variations in downstream pressure.

1) The valve will open on an increase in upstream pressure and close on a decrease in upstream pressure to maintain the required set point upstream pressure.

b. Rated Working Pressure:

1) Automatic Pressure Reducing Valves ≤ 12-in.: 250 or 500 psig.

2) Automatic Pressure Reducing Valves > 12-in.: 250 psig.

c. Sizing Data:

1) Refer to Schedule 40 05 53-4, located after the "End of Section" designation.

2) The downstream set point pressure shall be field adjustable over the range from 110% down to approximately 0%.

2. Materials:

a. Body:

1) Cast iron, ASTM A126, Class B; or

2) Ductile Iron, ASTM A536.

b. Piston: Bronze, ASTM B62.

c. Liner: Bronze, ASTM B62.

d. Seat crown: Bronze, ASTM B62.

e. Indicator rod and hardware: Bronze, ASTM B62.

f. Vent tube: Bronze, ASTM B62.

g. Glands: Bronze, ASTM B62.

h. All Flexible Items: Acrylonitrile butadiene synthetic rubber or other synthetic rubber suitable for the application.

i. Packing: Polytetrafluoroethylene.

j. All internal and external bolting and other hardware including pins, set screws, studs, bolts, nuts and washers: Type 316 stainless steel.

3. Construction:

a. Type:

1) Shall be either of the following, as shown on the Contract Drawings:

a) Pilot operated globe; or

b) Angle style valves.

b. The flow area shall be equal to nominal pipe area when valve is fully open.

c. The valves shall include a one-piece piston and a full stroke length liner.

1) The seating shall include a replaceable resilient seat ring mounted on underside of the piston and a metal seat integral with the liner or attached to the valve body.

d. Provide V-ports for pressure control at low flows.

e. The valves shall provide a drip-tight shut-off at the rated pressure when closed.

f. Provide a removable flanged cover to access the valve internals.

g. Provide an indicator rod attached to the piston for visual position indication of the piston.

h. Control piping:

1) The pilot control piping shall include the following minimum items:

a) A needle valve for field adjustment of closing speed.

b) A pilot valve to adjust the required set point upstream pressure.

c) A Y-strainer with a valved blow-off connection.

d) Isolation valves.

2) All control piping components (including piping, tubing, fittings, valves and Y-strainer) shall be brass or bronze with stainless steel wetted trim.

H. Gear Actuators for Manual Valves:

1. General:

a. Gear actuators shall be designed to hold the valve in any intermediate position without creeping or vibrating.

2. Materials:

a. Housing: Cast Iron, ASTM A126, Class B.

b. Gear Sector: Ductile Iron, ASTM A536.

c. Worm Gear: Steel, AISI 1144, hardened and tempered to an average Rc 40 and within range of Rc 35-45.

d. All Bearings: Bronze oil impregnated.

e. All Hardware including Bolts, Nuts, Washers, Set Screws and Pins: Type 316 stainless steel.

3. Construction:

a. Each actuator shall have all gearing totally enclosed.

b. The operator shaft and the gear sector shall be supported on permanently lubricated bronze bearings.

c. Metal encased spring loaded seals shall be provided in top and bottom covers of the gear housing.

d. Diameter ratio of the handwheel or the chainwheel and the gear sector: < 2.

e. For buried or submerged valves, the gear actuator shall be grease-packed and designed to withstand submersion and be droptight in water to 20 ft. head.

4. Appurtenances:

a. A valve position indicator shall be provided on each actuator. Stop-limiting devices shall be provided for open and closed position.

b. An adjustable stop shall be provided to adjust the seating pressure.

I. Electric Actuators (Open/Close):

1. General:

a. Electric actuators for open/close service shall conform to the requirements of AWWA C542.

b. Application Criteria:

1) Ambient Temperature Rating: -20°F to +150°F.

2) Ambient Humidity: 100%.

3) Maximum design differential pressures and forward/reverse flows applicable to the valves:

a) Refer top Schedule 40 05 53-1, located after the "End of Section" designation.

b) For the service conditions of exposed piping on which the actuated valve is installed, refer to Section 40 06 01.

4) Power Supply: 480 volts, 3 phase, 60 Hz.

5) Control Voltage: 120 volts, single phase, 60 Hz.

6) Torques: Per valve manufacturer.

7) Duty Cycle: ≥ 6 starts / hr.

8) Each electric actuator shall be equipped with a handwheel for manual operation.

a) The handwheel shall be connected such that operation by the motor will not cause the handwheel to rotate.

b) Should power be returned to the motor while the handwheel is in use, design of the unit shall prevent transmission of the motor torque to the handwheel.

9) The actuator shall be operable with handwheel or chainwheel even after the electric motor has been disengaged and removed for repairs.

c. Remote Control Panels:

1) Provide separate remote control panels for all valves with electric actuators located ≥ 6.00 ft. above the operating floor.

2) The separate remote control panels shall be provided with separate push-button stations.

3) The separate remote control panels shall be installed approximately 5 ft. above the operating floor at an approved location.

4) Electrical wiring shall be modified as required for the remote location of the control panels.

d. Sizing of each electric actuator shall be coordinated with the valve manufacturer who shall furnish the valve and the electric actuator as a unit.

e. The electric actuators shall be suitable for the valve orientation as shown on the Contract Drawings.

f. All electrical components shall conform to the area classification shown on the Contract Drawings.

2. Materials and Construction:

a. Electric Motor:

1) Motor shall be specifically designed for valve actuator service. It shall have high torque characteristics and shall have a maximum continuous total temperature rating of 70°C.

2) The motor shall be sized for at least 1.5 times the actuator torque requirement.

b. Actuator Gearing:

1) Housing: Die-cast aluminum.

2) Close coupled to electric motor.

3) Input Shaft Gearing: Spur or bevel gear assembly.

4) Output Shaft Gearing: Self-locking worm gears with minimum gear backlash to prevent valve disc chatter or vibration. The gearing shall be rated for twice the required actuator torque.

5) All gearing shall be of hardened alloy steel or a combination of hardened alloy steel and alloy bronze, accurately cut by hobbing machine.

6) Lubrication: Oil bath or grease.

7) Bearings: Ball or roller with a minimum B-10 life of 100,000 hrs.

8) Input Shaft: Hardened alloy steel.

9) Provide mechanical stops adjustable from 0° to 90° at each end of travel.

c. Limit Switches:

1) Each actuator shall be provided with "end of travel" limit switches to allow control of desired end position for each direction of travel.

2) Travel stops shall be threaded and of Type 316 stainless steel to allow adjustment at each end of actuator stroke.

3) Open and close limit switches shall be geared to the drive mechanism and in step at all times, whether the unit is operated electrically or manually and whether or not the actuator is powered by the 3-phase power supply. Friction devices or set-screw arrangements shall not be used to maintain the setting.

4) Limit switch gearing shall be appropriately lubricated.

5) The driven mechanism shall be totally enclosed to prevent entrance of foreign matter or loss of lubricant.

6) Each actuator shall be provided with four auxiliary contacts. Two contacts shall close and two contacts shall open at a desired end position for each direction of travel.

7) Switches shall be rated 5A or 10A at 120V, as applicable for the specified equipment.

d. Torque Switches:

1) Adjustable torque switches shall be provided with each valve actuator.

a) The torque switches shall operate during the complete valve cycle without the use of auxiliary relays, linkages, latches or other devices.

2) Torque switches shall be wired to de-energize the valve actuator motor in the event excessive torque is developed during either direction of travel.

3) It shall be possible to select the torque switches to control the open and close limit positions in either direction of valve travel.

4) Dry contacts, 5A or 10A, 120V, as applicable for the specified equipment, shall be provided for remote high torque alarm for automatically controlled valves.

3. Appurtenances:

a. Handwheel and Chainwheel:

1) Provide each electric actuator with a handwheel.

2) Maximum Effort on Rim of Handwheel:

a) For seating or unseating Load: ≤ 80 lbf.

b) For Running Load: ≤ 60 lbf..

3) The handwheel shall have an arrow and the word "OPEN" or "CLOSE" indicating required rotation.

4) The handwheel shall operate in the clockwise direction to close.

5) Chain Operators:

a) All valves ≥ 6.00 ft. above the operating floor level shall be equipped with chain operators.

6) Handwheels and chain operators shall conform to the requirements specified separately herein.

b. All fasteners shall be Type 316 stainless steel.

4. Controls:

a. Provide each electric actuator with controls:

1) Provide controls in a separate compartment integral with the actuator.

2) Enclosure: NEMA 4X, unless NEMA 7 is required for duty in the actuator location .

3) Starter:

a) Provide a combination reversing magnetic starter with circuit breaker and disconnect switch.

b) Housing:

(1) For nonhazardous areas: NEMA 4X, Type 316 SS enclosure.

