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: **TI-181**

Description: **Multi-Rake Screen and Degritting System Installation**

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

August 2026

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TALLMAN ISLAND WRRF
MULTI-RAKE SCREEN AND DEGRITTING SYSTEM INSTALLATION

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Notice To Bidders

Web-based access to BEDC EHS information

In conjunction with the requirements of Detailed Specification 01 35 27 – Environmental, Health and Safety (EHS) Requirements, DEP's Bureau of Engineering Design & Construction (BEDC) has provided the most recent version of DEP's EHS Policies and Procedures, BEDC EHS Standards, and other DEP EHS guidelines and additional information on the DEP Knowledge Reservoir of the BEDC web-based Project Management Information System (PMIS) at the following website: https://app.e-builder.net/public/publicLanding.aspx?QS=33fcd8611637450095d280fe48f856f1

For any question regarding the website, contact BEDC EHS at (718) 595-6228 or bedcehs@dep.nyc.gov.

Compliance with the latest versions of DEP EHS Policies and Procedures, BEDC EHS Standards, and DEP Guidelines are required on all DEP Contract work.

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Rev. 7/2020

NOTICE TO NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION CONTRACTORS

Please be advised that all notices required to be submitted to the New York City Department of Environmental Protection ("DEP") Commissioner pursuant to Article 11, Article 27, Article 30, and Article 78[1] of the City of New York Standard Construction Contract must now instead be submitted electronically to the following email address: commcontractnotices@dep.nyc.gov.[2] Upon receipt, DEP will send an acknowledgement via email. The DEP Commissioner will no longer accept physical copies of said notices.

If a contractor is unable to comply with this notice, please contact commcontractnotices@dep.nyc.gov immediately to make alternative arrangements.

Please note the above email address may only accept messages that are ten megabytes or smaller. If your submission is larger than that, please contact commcontractnotices@dep.nyc.gov to request a link that will allow you to upload the documents.

Thank you for your anticipated cooperation.

[1]Please note that Article 78 appears only in the 2017 City of New York Standard Construction Contract.
[2]Please be advised that this notice only applies to documents that must be submitted to the DEP Commissioner. Please follow the contract and the Procurement Board Policy Rules when submitting documents to the Comptroller of the City of New York, the Contract Dispute Resolution Board, or any other entity.

CITY OF NEW YORK

STANDARD CONSTRUCTION CONTRACT

March 2017

NO TEXT ON THIS PAGE

CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT

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WITNESSETH:

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

CHAPTER I: THE CONTRACT AND DEFINITIONS

ARTICLE 1. THE CONTRACT

1.1 Except for titles, subtitles, headings, running headlines, tables of contents and indices (all of which are printed herein merely for convenience), the following, except for such portions thereof as may be specifically excluded, shall be deemed to be part of this **Contract**:

1.1.1 All provisions required by law to be inserted in this **Contract**, whether actually inserted or not;

1.1.2 The Contract Drawings and Specifications;

1.1.3 The General Conditions and Special Conditions, if any;

1.1.4 The **Contract**;

1.1.5 The Information for Bidders; Request for Proposals; Notice of Solicitation and Proposal For Bids; Bid or Proposal, and, if used, the Bid Booklet;

1.1.6 All Addenda issued prior to the receipt of the bids; the Notice of Award; Performance and Payment Bonds, if required; and the Notice to Proceed or the Order to Work.

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

ARTICLE 2. DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.1.31 **"Small Tools"** shall mean items that are ordinarily required for a worker's job function, including but not limited to, equipment that ordinarily has no licensing, insurance or substantive storage costs associated with it; such as circular and chain saws, impact drills, threaders, benders, wrenches, socket tools, etc.