(2) For hazardous areas: Class 1 Division 2 cast aluminum housing.

4) Control Power Transformer:

a) Provide a transformer to transform the rated three phase, 60 Hz power to 120V, single phase.

b) The transformer shall be complete with a grounded and fused secondary and dual primary fuses.

5) Provide LOCAL/OFF/REMOTE Selector Switch. "LOCAL" position provides operation from open/close/stop push buttons.

a) "OFF" position disables local and remote operation.

b) "REMOTE" position enables open/close/stop control from a remote source.

6) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

7) Provide OPEN/CLOSE/STOP indicating lights.

8) Provide thermal overload and single phasing protection of the motor.

9) Provide a set of dry contacts to remotely indicate that the actuator is available for remote operation.

10) The actuator circuit boards shall be rated for high temperature service, minimum 55°C.

11) Provide electrical interlocks as shown on the Contract Drawings.

12) For monitoring of the actuator, provide a set of SPDT dry contacts. The monitor relay shall indicate that the actuator is available for remote operation.

b. Remote Mounted Control Panels:

1) Provide a remote mounted control panel for each electric actuator where:

a) Required by the valve location, as specified herein; or

b) Shown on the Contract Drawings.

2) Enclosure: NEMA 4X, Type 316 stainless steel.

3) Provide LOCAL/OFF/REMOTE Selector Switch. "LOCAL" position provides operation from open/stop/close push buttons.

a) "REMOTE" position enables open/close/stop control from remote source.

b) "OFF" position disables local and remote operation. Provide contact when switch is in remote position for remote indication.

4) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

5) Provide OPEN/CLOSE/STOP indicating lights and 0% to 100% position indication on liquid crystal display window.

J. Pneumatic Actuators (Open/Close):

1. General:

a. Pneumatic actuators for open/close service shall conform to the requirements of AWWA C541.

b. Application Criteria:

1) Ambient Temperature Rating: -20°F to +150°F.

2) Ambient Humidity: 100%.

3) Maximum design differential pressures and forward/reverse flows applicable to the valves:

a) Refer top Schedule 40 05 53-1, located after the "End of Section" designation.

b) For the service conditions of exposed piping on which the actuated valve is installed, refer to Section 40 06 01.

4) Pneumatic Air Supply: 80 psig.

5) Solenoid Voltage: 120 VAC, single-phase, 60 Hertz.

6) Control Voltage: 120 VAC, single phase, 60 Hz.

7) Torques: Per valve manufacturer.

8) Duty Cycle: ≥ 6 starts / hr.

9) Each electric actuator shall be equipped with a handwheel for manual operation.

a) The handwheel shall be connected such that operation by the vane will not cause the handwheel to rotate.

b) Should hydraulics be returned to the vane while the handwheel is in use, design of the unit shall prevent transmission of the pneumatic torque to the handwheel.

10) The actuator shall be operable with handwheel or chainwheel even after the vane has been disengaged and removed for repairs.

c. Remote Control Panels:

1) Provide separate remote control panels for all valves with electric actuators located ≥ 6.00 ft. above the operating floor.

2) The separate remote control panels shall be provided with separate push-button stations.

3) The separate remote control panels shall be installed approximately 5 ft. above the operating floor at an approved location.

4) Electrical wiring shall be modified as required for the remote location of the control panels.

d. Sizing of each pneumatic actuator shall be coordinated with the valve manufacturer who shall furnish the valve and the electric actuator as a unit.

e. The electric pneumatic shall be suitable for the valve orientation as shown on the Contract Drawings.

f. All electrical components shall conform to the area classification shown on the Contract Drawings.

2. Materials and Construction:

a. Solenoid Valve:

1) Provide each pneumatic actuator with the following style of solenoid:

a) When the solenoid valve can be mounted to the actuator: Provide a "NAMUR"-style solenoid.

b) When the solenoid valve cannot be mounted to the actuator: Provide a body ported solenoid valve mounted to a Type 316 stainless steel bracket.

2) The solenoid valve shall be energized to open and de-energized to close.

3) Cv: < 0.75.

4) Solenoid valve shall include:

a) One (1) ¼-in. NPT air supply port,

b) Two (2) ¼-in. NPT exhaust ports

c) One (1) 120 VAC, IP65, NEMA IV, 2-position coil, pneumatic manual override/

d) Two (2) exhaust speed controls.

b. Shaft and vane:

1) Actuator shaft and vane shall be a single machined part with square output shafts on both ends.

2) Shaft and vane shall be either stainless steel or SG iron, zinc plated.

c. Lip seals:

1) Shall be dual opposed injection molded polyurethane and must seal the shaft from the air supply.

2) Stainless steel expanders shall be fitted beneath the vane lip seals to ensure continual seal-to-case contact.

3) No type of O-ring type vane seals shall be acceptable.

d. Housing:

1) Provide either:

a) Pressure die cast zinc alloys; or

b) Sand cast LM25 grade aluminum

2) Externally coat with corrosion resistant baked epoxy enamel paint.

3) Actuator housing internal surfaces shall be coated with either corrosion resistant baked epoxy enamel paint or polytetrafluoroethylene impregnated.

4) Housing: Die-cast aluminum.

5) Close coupled to electric motor.

6) Input Shaft Gearing: Spur or bevel gear assembly.

7) Output Shaft Gearing: Self-locking worm gears with minimum gear backlash to prevent valve disc chatter or vibration. The gearing shall be rated for twice the required actuator torque.

8) All gearing shall be of hardened alloy steel or a combination of hardened alloy steel and alloy bronze, accurately cut by hobbing machine.

9) Lubrication: Oil bath or grease.

10) Bearings: Ball or roller with a minimum B-10 life of 100,000 hrs.

11) Input Shaft: Hardened alloy steel.

12) Provide mechanical stops adjustable from 0° to 90° at each end of travel.

e. Limit Switches:

1) Each actuator shall be provided with "end of travel" limit switches to allow control of desired end position for each direction of travel.

2) travel stops shall be threaded and of Type 316 stainless steel to allow adjustment at each end of actuator stroke.

3) Open and close limit switches shall be geared to the drive mechanism and in step at all times, whether the unit is operated electrically or manually and whether or not the actuator is powered by the 3-phase power supply. Friction devices or set-screw arrangements shall not be used to maintain the setting.

4) Limit switch gearing shall be appropriately lubricated.

5) The driven mechanism shall be totally enclosed to prevent entrance of foreign matter or loss of lubricant.

6) Each actuator shall be provided with four auxiliary contacts. Two contacts shall close and two contacts shall open at a desired end position for each direction of travel.

7) Switches shall be rated 5A or 10A at 120V, as applicable for the specified equipment.

f. Torque Switches:

1) Adjustable torque switches shall be provided with each valve actuator.

a) The torque switches shall operate during the complete valve cycle without the use of auxiliary relays, linkages, latches or other devices.

2) Torque switches shall be wired to de-energize the valve actuator motor in the event excessive torque is developed during either direction of travel.

3) It shall be possible to select the torque switches to control the open and close limit positions in either direction of valve travel.

4) Dry contacts, 5A or 10A, 120V, as applicable for the specified equipment, shall be provided for remote high torque alarm for automatically controlled valves.

g. Handwheel and Chainwheel:

1) Provide each electric actuator with a handwheel.

2) Maximum Effort on Rim of Handwheel:

a) For seating or unseating Load: ≤ 80 lbf.

b) For Running Load: ≤ 60 lbf..

3) The handwheel shall have an arrow and the word "OPEN" or "CLOSE" indicating required rotation.

4) The handwheel shall operate in the clockwise direction to close.

5) Chain Operators:

a) All valves ≥ 6.00 ft. above the operating floor level shall be equipped with chain operators.

6) Handwheels and chain operators shall conform to the requirements specified separately herein.

h. All fasteners shall be Type 316 stainless steel.

3. Controls:

a. Provide each electric actuator with controls:

1) Provide controls in a separate compartment integral with the actuator.

2) Enclosure: NEMA 4X, unless NEMA 7 is required for duty in the actuator location .

3) Starter:

a) Provide a combination reversing magnetic starter with circuit breaker and disconnect switch.

b) Housing:

(1) For nonhazardous areas: NEMA 4X, Type 316 SS enclosure.

(2) For hazardous areas: Class 1 Division 2 cast aluminum housing.

4) Control Power Transformer:

a) Provide a transformer to transform the rated three phase, 60 Hz power to 120V, single phase.

b) The transformer shall be complete with a grounded and fused secondary and dual primary fuses.

5) Provide LOCAL/OFF/REMOTE Selector Switch. "LOCAL" position provides operation from open/close/stop push buttons.

a) "OFF" position disables local and remote operation.

b) "REMOTE" position enables open/close/stop control from a remote source.

6) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

7) Provide OPEN/CLOSE/STOP indicating lights.