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

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

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

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

CHAPTER II: THE WORK AND ITS PERFORMANCE

ARTICLE 3. CHARACTER OF THE WORK

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

ARTICLE 4. MEANS AND METHODS OF CONSTRUCTION

4.1 Unless otherwise expressly provided in the **Contract Drawings**, **Specifications,** and **Addenda**, the **Means and Methods of Construction** shall be such as the **Contractor** may choose; subject, however, to the **Engineer's** right to reject the **Means and Methods of Construction** proposed by the **Contractor** which in the opinion of the **Engineer**:

4.1.1 Will constitute or create a hazard to the **Work**, or to persons or property; or

4.1.2 Will not produce finished **Work** in accordance with the terms of the **Contract**; or

4.1.3 Will be detrimental to the overall progress of the **Project**.

4.2 The **Engineer's** approval of the **Contractor's Means and Methods of Construction**, or his/her failure to exercise his/her right to reject such means or methods, shall not relieve the **Contractor**

of its obligation to complete the **Work** as provided in this **Contract**; nor shall the exercise of such right to reject create a cause of action for damages.

ARTICLE 5. COMPLIANCE WITH LAWS

5.1 The **Contractor** shall comply with all **Laws** applicable to this **Contract** and to the **Work** to be done hereunder.

5.2 Procurement Policy Board Rules: This **Contract** is subject to the Rules of the **PPB** ("**PPB** Rules") in effect at the time of the bid opening for this **Contract**. In the event of a conflict between the **PPB** Rules and a provision of this **Contract**, the **PPB** Rules shall take precedence.

5.3 Noise Control Code provisions.

5.3.1 In accordance with the provisions of Section 24-216(b) of the Administrative Code of the **City** ("Administrative Code"), Noise Abatement Contract Compliance, devices and activities which will be operated, conducted, constructed or manufactured pursuant to this **Contract** and which are subject to the provisions of the **City** Noise Control Code shall be operated, conducted, constructed, or manufactured without causing a violation of the Administrative Code. Such devices and activities shall incorporate advances in the art of noise control development for the kind and level of noise emitted or produced by such devices and activities, in accordance with regulations issued by the **Commissioner** of the **City** Department of Environmental Protection.

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

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

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

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

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

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

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

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

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

5.4.2 Ultra Low Sulfur Diesel Fuel

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

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

5.4.2(c) **Contractors** shall not be required to comply with this Article 5.4.2 where the **City Agency** letting this **Contract** makes a written finding, which is approved, in writing, by the DEP Commissioner, that a sufficient quantity of Ultra Low Sulfur Diesel Fuel, or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) is not available to meet the requirements of Section 24-163.3 of the Administrative Code, provided that such **Contractor** in its fulfillment of the

requirements of this **Contract**, to the extent practicable, shall use whatever quantity of Ultra Low Sulfur Diesel Fuel or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) is available. Any finding made pursuant to this Article 5.4.2(c) shall expire after sixty (60) **Days**, at which time the requirements of this Article 5.4.2 shall be in full force and effect unless the **City Agency** renews the finding in writing and such renewal is approved by the DEP Commissioner.

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

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

5.4.3 Best Available Technology

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

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

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

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

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

5.4.3(d)(ii) Where the DEP Commissioner has issued a written waiver based upon the **Contractor** having demonstrated to the DEP Commissioner that the use of the best available technology for reducing the emission of pollutants might endanger the operator of such vehicle or those working near such vehicle, due to engine malfunction, the **Contractor** shall use whatever technology for

reducing the emission of pollutants, if any, is available and appropriate for such vehicle, which would not endanger the operator of such vehicle or those working near such vehicle.

5.4.3(d)(iii) In determining which technology to use for the purposes of Articles 5.4.3(d)(i) and 5.4.3(d)(ii) above, the **Contractor** shall primarily consider the reduction in emissions of particulate matter and secondarily consider the reduction in emissions of nitrogen oxides associated with the use of such technology, which shall in no event result in an increase in the emissions of either such pollutant.

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

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

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

5.4.5 Compliance

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

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

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

5.4.6 Reporting

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 6. INSPECTION

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

6.2 The **Contractor's** obligation hereunder shall include the uncovering or taking down of finished **Work** and its restoration thereafter; provided, however, that the order to uncover, take down and restore shall be in writing, and further provided that if **Work** thus exposed proves satisfactory, and if the **Contractor** has complied with Article 6.1, such uncovering or taking down and restoration shall be

considered an item of **Extra Work** to be paid for in accordance with the provisions of Article 26. If the **Work** thus exposed proves unsatisfactory, the **City** has no obligation to compensate the **Contractor** for the uncovering, taking down or restoration.

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

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

ARTICLE 7. PROTECTION OF WORK AND OF PERSONS AND PROPERTY; NOTICES AND INDEMNIFICATION

7.1 During the performance of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall be under an absolute obligation to protect the finished and unfinished **Work** against any damage, loss, injury, theft and/or vandalism and in the event of such damage, loss, injury, theft and/or vandalism, it shall promptly replace and/or repair such **Work** at the **Contractor's** sole cost and expense, as directed by the **Resident Engineer**. The obligation to deliver finished **Work** in strict accordance with the **Contract** prior to **Final Acceptance** shall be absolute and shall not be affected by the **Resident Engineer's** approval of, or failure to prohibit, the **Means and Methods of Construction** used by the **Contractor**.

7.2 During the performance of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall take all reasonable precautions to protect all persons and the property of the **City** and of others from damage, loss or injury resulting from the **Contractor's**, and/or its **Subcontractors'** operations under this **Contract.** The **Contractor's** obligation to protect shall include the duty to provide, place or replace, and adequately maintain at or about the **Site** suitable and sufficient protection such as lights, barricades, and enclosures.

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

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

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

being given on behalf of the City of New York as Additional Insured, such other Additional Insureds, as well as the Named Insured."

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

7.3.2(b) If the **Contractor** fails to provide any of the foregoing notices to any appropriate insurance carrier(s) in a timely and complete manner, the **Contractor** shall indemnify the **City** for all losses, judgments, settlements, and expenses, including reasonable attorneys' fees, arising from an insurer's disclaimer of coverage citing late notice by or on behalf of the **City**.

7.4 To the fullest extent permitted by law, the **Contractor** shall defend, indemnify, and hold the **City**, its employees, and officials (the "Indemnitees") harmless against any and all claims (including but not limited to claims asserted by any employee of the **Contractor** and/or its **Subcontractors**) and costs and expenses of whatever kind (including but not limited to payment or reimbursement of attorneys' fees and disbursements) allegedly arising out of or in any way related to the operations of the **Contractor** and/or its **Subcontractors** in the performance of this **Contract** or from the **Contractor's** and/or its **Subcontractors'** failure to comply with any of the provisions of this **Contract** or of the **Law**. Such costs and expenses shall include all those incurred in defending the underlying claim and those incurred in connection with the enforcement of this Article 7.4 by way of cross-claim, third-party claim, declaratory action or otherwise. The parties expressly agree that the indemnification obligation hereunder contemplates (1) full indemnity in the event of liability imposed against the Indemnitees without negligence and solely by reason of statute, operation of **Law** or otherwise; and (2) partial indemnity in the event of any actual negligence on the part of the Indemnitees either causing or contributing to the underlying claim (in which case, indemnification will be limited to any liability imposed over and above that percentage attributable to actual fault whether by statute, by operation of **Law**, or otherwise). Where partial indemnity is provided hereunder, all costs and expenses shall be indemnified on a pro rata basis.

7.4.1 Indemnification under Article 7.4 or any other provision of the **Contract** shall operate whether or not **Contractor** or its **Subcontractors** have placed and maintained the insurance specified under Article 22.

7.5 The provisions of this Article 7 shall not be deemed to create any new right of action in favor of third parties against the **Contractor** or the **City**.