8) Provide thermal overload and single phasing protection of the motor.

9) Provide a set of dry contacts to remotely indicate that the actuator is available for remote operation.

10) The actuator circuit boards shall be rated for high temperature service, minimum 55°C.

11) Provide electrical interlocks as shown on the Contract Drawings.

12) For monitoring of the actuator, provide a set of SPDT dry contacts. The monitor relay shall indicate that the actuator is available for remote operation.

b. Remote Mounted Control Panels:

1) Provide a remote mounted control panel for each electric actuator where:

a) Required by the valve location, as specified herein; or

b) Shown on the Contract Drawings.

2) Enclosure: NEMA 4X, Type 316 stainless steel.

3) Provide LOCAL/OFF/REMOTE Selector Switch. "LOCAL" position provides operation from open/stop/close push buttons.

a) "REMOTE" position enables open/close/stop control from remote source.

b) "OFF" position disables local and remote operation. Provide contact when switch is in remote position for remote indication.

4) Provide OPEN/CLOSE/STOP push buttons with a hold-to-run or momentary contact selection.

5) Provide OPEN/CLOSE/STOP indicating lights and 0% to 100% position indication on liquid crystal display window.

K. Appurtenances for Exposed Metallic Valves

1. Provide appurtenances for all exposed valves of metallic construction, unless otherwise specified.

2. Provide handwheels for all valves located < 6 ft. above the operating floor.
   a. All handwheels shall conform to the applicable AWWA Standards.
   b. Material of Construction: Ductile iron or cast aluminum.
   c. Arrow indicating direction of opening and word "OPEN" shall be cast on the trim of the handwheel.
   d. Maximum Handwheel Diameter: 30 inches.
3. Provide chain operators for all valves located ≥ 6 ft. above the operating floor.
   a. Chains shall extend to three feet above the operating floor.
   b. A ½-in. stainless steel hook bolt shall be provided to keep the chain out of the walking area.
   c. Materials of Construction:
      1) Chain: Type 316L stainless steel.
      2) Chain wheel: Recessed groove type made out of Type 316 stainless steel.
      3) Guards and Guides: Type 316L stainless steel.
   d. Chain Construction: Chain shall be of welded link type with smooth finish. Chain that is crimped and has links type with exposed ends that may cause injury shall not be acceptable.
   e. Provide geared operators where required to position chain wheels in vertical position.
4. Extension stems and floorstands:
   a. Provide where indicated, necessary, or required.
   b. Sizing of the complete lifting mechanism shall conform to the applicable requirements of AWWA C501.
   c. Bench and Pedestal Floorstands:
      1) The valves requiring extension stems shall be provided with bench or pedestal floorstands as indicated.
      2) Type: Heavy-duty with tapered roller bearings enclosed in a weatherproof housing, provided with positive mechanical seals around lift nut and pinion shaft to prevent loss of lubrication and to prevent moisture from entering the housing. A lubrication fitting shall be provided for grease. The base shall be machined.
   d. Extension Stems:
      1) Maximum Slenderness Ratio (L/R): 100.

2) Minimum Diameter: 1.5 in.

3) Threads: ACME.

4) A top nut and a bottom coupling shall be provided on the stem with required pins and set screws.

e. Stem Guides:

1) Maximum Stem Length between Guides: 7 feet.

2) Stem guides shall be adjustable in two directions.

f. Materials of Construction:

1) Floorstand Housing: Cast-iron, ASTM A126, Class B.

2) Lift Nut: Cast bronze, ASTM B 98.

3) Wall Brackets for Floorstands: Type 316L stainless steel.

4) Stem and Stem Couplings: Type 316 stainless steel.

5) Top Nut, Bottom Coupling and Hardware: Type 316 stainless steel.

6) Stem Guides: Type 316 cast stainless steel.

7) Grease Fitting: Stainless steel.

8) All Bolting: Type 316 stainless steel.

g. Stem Covers:

1) Shall be furnished with clear butyrate plastic or grade 153 Lexan pipe stem covers.

2) The cover shall be furnished with a cast adaptor for mounting cover to bench and floor stands.

3) Stem cover shall be designed and furnished with gasketing and breathers to eliminate water intrusion into operator and condensation within the cover.

4) The cover shall be provided with Mylar tape with legible markings showing the gate position at one inch intervals and open/close limits of the gates.

5. Crank Operator:

a. Crank operator shall be removable and fitted with a rotating handle.

b. Maximum Radius of Crank: 15 in..

c. Materials:

1) Crank: Cast iron or ductile iron.

2) Handle: Type 304 stainless steel.

3) Hardware: Type 304 stainless steel.

L. Anchor and Miscellaneous Mounting Bolts

1. All bolts, nuts and washers furnished for connection of the valve appurtenances to the concrete structure or other structural members shall be furnished by the valve equipment manufacturer, and shall be of ample size and strength for the purpose intended.

2. Anchor bolts shall be hooked or adhesive type.

3. All bolts and washers shall be of Type 316 stainless steel and nuts shall be UNS S21800 alloy stainless steel and shall conform to the requirements of ASTM A194 Grade 8SA.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. General:

1. Stainless Steel:

a. Fabricated stainless steel items shall be cleaned and descaled in accordance with ASTM A380, and shall be as follows:

1) All stainless steel welded fabricated items shall be passivated after manufacture by immersion in a pickling solution of 6% nitric acid and 3% hydrofluoric acid.

a) Temperature and detention time shall be sufficient for removal of oxidation and ferrous contamination without etching of surface.

b) Perform a complete neutralizing operation by immersion in a trisodium phosphate rinse followed by clean water wash.

2) The welds shall be scrubbed with the same pickling solution or pickling paste and stainless steel wire brushes after fabrication to remove weld discoloration and then shall be neutralized and washed clean.

b. Anti-seize Compound:

1) For all stainless steel bolting, anti-seize compound, graphite free, shall be used to prevent galling.

2) Strength of bolting shall not be affected by anti-seize compound.

2. Painting of Exposed Valves and Appurtenances:

a. Exterior steel, cast-iron, and ductile iron surfaces except machined or bearing surfaces of all exposed valves and appurtenances shall be finish painted in the shop.

b. The surface preparation, priming, finish painting, and field touch-up painting shall conform to Section 09 91 00 - Painting.

c. .

3. Limit Switches:

a. Where shown on the Contract Drawings and/or specified, all control-closing swing check valves shall be provided with limit switches as specified and/or as shown in the contract documents.

4. Nameplates:

a. All valves shall be provided with Type 316 stainless steel nameplates attached with Type 316 stainless steel screws.

b. The nameplates shall have engraved letters and shall include the following information as a minimum:

1) Valve size.

2) Pressure and temperature ratings.

3) Date of manufacture.

4) Manufacturer's name and address.

5. Identification:

a. The valves shall be provided with identification conforming to the requirements of Section 40 05 97 - Identification for Process Equipment.

B. Gate Valves (Metal-Seated):

1. Interior Coating:

a. All metal-seated gate valves shall be coated inside.

b. The steel, cast-iron, and ductile iron surfaces, except machined surfaces, shall be epoxy coated in accordance with AWWA C550.

C. Plug Valves (Liquid Service):

1. Interior Coating:

a. All plug valves shall be coated inside.

b. If the pipe connecting to the plug valve, as specified in Section 40 06 01 - Schedule for Exposed Piping, shall not have glass lining, the interior of the plug valve shall be coated as follows:

1) The steel, cast-iron, and ductile iron surfaces, except machined surfaces, shall be epoxy coated in accordance with AWWA C550.

c. If the pipe connecting to the plug valve, as specified in Section 40 06 01 - Schedule for Exposed Piping, shall have glass lining, the interior of the plug valve shall be glass lined as follows:

1) The interior of the valve body shall have glass confirming to the requirements specified herein.

D. Check Valves (Liquid Service):

1. Interior Coating:

a. All swing check valves for liquid service shall be coated inside.

b. The steel, cast-iron and ductile iron surfaces, except machined surfaces, shall be epoxy coated in accordance with AWWA C550.

E. Automatic Pressure Reducing Valves:

1. Interior Coating:

a. All automatic pressure reducing valves shall be coated inside.

b. Epoxy coat steel, cast-iron, and ductile iron surfaces in accordance with AWWA C550.

F. Telescopic Valves:

1. All fabricated stainless steel items shall be pickled and cleaned.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Gate Valves (Metal-Seated):

1. Test all metal-seated gate valves in accordance with the requirement of AWWA C500.

2. All shop tests shall be witnessed by a registered professional engineer who may be an employee of the manufacturer. The performance test reports shall be certified, signed, and sealed by the professional engineer.