CHAPTER III: TIME PROVISIONS

ARTICLE 8. COMMENCEMENT AND PROSECUTION OF THE WORK

8.1 The **Contractor** shall commence the **Work** on the date specified in the **Notice to Proceed** or the **Order to Work**. The time for performance of the **Work** under the **Contract** shall be computed from

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

ARTICLE 9. PROGRESS SCHEDULES

9.1 To enable the **Work** to be performed in an orderly and expeditious manner, the **Contractor**, within fifteen (15) **Days** after the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Engineer**, shall submit to the **Engineer** a proposed progress schedule based on the Critical Path Method in the form of a bar graph or in such other form as specified by the **Engineer**, and monthly cash flow requirements, showing:

9.1.1 The anticipated time of commencement and completion of each of the various operations to be performed under this **Contract**; and

9.1.2 The sequence and interrelation of each of these operations with the others and with those of other related contracts; and

9.1.3 The estimated time required for fabrication or delivery, or both, of all materials and equipment required for the **Work**, including the anticipated time for obtaining required approvals pursuant to Article 10; and

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

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

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

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

ARTICLE 10. REQUESTS FOR INFORMATION OR APPROVAL

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

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

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

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

11.1.1 Within fifteen (15) **Days** after the **Contractor** becomes aware or reasonably should be aware of each such condition, the **Contractor** must notify the **Resident Engineer** or **Engineer**, as directed by the **Commissioner**, in writing of the existence, nature and effect of such condition upon the approved progress schedule and the **Work**, and must state why and in what respects, if any, the condition is causing or may cause a delay. Such notice shall include a description of the construction activities that are or could be affected by the condition and may include any recommendations the **Contractor** may have to address the delay condition and any activities the **Contractor** may take to avoid or minimize the delay.

11.1.2 If the **Contractor** shall claim to be sustaining damages for delay as provided for in this Article 11,within forty-five (45) **Days** from the time such damages are first incurred for each such condition, the **Contractor** shall submit to the **Commissioner** a verified written statement of the details and estimates of the amounts of such damages, including categories of expected damages and projected monthly costs, together with documentary evidence of such damages as the **Contractor** may have at the time of submission ("statement of delay damages"), as further detailed in Article 11.6. The **Contractor** may submit the above statement within such additional time as may be granted by the **Commissioner** in writing upon written request therefor.

11.1.3 Articles 11.1.1 and 11.1.2 do not relieve the **Contractor** of its obligation to comply with the provisions of Article 44.

11.2 Failure of the **Contractor** to strictly comply with the requirements of Article 11.1.1 may, in the discretion of the **Commissioner**, be deemed sufficient cause to deny any extension of time on account of delay arising out of such condition. Failure of the **Contractor** to strictly comply with the requirements of both Articles 11.1.1 and 11.1.2 shall be deemed a conclusive waiver by the **Contractor** of any and all claims for damages for delay arising from such condition and no right to recover on such claims shall exist.

11.3 When appropriate and directed by the **Engineer**, the progress schedule shall be revised by the **Contractor** until finally approved by the **Engineer**. The revised progress schedule must be strictly adhered to by the **Contractor**.

11.4 Compensable Delays

11.4.1 The **Contractor** agrees to make claim only for additional costs attributable to delay in the performance of this **Contract** necessarily extending the time for completion of the **Work** or resulting from acceleration directed by the **Commissioner** and required to maintain the progress schedule, occasioned solely by any act or omission to act of the **City** listed below. The **Contractor** also agrees that delay from any other cause shall be

compensated, if at all, solely by an extension of time to complete the performance of the **Work**.

11.4.1.1 The failure of the **City** to take reasonable measures to coordinate and progress the **Work** to the extent required by the **Contract**, except that the City shall not be responsible for the **Contractor's** obligation to coordinate and progress the **Work** of its **Subcontractors**.

11.4.1.2 Unreasonable delays attributable to the review of shop drawings, the issuance of change orders, or the cumulative impact of change orders that were not brought about by any act or omission of the **Contractor**.

11.4.1.3 The unavailability of the **Site** caused by acts or omissions of the **City**..

11.4.1.4 The issuance by the **Engineer** of a stop work order that was not brought about through any act or omission of the **Contractor**.

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

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

11.4.1.7 Delays not contemplated by the parties;

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

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

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

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

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

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

11.5.2 Any situation which was within the contemplation of the parties at the time of entering into the **Contract**, including any delay indicated or disclosed in the **Contract Documents** or that would be generally recognized by a reasonably prudent contractor as related to the nature of the **Work**, and/or the existence of any facility or appurtenance owned, operated or maintained by any third party, as indicated or disclosed in the **Contract Documents** or ordinarily encountered or generally recognized as related to the nature of the **Work**;

11.5.3 Restraining orders, injunctions or judgments issued by a court which were caused by a Contractor's submission, action or inaction or by a Contractor's **Means and Methods of Construction**, or by third parties, unless such order, injunction or judgment was the result of an act or omission by the **City**;

11.5.4 Any labor boycott, strike, picketing, lockout or similar situation;

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

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

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

11.6 Required Content of Submission of Statement of Delay Damages

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

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

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

11.6.1.3 The estimated amount of additional compensation sought and a breakdown of that amount into categories as described in Article 11.7.

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

11.7 Recoverable Costs

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

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

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

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

11.7.1.4 Additional insurance and bond costs;

11.7.1.5 Extended **Site** overhead, field office rental, salaries of field office staff, on-site project managers and superintendents, field office staff vehicles, **Project-**specific storage, field office utilities and telephone, and field office consumables;

11.7.1.6 Labor escalation costs based on actual costs;

11.7.1.7 Materials and equipment escalation costs based on applicable industry indices unless documentation of actual increased cost is provided;

11.7.1.8 Additional material and equipment storage costs based on actual documented costs and additional costs necessitated by extended manufacturer warranty periods; and

11.7.1.9 Extended home office overhead calculated based on the following formula:

(1) Subtract from the original **Contract** amount the amount earned by original contractual **Substantial Completion** date (not including change orders);

(2) Remove 15% overhead and profit from the calculation in item (1) by dividing the results of item (1) by 1.15;

(3) Multiply the result of item (2) by 7.25% for the total home office overhead;

(4) Multiply the result of item (3) by 7.25% for the total profit; and

(5) The total extended home office overhead will be the total of items (3) and (4).

11.7.2 Recoverable Subcontractor Costs. When the **Work** is performed by a **Subcontractor**, the **Contractor** may be paid the actual and necessary costs of such subcontracted **Work** as outlined above in Articles 11.7.1.1 through 11.7.1.8, and an additional overhead of 5% of the costs outlined in Articles 11.7.1.1 through 11.7.1.3.

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

11.7.3.1 Profit, or loss of anticipated or unanticipated profit, except as provided in Article 11.7.1.9;

11.7.3.2 Consequential damages, including, but not limited to, construction or bridge loans or interest paid on such loans, loss of bonding capacity, bidding opportunities, or interest in investment, or any resulting insolvency;

11.7.3.3 Indirect costs or expenses of any nature except those included in Article 11.7.1;

11.7.3.4 Direct or indirect costs attributable to performance of **Work** where the **Contractor**, because of situations or conditions within its control, has not progressed the **Work** in a satisfactory manner; and

11.7.3.5 Attorneys' fees and dispute and claims preparation expenses.

11.8 Any claims for delay under this Article 11 are not subject to the jurisdiction of the Contract Dispute Resolution Board pursuant to the dispute resolution process set forth in Article 27.

11.9 Any compensation provided to the **Contractor** in accordance with this Article 11 will be made pursuant to a claim filed with the **Comptroller**. Nothing in this Article 11 extends the time for the **Contractor** to file an action with respect to a claim within six months after **Substantial Completion** pursuant to Article 56.