3. The following shop tests shall also be witnessed by two (2) representatives of DEP:

a. All gate valves (metal-seated) included in Schedule 40 05 53-1, located after the "End of Section" designation.

b. Quantity of gate valve (metal-seated) shop tests that shall be witnessed by representatives of the DEP:

1) The shop tests for each individual gate valve (metal-seated) shall be witnessed.

4. The Contractor shall bear all costs for travel, lodging, and boarding of these representatives, for the shop witness tests. The Contractor shall bear all similar costs if the equipment must be retested.

5. In the event that the manufacturer is unable to demonstrate that a valve meets the test requirements, the deficient equipment shall be rejected. All rejected equipment shall be adjusted, modified or replaced and retested at no additional cost to the City.

6. Shop test all metal-seated gate valves in accordance with the requirement of AWWA C500.

B. Plug Valves (Liquid Service):

1. Perform shop tests on all plug valves for liquid service.
2. Open/Close Test:
   a. Each plug valve (with the actuator mounted directly on the valve) shall be shop operated three (3) times from the fully closed to the fully opened position and the reverse under a no-flow condition.
3. Leakage Tests:
   a. Plug valves shall be given a leakage test at the design working and operating pressures.
   b. During the test, the plug valves shall be drip-tight.
   c. Duration:
      1) For plug valves < 20-in.: 5 min.
      2) For plug valves ≥ 20-in.: 10 min.
   d. The tests shall be repeated with pressure in the opposite direction.
4. Hydrostatic Test:
   a. All plug valve bodies shall be subjected to an internal hydrostatic pressure equivalent to twice the rated pressure.
   b. During the hydrostatic test, there shall be no leakage through the metal, end joints, or shaft seal, nor shall any part be permanently deformed.
   c. The duration of the hydrostatic test shall be sufficient to allow visual examination for leakage.
   d. Duration:
      1) For plug valves ≤ 8-in.: 1 min.
      2) For plug valves 8-in. through 20 in.: 3 min.
      3) For plug valves > 20 in.: 10 min.
5. Glass Lining Continuity Test:
   a. The glass lining test applies only to plug valves for liquid service which have glass lining.
   b. Each plug valve shall be tested for continuous coverage of glass lining by a low voltage wet sponge holiday detection unit.
   c. Number of pinholes permitted in each plug valve lining: ≤ 2.

C. Check Valves (Liquid Service):

1. Shop test all swing check valves for liquid service in accordance with the requirements of AWWA C508.
    a. Permitted leakage at design working and operating pressures: 0.

D. Automatic Pressure Reducing Valves:
1. Perform shop tests on all automatic pressure reducing valves.
2. Hydrostatic Test:
    a. Test each assembled valve (except control piping) at 1.5 times the rated working pressure.
    b. Duration: 5 min.
3. Leakage Test:
    a. Test each valve for leakage at the rated working pressure against closed valve.
    b. Duration: 15 minutes
    c. Permitted leakage: 0.
4. Functional Test:
    a. Verify specified performance over full range of operating conditions specified in schedule 40 05 53-3, located after the "End of Section" designation.

E. Electric Actuators (Open/Close):
1. Shop test each actuator in accordance with the requirements of AWWA C542.

F. Pneumatic Actuators (Open/Close):
1. Shop test each actuator in accordance with the requirements of AWWA C541.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Install valves in complete accordance with the manufacturer's printed instructions and the approved Shop Drawings.

B. All valves shall be installed plumb and level. The valves shall be free from distortion and strain caused by misaligned piping, equipment or other causes.

C. All valves shall be installed so that operating handwheels or levers may be conveniently turned from operating floor without interfering with access, and shall

be as approved by the Engineer. Chain operators shall be oriented out of the way from the walking areas.

D. For motor-operated valves located less than 6.00 ft. above the operating floor, the orientation of the motor actuator shall permit easy access to the push buttons and the handwheel.

E. For buried valves:

1. The valve boxes shall be set plumb and centered.

2. Carefully tamp to a lateral distance of 4 ft. on all sides of the valve box.

3. If the undisturbed trench face is less than 4 ft. from the valve box in any direction, carefully tamp to the undisturbed trench face.

F. Installation of plug valves in sludge lines:

1. Plug valves in horizontal lines shall be installed with the stem horizontal. The plugs shall be on top when open and on pressure side when closed.

2. Plug valves in vertical lines shall be installed with the plug at the top when closed.

G. Provide identification accordance with the requirements of Section 40 05 97 - Identification for Process Equipment.

3.03 FIELD TESTING / QUALITY CONTROL

A. All parts and components shall be adjusted as required to provide correct operation.

B. A functional field test of each valve shall be conducted in the presence of the Engineer to demonstrate that each part and all components function together correctly.

3.04 STARTUP / DEMONSTRATION

A. Where specified herein, the Contractor shall provide the services of qualified factory trained service technicians to check and approve the installation.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Provide field touch up painting in accordance with the requirements of Section 09 91 00 - Painting.

END OF SECTION

SCHEDULE 40 05 53-1
VALVE SCHEDULE, VALVES 4 INCH AND LARGER(1)

Quantity:	Service:	Size: (in.)	Type:	Material:	Actuator:	End Type:	Remarks:
2	DS	12	PV	DI	Manual	Flg	

Notes:
(1) Only valves to be permanently provided as part of the Work are included in Schedule 40 05 53-1.

A. The following service abbreviations are used in Schedule 40 05 53-1:

Service:	**Abbrev:**
Digested Sludge	DS

B. The following valve type abbreviations are used in Schedule 40 05 53-1:

Valve Type:	**Abbrev:**
Plug Valve, Liquid Service	PV

C. The following actuator type abbreviations are used in Schedule 40 05 53-1:

Actuator Type:	**Abbrev:**
Manual	Manual

D. The following valve material abbreviations are used in Schedule 40 05 53-1:

Pipe Material:	**Abbrev:**
Ductile Iron	DI

E. The following valve end type abbreviations are used in Schedule 40 05 53-1:

Joint Type:	**Abbrev:**
Flanged	Flg

SECTION 40 05 97– IDENTIFICATION FOR PROCESS EQUIPMENT
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to furnish and install all components of the system for identification of exposed piping and equipment.

B. The following index of this Section is presented for convenience:

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1.03	Related Sections	2
1.04	References	2
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C. The following schedules, attached after the “End of Section” designation, are a part of this Section:

1. Schedule 40 05 97-1, Dimensions of Identification Signs and Nameplates.
2. Schedule 40 05 97-2, Table of Standard Colors.
3. Schedule 40 05 97-3, General Color Code.
4. Schedule 40 05 97-4, Pipe Identification Signs.
5. Schedule 40 05 97-5, Nameplates.
6. Schedule 40 05 97-6, Pipeline and Equipment Identification.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Section 09 91 00 – Painting

1.04 REFERENCES

A. ASTM D523 Standard Test Method for Specular Gloss

B. ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents

C. ASTM D638 Standard Test Method for Tensile Properties of Plastics

D. ASTM D646 Standard Test Method for Grammage of Paper and Paperboard (Mass per Unit Area)

E. ASTM D709 Standard Specification for Laminated Thermosetting Materials

F. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

G. ASTM D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

H. ASTM D5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)

I. SAE AMSSTD595 Colors Used in Government Procurement.

J. New York City Local Law 30

1.05 DESCRIPTION

A. This Section describes the system for the identification of piping and equipment. This includes the placing of identification signs and direction-of-flow arrows on all visible, exposed plant piping, the placing of nameplates on plant equipment and structures, and painting in color of all equipment and pipe (except stainless steel or aluminum surfaces) as shown on the Contractor's Shop Drawings submitted under other Section(s) for equipment, piping, and valves, and as required.

1.06 QUALITY ASSURANCE

A. Provide the specified items from firms regularly engaged in the manufacture of identification devices of types and sizes required, with at least five (5) years' experience in manufacturing signs.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents. In addition, submittals shall include, but not be limited to:

1. Action Submittals:

a. Submit samples of the lettering to be used for fiberglass reinforced plastic signs to the Engineer for approval before manufacturing begins.

1) Such samples must show the height, width and spacing of letters and numbers for any three (3) legends of ten or more letters and spaces as specified herein.

b. Submit sample direction-of-flow arrows for both sizes of pipe identification signs to the Engineer for approval before installation.

c. Submit details of the method of fastening nameplates to the Engineer.

1) Since it is impractical to detail each means of attachment in the Contract Drawings, each means of attachment shall receive approval only on its own merits – submit for approval sketches of each type of attachment proposed.

2. Information Submittals:

a. Submit certification on acid resistance to the Engineer prior to installation.

b. Submit manufacturer's guarantee and warranty, in writing.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver materials provided under this Section in accordance with the requirements of the Contract Documents.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Contractor shall provide spare parts and special tools necessary to service, disassemble, repair, and adjust the materials provided under this Section, and as per the requirements of the Contract Documents.

B. In addition, provide the following spare parts for identification of piping and equipment:

1. For every twenty (20) pipe identification signs installed:

a. One (1) pair stainless steel mounting screws

b. One (1) pair stainless steel threaded brackets

c. One (1) pair fiber or plastic washers

d. One (1) pair stainless steel banding seals

2. One (1) set banding tools and banding accessories

3. One (1) stainless steel banding strap, approximately 1000 ft.

4. One (1) complete nameplate mounting assembly for every twenty (20) nameplates installed

5. One (1) stainless steel cable and splice for every twenty (20) valve identification tags

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Mounting assembly "Steelbinder" strapping units:

1. A.J. Gerrard & Co., Lake City, FL;

2. Independent Metal Strap, Roslyn, NY;

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Construction:

1. Construct fiberglass reinforced plastic identification signs and nameplates of 100 mils thick fiberglass reinforced plastic conforming to ASTM D709.

2. Provide fiberglass reinforced plastic process with a blemish free, low gloss surface of superior permanence and durability in the colors selected.

3. Construct all signs and nameplates in conformity with ASTM D523, D638, D646, D790, D792, and D5420.

4. Make direction-of-flow arrows for attachment to pipe identification signs from No. 16 U.S. gauge Type 304 stainless steel, the full width of the sign.

5. Chemical Resistance:

a. Provide fiberglass reinforced plastic signs resistant to abrasion, impact, corrosion, and the following acids, alkalis, salts, and solvents in accordance with ASTM D543:

1) 10% citric acid

2) 5% acetic acid

3) 3-30% sulfuric acid

4) 10% ammonium hydroxide

5) 10% sodium chloride
6) turpentine
7) mineral spirits
8) heptane
9) kerosene
10) ethyl alcohol
11) ethyl acetate
12) transformer oil
13) heavy duty detergents
14) water

B. Lettering:

1. Provide lettering made by silk screening or other permanent embedment of subsurface printed graphics in the material so as to produce a clear, legible sign.

C. Grommets and Holes:

1. Provide signs for piping and valve identification with two ⅜-in. diameter grommet-protected holes located on the long side center line, the center of the hole to be ½-in. from the edge.
2. Provide nameplates for equipment and structures with four ⅜-in. diameter grommet-protected holes, the center of the hole located ½-in. away from the edges.
3. Provide all holes with suitable brass or stainless steel grommets.
4. Shall be of Type 304 stainless steel construction.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Dimensions of Signs and Tags:

1. Provide identification signs and nameplates rectangular in shape and of the dimensions specified in Schedule 40 05 97-1, Dimensions of Identification Signs and Nameplates, located after the "End of Section" designation.
   a. A dimensioned tolerance of $\pm 1/16$- in. is permissible.

B. Lettering of Signs:

1. Perform all lettering and numbering on identification signs and nameplates in block style in size and spacing to suit the size of sign, as approved by the Engineer.
2. Unless otherwise approved by the Engineer, the following limits shall apply:

a. Limit the legend on pipe identification signs to one (1) line and to a total of 12 letters and spaces

b. Limit the legend on equipment nameplates to two (2) lines and a maximum of 35 letters and spaces.

3. Do not place lettering, symbols or markings containing the name of the manufacturer on the signs.

a. The contract number and the year of the contract as given on the Contract Drawings may be placed in small lettering on the front of the sign, if approved by the Engineer.

C. Colors:

1. Provide each identification sign and nameplate in two colors and with the legend specified.

a. Provide the backside of the sign in black or some other uniform color.

2. Code pipeline signs and equipment nameplates and finish coats of paint for pipe lines and equipment in basic colors.

3. Provide brilliant colors, distinctive shades matching as closely as possible (without custom color blending) the basic colors as specified by the Munsell Color System (MN) in Schedule 40 05 97-2, Table of Standard Colors, located after the "End of Section" designation:

4. Provide identification signs for pipelines of all sizes, mechanical equipment, sluice gates, and valves in the color combinations specified in Schedule 40 05 97-3, General Color Code, located after the "End of Section" designation.

5. Provide vents and drains of the same color combination as the contents of tanks and equipment vented and drained.

6. Identification signs for services not included in the Schedule 40 05 97-3 shall be black letters on a white background.

D. Legend for Pipe Identification Signs:

1. Provide identification signs, to identify the pipe line service, with the words or abbreviations in color combinations shown in Schedule 40 05 97-4, Pipe Identification Signs, located after the "End of Section" designation.

2. Number sluice gates and valves in conformity with the Basic Code as specified by the Operation and Maintenance Manual for the plant. Perform color combinations for such lines and valves in the same color combinations as the medium serviced and as specified in Schedule 40 05 97-3.

E. Valve Identification Tags:

1. Furnish and attach valve identification tags to all valves, gates, and controls.

2. Provide round fiberglass reinforced plastic tags, in sizes per Schedule 40 05 97-1, made in conformity with the requirements specified herein. Provide tags with one ⅛-in. grommet protected hole at the top for fastening to the valve body using $^{1}/_{16}$-in. diameter cable and splices or pins as approved. Provide grommets, cable splices and pins of stainless steel or other approved corrosion resistant material.

3. Provide numbering code for the identification tags in conformity with the Basic Code as specified by the Operation and Maintenance Manual for the plant. Assign identification numbers subject to the approval of the Engineer and in conformity with the entire piping and equipment identification system. Provide identification code for each valve and control without duplication. Provide lettering on identification tags not less than $^{5}/_{16}$-in. high and limited to two lines. Silk-screen lettering in correct color combination; stenciled or painted numbers and lettering will not be accepted.

F. Arrows:

1. Make the arrow head with a tapered point, about 90° at the apex, extending one half of the sign width from the sign edge and one half of the sign width extending under the sign.

   a. Make point with a radius of ¼-in. for the 3½-in. wide sign and a radius of $^{3}/_{16}$-in. for the 1½ in. wide sign.

2. Finish all edges of the arrow.

3. Punch detents on the arrows to prevent twisting of the point.

4. Drill one hole in the arrow in alignment with the hole in the pipe identification sign so that both sign and arrow can be mounted with the same screw and bracket.

G. Nameplates:

1. Provide nameplates for equipment and structures in the same color combination as the medium they service. Legends for nameplates must follow the terminology shown. Provide numbering system as described in the Operation and Maintenance Manual.

2. Schedule 40 05 97-5, Nameplates, located after the "End of Section" designation, is a representative list (and not necessarily complete) of nameplate legends with appropriate color combinations to which the equipment identification number(s) shall be added.

H. Additional Signs and Nameplates:

1. In addition to the legends specified above, the Engineer may order the Contractor to furnish and install additional identification signs, arrows and nameplates at no additional cost to the City.

2. Such additional signs may be requested near completion of the work and will be limited to no more than five (5) signs for each of the five (5) types listed in Schedule 40 05 97-1.

3. Conform legends and color combinations for additional signs to the requirements specified.

I. Color of Pipelines and Equipment:

1. Paint all pipelines and equipment in conformity with the requirements of Section 09 91 00 - Painting.

a. Color code the color of the final coats of paint.

2. Match the color of the final coats as closely as possible, without custom blending, to the colors presented in Schedule 40 05 97-6, Pipeline and Equipment Identification, located after the "End of Section" designation.

a. For mixed sludge and digester sludge recirculation pipelines and equipment, use Schedule 40 05 97-7, Mixed Sludge and Digested Sludge Recirculation Pipeline and Equipment Identification, located after the "End of Section" designation.

b. The colors in Schedule 40 05 97-6 and Schedule 40 05 97-7 are identified by a name and their SAE AMSSTD595 color identification number and shall match this standard; the names of the colors in Schedules 40 05 99-6 and 40 05 97-7 are for convenience only.

3. Do not paint aluminum or stainless steel ductwork or jackets on insulated pipelines. Should the Contract Documents state that flanges, flexible couplings, valves, and/or fittings for such jacketed lines not be covered, paint only the flanges, flexible couplings, valves, and/or fittings in accordance with the piping color code.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Location:

1. Locate identification signs for piping along straight line runs at intervals of not more than 30 ft, near valves, branches and junction points and where pipes pass through walls or ceilings.

2. Place direction-of-flow arrows as shown or required.

3. Locate signs on large valves on or adjacent to the valve itself.

4. Place all piping identification signs so as to be easily visible from operating locations.

5. Locate nameplates on equipment bases and on structures at readily visible levels in such positions relative to the equipment and structures so as to prevent damage to the nameplate.

3.02 INSTALLATION

A. Mounting:

1. Mount identification signs and arrows on piping parallel and tangent to the pipe and valves by fastening with screws, plastic or fiber washers, threaded brackets, and banding straps and seals.

2. Provide screws and brackets of stainless steel with 5/16 - 18 American Standard Coarse Threads; provide No. 25 U.S. gauge stainless steel, /4 inch wide bands.