ARTICLE 12. COORDINATION WITH OTHER CONTRACTORS

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

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

12.3 The **Contractor** shall notify the **Engineer** in writing if any **Other Contractor** on this **Project** is failing to coordinate its work with the **Work** of this **Contract**. If the **Engineer** finds such charges to be true, the **Engineer** shall promptly issue such directions to the **Other Contractor** with respect thereto as the situation may require. The **City** shall not, however, be liable for any damages suffered by any **Other Contractor's** failure to coordinate its work with the **Work** of this **Contract** or by reason of the **Other Contractor's** failure to promptly comply with the directions so issued by the **Engineer**, or by reason of any **Other Contractor's** default in performance, it being understood that the **City** does not guarantee the responsibility or continued efficiency of any contractor. The **Contractor** agrees to make no claim against the **City** for any damages relating to or arising out of any directions issued by the **Engineer** pursuant to this Article 12 (including but not limited to the failure of any **Other Contractor** to comply or promptly comply with such directions), or the failure of any **Other Contractor** to coordinate its work, or the default in performance of any **Other Contractor**.

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

12.5 Should the **Contractor** sustain any damage through any act or omission of any **Other Contractor** having a contract with the **City** for the performance of work upon the **Site** or of work which may be necessary to be performed for the proper prosecution of the **Work** to be performed hereunder, or through any act or omission of a subcontractor of such **Other Contractor**, the **Contractor** shall have no claim against the **City** for such damage, but shall have a right to recover such damage from the **Other**

Contractor under the provision similar to the following provisions which apply to this **Contract** and have been or will be inserted in the contracts with such **Other Contractors**:

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

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

ARTICLE 13. EXTENSION OF TIME FOR PERFORMANCE

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

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

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

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

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

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

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

13.4 The **Contractor** shall not be entitled to receive a separate extension of time for each of several causes of delay operating concurrently, but, if at all, only for the actual period of delay in completion of the **Work** as determined by the **ACCO** or the Board, irrespective of the number of causes contributing to produce such delay. If one of several causes of delay operating concurrently results from any act, fault or omission of the **Contractor** or of its **Subcontractors** or **Materialmen**, and would of itself (irrespective

of the concurrent causes) have delayed the **Work**, no extension of time will be allowed for the period of delay resulting from such act, fault or omission.

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

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

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

13.8 Application for Extension of Time:

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

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

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

13.8.1(c) Original total bid price;

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

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

13.8.1(f) The extension of time requested.

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

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

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

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

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

13.9 Analysis and Approval of Time Extensions:

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

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

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

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

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

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

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

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

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

ARTICLE 14. COMPLETION AND FINAL ACCEPTANCE OF THE WORK

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

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

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

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

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

14.4 Determining the Date of **Final Acceptance**: The **Work** will be accepted as final and complete as of the date of the **Engineer**'s/**Resident Engineer**'s inspection if, upon such inspection, the **Engineer/Resident Engineer** finds that all items on the **Final Approved Punch List** are complete and no further **Work** remains to be done. The **Commissioner** will then issue a written determination of **Final Acceptance**.

14.5 Request for Inspection: Inspection of the **Work** by the **Engineer/Resident Engineer** for the purpose of **Substantial Completion** or **Final Acceptance** shall be made within fourteen (14) **Days** after receipt of the **Contractor's** written request therefor.

14.6 Request for Re-inspection: If upon inspection for the purpose of **Substantial Completion** or **Final Acceptance**, the **Engineer/Resident Engineer** determines that there are items of **Work** still to be performed, the **Contractor** shall promptly perform them and then request a re-inspection. If upon re-inspection, the **Engineer/Resident Engineer** determines that the **Work** is substantially complete or finally accepted, the date of such re-inspection shall be the date of **Substantial Completion** or **Final Acceptance**. Re-inspection by the **Engineer/Resident Engineer** shall be made within ten (10) **Days** after receipt of the **Contractor's** written request therefor.

14.7 Initiation of Inspection by the **Engineer/Resident Engineer**: If the **Contractor** does not request inspection or re-inspection of the **Work** for the purpose of **Substantial Completion** or **Final Acceptance**, the **Engineer/Resident Engineer** may initiate such inspection or re-inspection.