3. Where pipe is insulated, use care in mounting the signs so to prevent the banding straps from crushing the insulation.

4. Provide mounting assembly "Steelbinder" strapping units.

5. Mount nameplates in the manner specifically approved by the Engineer, after the installation of equipment or the construction of structures is complete.

6. Mount valve identification signs with approved stainless steel brackets or approved stainless steel strapping in such a fashion that sharp corners or edges on signs, brackets, bolts, chain or strapping will not constitute a hazard to personnel operating the valves.

7. Do not attach identification tags or signs to handwheels.

8. Use of flange bolts or bonnet bolts as a means of attachment of brackets shall receive consideration 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. Not Used

END OF SECTION

SCHEDULE 40 05 97-1
DIMENSIONS OF IDENTIFICATION SIGNS AND NAMEPLATES

Type of Sign:	**Sign Dimensions: (Width × Length)**
PIPE IDENTIFICATION -	
1. Outside diameter of pipe (including pipe insulation):	
a. 4-in. and larger:	3½-in. × 12-in.
b. Less than 4-in.:	1½-in. × 7-in.
VALVE IDENTIFICATION -	
1. Valve tags:	2-in. diameter
2. Operating stands for valves and sluice gates:	1½-in. × 7-in.
NAMEPLATES -	
1. Equipment and structures	3½-in. x 12 in.

SCHEDULE 40 05 97-2
TABLE OF STANDARD COLORS

Color:	**Munsell Number:**
White	MN - N8.8/
Yellow	MN - 4Y7.5/12.8
Orange	MN - 0.5 YR 4.6/12.2
Red	MN - 7R 3.6/12.7
Brown	MN - 2.5 YR 4.2/4.3
Gray	MN - 2.5PB 5.8/1.7
*Charcoal	MN - 6B 5/0.4
Black	MN - N1/
Blue	MN - 3PB 3.3/7.4
Green	MN - 8G 4.4/6.2
* Provide color "Charcoal" for paints equivalent to MN - N 3.75.	

SCHEDULE 40 05 97-3
GENERAL COLOR CODE

Service Line:	**Colors:**	
	Letters:	**Background:**
1. FIRE AND STANDPIPE	White	Red
2. SLUDGE OR UTILITY GAS		
a. High Pressure	Black	Orange
b. Low Pressure	White	Orange
3. FUEL OIL	Orange	White
4. LUBRICATING OIL	Black	White
5. HYDRAULIC FLUID	Red	White
6. CHEMICALS		
a. Ferric Chloride	White	Blue
b. Glycerol	Brown	Yellow
c. Methanol	Black	Yellow
d. Polymer	Brown	Yellow
e. Sodium Bisulfite	Orange	Black
f. Sodium Hydroxide	Black	Yellow
g. Sodium Hypochlorite	Blue	Yellow
h. Other (Hazardous)	Black	Yellow
i. Other (Relatively Safe)	Brown	Yellow
7. OZONE	Black	Yellow
8. CHLORINE		
a. Gas	Black	Yellow
b. Liquefied	Red	Yellow
c. Solution	Blue	Yellow
9. LIQUIDS THICK IN SOLIDS		
a. Primary Sludge	White	Black
b. Digested Sludge		

Service Line:	Colors:	
	Letters:	Background:
c. Thickened Sludge		
10. LIQUIDS THINNER IN SOLIDS a. Secondary Sludge b. Return Sludge c. Mixed Liquor d. Grease, Scum, Grit	White	Brown
11. LIQUIDS WEAK IN SOLIDS a. Sewage b. Effluent c. Thickening Tank Drains, Vents, Overflow d. Digester Tank Drains, Vents, Overflow e. Concentration Tank Drains, Vents, Overflow f. Storage Tank Overflow, Drains g. Settling Tank Overflow, Drains h. Sump Drains	Black	Gray
12. STRAINED EFFLUENT a. Spray Water b. Flushing Water c. Plant Water	Yellow	Gray
13. NON-POTABLE WATER a. Seal Water b. Chilled Water c. Engine Cooling Water d. Sludge Heating Water e. Hydraulic Control Water	Yellow	Blue
14. CITY WATER	White	Blue

Service Line:	Colors:	
	Letters:	**Background:**
15. STEAM, DANGEROUSLY HOT WATER	Blue	Orange
16. ENGINE AIR		
a. Starting	Orange	Green
b. Intake	Yellow	Green
17. ENGINE EXHAUST	Yellow	Orange
18. VACUUM SERVICE	Black	Green
19. PLANT SERVICE (COMPRESSED) AIR	White	Green
20. PROCESS (BLOWER) AIR	Gray	Green
21. HIGH PRESSURE AIR	Orange	Green
22. HEATING, VENTILATING AND CONDITIONING AIR (Equipment And Ductwork)	Green	Charcoal

SCHEDULE 40 05 97-4
PIPE IDENTIFICATION SIGNS

Legend:	**Service:**	**Color Code:**	
		Lettering:	**Background:**
BLOWER LUBE	Blower lube oil	Black	White
BLOWOFF	Blowoff	*	*
CAUSTIC	Caustic soda (Sodium hydroxide)	Black	Yellow
CHILL SUPPLY	Chilled water supply	Yellow	Blue
CHILL RETURN	Chilled water return	Yellow	Blue
CHLORINE GAS	Chlorine gas	Black	Yellow
CHLOR. LIQ.	Liquefied chlorine	Red	Yellow
CHLOR. SOL.	Chlorine solution	Blue	Yellow
COMP. AIR	Compressed or plant service air	White	Green
CONDENSATE	Condensate	Yellow	Blue
DEFOAMANT	Defoamant or foam control	Brown	Yellow
DIESEL FUEL	Diesel fuel oil	Orange	White
DIGEST. SL.	Digested sludge	White	Black
DIG. O'FLOW	Digester overflow	Black	Gray
DISINFECT	Disinfectant	Brown	Yellow
DRAIN - *	Drain - *	*	*
EFFLUENT	Effluent water	Black	Gray
ENGINE AIR	Engine air intake	Yellow	Green
ENG. EXHAUST	Engine exhaust	Yellow	Orange
ENGINE LUBE	Engine lube oil	Black	White

Legend:	Service:	Color Code:	
		Lettering:	Background:
ENGINE VENT	Engine crankcase vent	Black	White
EXCESS SLUDGE	Excess sludge	White	Black
EXH. BLOWOFF	Exhaust silencer blowoff	Red	Blue
FERRIC	Ferric chloride	White	Blue
FIRE	Fire line	White	Red
FLUSH. WATER	Pump flushing water	Yellow	Gray
FLY ASH	Wet fly ash	White	Black
FUEL OIL	Fuel oil	Orange	White
FUEL FILL	Fuel oil fill	Orange	White
GAS – SLUDGE	Sludge gas	White	Orange
GAS – UTILITY	Utility gas	White	Orange
GAS – HP	Sludge or utility gas – high pressure	Black	Orange
GLY	Glycerol	Brown	Yellow
GREASE	Grease	White	Brown
GRIT	Grit	White	Brown
HI PRESS. AIR	High pressure air	Orange	Green
H.W. RETURN	Hot water return	Blue	Orange
H.W. SUPPLY	Hot water supply	Blue	Orange
HYDRAULIC	Hydraulic fluid	Red	White
HYPOCHLORITE	Sodium hypochlorite	Blue	Yellow
INSTR. AIR	Instrument air	White	Green
JACKET WATER	Engine jacket water	Yellow	Blue

Legend:	Service:	Color Code:	
		Lettering:	Background:
LUBE	Lubricating oil	Black	White
LUBE FILL	Lubricating oil fill	Black	White
METER - *	Metering - *	*	*
METHANOL	Methanol	Black	Yellow
MIXED LIQUOR	Mixed liquor	White	Brown
MIXED SLUDGE	Mixed sludge	White	Brown
MODIFIED SL.	Modified sludge	White	Brown
O'FLOW - *	Overflow - *	*	*
OZONE	Ozone	Black	Yellow
PLANT DRAIN	Plant drain	Black	Gray
PLANT WATER	Plant water	Yellow	Gray
POLYMER	Polymer	Brown	Yellow
PRIMARY SL.	Primary sludge	White	Black
PROCESS AIR	Process or blower air	Gray	Green
RECIRC. SL.	Recirculated sludge	White	Brown
RETURN SL.	Return sludge	White	Brown
SBS	Sodium bisulfite	Orange	Black
SCUM	Scum	White	Brown
SEAL WATER	Seal water	Yellow	Blue
SECOND. SL.	Secondary sludge	White	Brown
SEWAGE	Sewage	Black	Gray
SEW. SAMPLE	Sewage sampling	Black	Gray
SPRAY WATER	Spray water	Yellow	Gray

Legend:	Service:	Color Code:	
		Lettering:	Background:
STARTING AIR	Starting air	Orange	Green
STEAM	Steam	Blue	Orange
SUMP - *	Sump pump line - *	*	*
SUPERNATANT	Supernatant	Black	Gray
THICK. DR.	Thickener drain	Black	Gray
THICK. EFF.	Thickener effluent	Black	Gray
THICK. SL.	Thickened sludge	White	Black
TREAT. WATER	Chemically treated boiler feed water	Brown	Yellow
VACUUM	Vacuum line	Black	Green
VENT - *	Vent - *	*	*
WASTE GAS	Waste gas	White	Orange
WASTE OIL	Waste lubricating oil	Black	White
WATER	City water	White	Blue
* Where shown, specified or required, the legend for blowoff, drain, metering, sump, vent and similar lines shall also include the equipment, structure or identification number to which the service applies.			

SCHEDULE 40 05 97-5
NAMEPLATES

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
AIR BLOWER	**	White	Charcoal
AIR COMPRESSOR	**	White	Green
AIR HANDLING	UNIT **	White	Charcoal
AIR CONDITIONING	UNIT **	White	Charcoal
AUXILIARY ELECTRIC	GENERATOR **	Red	Green
AUXILIARY LUBE	OIL PUMP **	Black	White
BAR SCREEN	**	Black	Gray
BLOWER CONTROL	CABINET **	Gray	Green
BLOWER CONTROL AIR	RECEIVER **	White	Green
BLOWER LUBE OIL	AUX. PUMP **	Black	White
BLOWER LUBE OIL	COOLER **	Black	White
BLOWER LUBE OIL	RESERVOIR **	Black	White
BLOWER SILENCER	**	Gray	Green
BULK LUBE OIL	STORAGE **	Black	White
BYPASS OIL FILTER	**	Black	White
CHILLERS	**	White	Blue
CLEAN LUBE OIL	TANK **	Black	White
CONCENTRATION TANK	**	White	Black
CONDENSATE PUMP	**	Yellow	Blue
CONDENSATE RECEIVER	**	Yellow	Blue
CONDENSER	WATER COOLED **	Yellow*	Blue*
CONDENSER	AIR COOLED **	Yellow*	Blue*
CONE VALVE AIR	RECEIVER **	White	Green
DESCALER	**	Yellow	Blue
DIESEL TANK	**	Orange	White

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
DIGESTION TANK	**	White	Black
DIRTY LUBE OIL	TANK **	Black	White
EFFLUENT-LUBE OIL	COOLER **	Yellow	Gray
EFFLUENT WATER	STRAINER **	Yellow	Gray
EFFLUENT WATER	PUMP **	Black	Gray
EFFLUENT WATER	TANK **	Yellow	Gray
ENGINE GENERATOR	**	Red	Green
ENGINE J.W.	MAKEUP	Yellow	Blue
ENGINE LUBE OIL	PURIFIER **	Black	White
ENGINE LUBE OIL	TANK **	Black	White
ENGINE OIL SUMP	TANK **	Black	White
EXHAUST FAN	**	White	Charcoal
EXCESS SLUDGE	DISTRIB. BOX **	White	Black
EXHAUST STEAM	CONVERTER **	Blue	Orange
FAN COIL UNITS	**	Blue*	Orange*
FLUSHING WATER	PUMP **	Yellow	Gray
FUEL OIL	PUMP **	Orange	White
FUEL OIL TANK	NO. 2 OIL **	Orange	White
FUEL OIL TANK	NO. 4 OIL **	Orange	White
FUEL OIL TANK	NO. 6 OIL **	Orange	White
FULL FLOW OIL	FILTER **	Black	White
GAS BOOSTER	**	Black	Orange
GASOLINE TANK	**	Orange	White
GAS COMPRESSOR	**	Black	Orange
GAS RECEIVER	**	Black	Orange
GAS SURGE TANK	**	White	Orange
HEAT EXCHANGER	OIL **	White	Orange
HEAT EXCHANGER	STEAM-WATER **	Blue	Orange

Legend:		Color Code:	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
HEAT EXCHANGER	WATER-WATER **	Blue	Orange
HEAT RECOVERY	SILENCER **	Yellow	Orange
HEAT. & VENT.	UNIT **	White	Charcoal
HIGH PRESSURE AIR	COMPRESSOR **	Orange	Green
HIGH PRESSURE AIR	DRYER **	Orange	Green
HIGH PRESSURE AIR	RECEIVER	Orange	Green
HOT WATER BOILER	**	Blue	Orange
HOT WATER CONVERTER	DOMESTIC **	Blue	Orange
HOT WATER HEATER	ELECTRIC **	Blue	Orange
HOT WATER GENERATOR	DOMESTIC **	Blue	Orange
HYDRO-PNEUMATIC	TANK **	White	Blue
INLET SLUICE GATE	CYLINDER **	Red	White
JACKET WATER CIRC.	PUMP **	Yellow	Blue
JACKET WATER	COOLER **	Yellow	Blue
JACKET WATER ENG.	OIL COOLER **	Yellow	Blue
LUBE OIL	PURIFIER **	Black	White
LUBE OIL STORAGE	PUMP **	Black	White
LUBE OIL STORAGE	TANK **	Black	White
LUBE OIL TRANSFER	PUMP **	Black	White
MIXED SLUDGE	PUMP **	White	Brown
OUTLET SLUICE GATE	CYLINDER **	Red	White
OZONATOR	**	Black	Yellow
PLANT AIR	AFTERCOOLER **	White	Green
PLANT AIR	COMPRESSOR **	White	Green
PLANT AIR	RECEIVER **	White	Green
PLANT WATER	MAKEUP **	Yellow	Gray
PLANT WATER	TANK **	Yellow	Gray

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
PLANT WATER	PUMP **	Yellow	Gray
PUMP – CHILLED WATER	**	White	Blue
PUMP – CONDENSER WATER	**	Yellow	Blue
PUMP – DOMESTIC	HOT WATER **	White	Blue
PUMP – FEED WATER	**	Yellow	Blue
PUMP – FIRE	**	White	Red
RETURN FAN	**	White	Charcoal
RETURN SLUDGE	PUMP **	White	Brown
SCUM PIT	**	White	Brown
SEAL WATER	PUMP **	Yellow	Blue
SEWAGE EJECTOR	**	Black	Gray
SEWAGE FLOW	METER **	Black	Gray
SEWAGE PUMP	**	Black	Gray
SLUICE GATE CONT.	AIR CHAMBER **	White	Green
SLUICE GATE CONT.	AIR TANK **	White	Green
SLUICE GATE HYD.	FLUID PUMP **	Red	White
SLUDGE HEATER	**	White	Black
SLUDGE HEATING H.W.	CIRC. PUMP **	White	Orange
SLUDGE HEAT WATER	MAKEUP TANK **	Yellow	Blue
SLUDGE DOCK	PUMP **	White	Black
SLUDGE RECIRC.	PUMP **	White	Brown
SLUDGE STORAGE	TANK **	White	Black
SLUDGE TRANSFER	BOX **	White	Black
SLUDGE TRANSFER	PUMP **	White	Black
SPRAY WATER	PUMP **	Yellow	Gray
STANDBY GENERATOR	**	Red	Green
STARTING AIR	COMPRESSOR **	Orange	Green

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
STARTING AIR	TANK **	Orange	Green
STEAM BOILER	**	Blue	Orange
SUMP PUMP	**	Black	Gray
SUMP PUMP – CONC.	TANK **	Black	Gray
SUMP PUMP – DIGEST.	TANK **	Black	Gray
SUMP PUMP – EFF.	VAULT **	Black	Gray
SUPPLY FAN	**	White	Charcoal
THICKENER	**	White	Black
TRASH RACK	**	Black	Gray
UNIT HEATER – STEAM	**	White*	Charcoal*
UNIT HEATER – WATER	**	White	Charcoal*
WASTE LUBE OIL	PUMP **	Black	White
WASTE LUBE OIL	TANK **	Black	White
WATER TREATMENT	PUMP **	Brown	Yellow
WATER TREATMENT	TANK **	Brown	Yellow

(1) Nominal limit of 18 letters, numerals and spaces.
(2) Nominal limit of 17 letters, numerals and spaces.

*Where equipment is mounted on roofs or where exposed to the public view, such as in lobby or office areas, the color will be selected by the Architect.

**The legend on these nameplates also includes the appropriate six-digit numeral and letter designation for such equipment and structures as specified by the Operation and Maintenance Manual.

SCHEDULE 40 05 97-6
PIPELINE AND EQUIPMENT IDENTIFICATION

Abbr.:	**Process/Service Line:**	**Fed. Std. 595B Color:**
AD	Aerator Drain	Gray 16187
APLM	Anionic Polymer	Green 14090
BLW	Balance Water	Blue 15193
BLO	Blower Lube Oil	White 17925
CPLM	Cationic Polymer	Green 14090
CSTC	Caustic (Sodium Hydroxide)	Orange 22544
CEN	Centrate	Gray 16492
CF	Centrifuge Feed	Black 14036
CHA	Channel Air	Green 14260
CHWR	Chill Water Return	Blue 17877
CHWS	Chill Water Supply	Blue 15450
CHEFF	Chlorinated Effluent	Gray 17875
CW	City Water	Blue 15200
CLD	Clarifier Drain	Gray 16187
CLWR	Cold Water Return	Blue 15187
CLWS	Cold Water Supply	Blue 15125
CA	Compressed Air (Plant Air)	Green 14449
CCSK	Concentrated Skimmings	Tan 17778
CSB	Concentrator Subnatant	Gray 16314
C	Condensate	Gray 16357
CTD	Contact Tank Drain	Gray 16187
DFM	Defoamant	Pink 11630
DGOF	Degrit Overflow	Gray 16250
DGS	Degritted Primary Sludge	Olive 14257
DWS	Dewatered Sludge	Navy 15044
DF	Diesel Fuel	Mustard 13275

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
DSD	Digested Sludge Disposal	Brown-black 10032
RCD	Digested Sludge Recirculation (mixing)	(See Note 1)
DSR	Digested Sludge Recycle	Black 14084
DSS	Digested Sludge to Storage	Black 17038
DST	Digested Sludge Transfer	Gray 16081
DSK	Dilute Skimmings	Tan 16405
ELF	Elutriation Feed	Black 15042
ECWR	Engine Cooling Water Return	Gray 15526
ECWS	Engine Cooling Water Supply	Navy 15045
EXH	Engine Exhaust	Stainless Steel Jacket
ELO	Engine Lube Oil	White 17925
FECL	Ferric Chloride	Blue 15095
FEF	Final Effluent	Gray 16492
FRS	Fire and Standpipe	Red 11350
FW	Flushing Water	Blue 15090
FF	Fuel Fill	Tan 10266
FO	Fuel Oil	Brown 16160
	Gasoline Fill Port – high octane	Red 11086
	Gasoline Fill Port – middle octane	Blue 15056
	Gasoline Fill Port – low octane	White 17925
	Gasoline Fill Port, unleaded – high octane	Red 11086 with white 17925 cross
	Gasoline Fill Port, unleaded – middle octane	Blue 15056 with white 17925 cross
	Gasoline Fill Port, unleaded – low octane	White 17925 with black 17038 cross
	Gasoline Vapor Recovery	Orange 12246
GRIT	Grit	Gray 14064
HPAR	High Pressure Air (Plant Air)	Green 14272
DG(H)	High Pressure Digester Gas	Orange 22510

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
HPUGS	High Pressure Utility Gas	Orange 22510
HWR	Hot Water Return (heating)	Orange 12215
HWS	Hot Water Supply (heating)	Orange 11400
HVACEX	HVAC Exhaust	Gray 14158
HVACR	HVAC Return	Gray 14077
HVACS	HVAC Supply	Gray 14056
HCW	Hydraulic Control Water	Blue 15107
HOR	Hydraulic Oil Return	Brown 10059
HOS	Hydraulic Oil Supply	Brown 10045
ITK	Intake (Engine Air)	Green 14672
JKWR	Jacket Water Return	Gray 15109
JKWS	Jacket Water Supply	Navy 15050
	Kerosene Fill Port	Brown 20100
LM	Lime	Tan 13740
DG(L)	Low Pressure Digester Gas	Orange 22510
LPUGS	Low Pressure Utility Gas	Orange 22510
LF	Lube Fill	White 17925
MH	Methanol	Brown 10233
MS	Mixed Sludge (heating)	(See Schedule 40 05 97-7)
ODCDW	Odor Control Draw	Green 14110
ODCVT	Odor Control Vent	Unpainted
O2	Oxygen	Red 11105
OZR	Ozone Recycle	Blue 15177
OZS	Ozone Supply	Blue 15080
OZVT	Ozone Vent	Blue 15180
PD	Plant Drain	Gray 16187
PW	Plant Water	Blue 15092

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
PTPM	Potassium Permanganate	Red 11140
PEFF	Primary Effluent	Gray 16251
PA	Process Air	Green 14115
RINF	Raw Influent	Gray 16293
RPS	Raw Primary Sludge	Olive 14151
RSC	Raw Screenings	Tan 16350
RAS	Return Activated Sludge	Tan 10260
SMP	Sampling Line	(Match to Service)
SLW	Seal Water	Blue 15182
SBP	Secondary Bypass	Gray 16473
SAR	Service Air (Plant Air)	Green 14193
SW	Service Water	Blue 15102
SHW	Sludge Heating Water	Orange 12473
NA2SO3	Sodium Bisulfite	Black 14084
NAOCL	Sodium Hypochlorite	Yellow 13591
SPW	Spray Water	Navy 15052
STA	Starting Air (Engine Air)	Green 14187
STMR	Steam Return (Condensate)	Tan 11670
STMS	Steam Supply	Orange 22356
STD	Storm Drain	Gray 16440
SULAD	Sulfuric Acid	Brown 10049
SD	Sump Drain	Gray 16376
SU	Supernatant	Gray 16307
TS	Thickened Sludge	Brown 10070
TD	Thickener Drain	Gray 16187
TO	Thickener Overflow	Gray 16329
VCS	Vacuum Service	Green 14062
WAS	Waste Activated Sludge	Tan 13596

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
WDGS	Waste Digester Gas	Orange 22510
WML	Waste Mixed Liquor	Tan 12648
WO	Waste Oil	White 17925
WSC	Washed/Compacted Screenings	Black 14084

SECTION 40 06 01 – SCHEDULE FOR EXPOSED PIPING
CONTRACT NR-107

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified and required, to furnish, install, and test all exposed piping as indicated in the exposed piping schedule, complete and operational.

B. The following index of this Section is presented for convenience:

Article	Title	Section Page
PART 1	GENERAL	1
1.01	Summary	1
1.02	Payment	1
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	2
1.07	Submittals	2
1.08	Delivery, Storage, and Handling	2
1.09	Spare Parts, Special Tools, and Supplies	2
1.10	Warranty	2
PART 2	PRODUCTS	2
2.01	Manufacturers	2
2.02	Materials / Equipment	2
2.03	Fabrication / Assembling / Finishes	2
2.04	Source Quality Control / Shop Tests	2
PART 3	EXECUTION	3
3.01	Examination / Preparation	3
3.02	Installation	3
3.03	Field Testing / Quality Control	3
3.04	Startup / Demonstration	3
3.05	Adjusting / Protection / Cleanup	3

C. The following schedule(s), attached after the End of Section designation, are a part of this Section:

1. Schedule 40 06 01-1, Exposed Piping Schedule.

1.02 PAYMENT

A. No separate payment shall be made for performing any Work required under this Section. All costs 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 01 27 00 – Measurement and Payment.

1.03 RELATED SECTIONS

A. 40 05 05 – Exposed Piping Installation

B. 40 05 05.30 – Leakage Testing for Exposed Piping

C. 40 05 06 – Couplings, Adapters, and Specials for Process Piping

D. 40 05 07 – Hangers and Supports for Process Piping

E. 40 05 19 – Ductile Iron Process Pipe

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Not Used

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

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

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SCHEDULE 40 06 01-1
EXPOSED PIPING SCHEDULE

Service Name	Material	Wall Thickness/ Schedule/ Class	Type of Joint	Working Pressure (psig)	Test Type	Test Pressure (psig)	Interior Coating	Exterior Coatings, Treatments	Remarks
DS	DI	Class 54	Flg	250	Hyd	250	CEL	AC	

B. The following service abbreviations are used in Schedule 40 06 01-1:

Service:	**Abbrev:**
Digested Sludge	DS

C. The following pipe material abbreviations are used in Schedule 40 06 01-1:

Pipe Material:	**Abbrev:**
Ductile Iron	DI

D. The following joint type abbreviations are used in Schedule 40 06 01-1:

Joint Type:	**Abbrev:**
Flanged	Flg

E. The following interior coating abbreviations are used in Schedule 40 06 01-1:

Interior Coating	**Abbrev:**
Ceramic Epoxy Lined	CEL

F. The following exterior coating and treatment abbreviations are used in Schedule 40 06 01-1:

Exterior Coating, Treat.:	**Abbrev:**
Asphalt Coated	AC

G. The following testing abbreviations are used in Schedule 40 06 01-1:

Test Type:	**Abbrev:**
Hydrostatic	Hyd

THE CITY OF NEW YORK

DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

NR-107
North River WRRF – Underdeck Structural and Marine Improvements

Volume 3 of 3
Specifications
(with separate Bid Booklet)

August 2026