ARTICLE 15. LIQUIDATED DAMAGES

15.1 In the event the **Contractor** fails to substantially complete the **Work** within the time fixed for such **Substantial Completion** in Schedule A of the General Conditions, plus authorized time extensions, or if the **Contractor**, in the sole determination of the **Commissioner**, has abandoned the **Work**, the **Contractor** shall pay to the **City** the sum fixed in Schedule A of the General Conditions, for each and every **Day** that the time consumed in substantially completing the **Work** exceeds the time allowed therefor; which said sum, in view of the difficulty of accurately ascertaining the loss which the **City** will suffer by reason of delay in the **Substantial Completion** of the **Work** hereunder, is hereby fixed and agreed as the liquidated damages that the **City** will suffer by reason of such delay, and not as a penalty. This Article 15 shall also apply to the **Contractor** whether or not the **Contractor** is defaulted pursuant to Chapter X of this **Contract**. Neither the failure to assess liquidated damages nor the granting of any time extension shall operate as a waiver or release of any claim the **City** may have against the **Contractor** for either actual or liquidated damages.

15.2 Liquidated damages received hereunder are not intended to be nor shall they be treated as either a partial or full waiver or discharge of the **City's** right to indemnification, or the **Contractor's** obligation to indemnify the **City**, or to any other remedy provided for in this **Contract** or by **Law**.

15.3 The **Commissioner** may deduct and retain out of the monies which may become due hereunder, the amount of any such liquidated damages; and in case the amount which may become due hereunder shall be less than the amount of liquidated damages suffered by the **City**, the **Contractor** shall be liable to pay the difference.

ARTICLE 16. OCCUPATION OR USE PRIOR TO COMPLETION

16.1 Unless otherwise provided for in the **Specifications**, the **Commissioner** may take over, use, occupy or operate any part of the **Work** at any time prior to **Final Acceptance**, upon written notification to the **Contractor**. The **Engineer** or **Resident Engineer**, as applicable, shall inspect the part of the **Work** to be taken over, used, occupied, or operated, and will furnish the **Contractor** with a written statement of the **Work**, if any, which remains to be performed on such part. The **Contractor** shall not object to, nor interfere with, the **Commissioner's** decision to exercise the rights granted by Article 16. In the event the **Commissioner** takes over, uses, occupies, or operates any part of the **Work:**

16.1.1 the **Engineer/Resident Engineer** shall issue a written determination of **Substantial Completion** with respect to such part of the **Work**;

16.1.2 the **Contractor** shall be relieved of its absolute obligation to protect such part of the unfinished **Work** in accordance with Article 7;

16.1.3 the **Contractor's** guarantee on such part of the **Work** shall begin on the date of such use by the **City**; and;

16.1.4 the **Contractor** shall be entitled to a return of so much of the amount retained in accordance with Article 21 as it relates to such part of the **Work**, except so much thereof as may be retained under Articles 24 and 44.

CHAPTER IV: SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 17. SUBCONTRACTS

17.1 The **Contractor** shall not make subcontracts totaling an amount more than the percentage of the total **Contract** price fixed in Schedule A of the General Conditions, without prior written permission from the **Commissioner**. All subcontracts made by the **Contractor** shall be in writing. No **Work** may be performed by a **Subcontractor** prior to the **Contractor** entering into a written subcontract with the **Subcontractor** and complying with the provisions of this Article 17.

17.2 Before making any subcontracts, the **Contractor** shall submit a written statement to the **Commissioner** giving the name and address of the proposed **Subcontractor**; the portion of the **Work** and materials which it is to perform and furnish; the cost of the subcontract; the VENDEX questionnaire if required; the proposed subcontract if requested by the **Commissioner**; and any other information tending to prove that the proposed **Subcontractor** has the necessary facilities, skill, integrity, past experience, and financial resources to perform the **Work** in accordance with the terms and conditions of this **Contract**.

17.3 In addition to the requirements in Article 17.2, **Contractor** is required to list the **Subcontractor** in the web based Subcontractor Reporting System through the City's Payee Information Portal (PIP), available at www.nyc.gov/pip.[1] For each **Subcontractor** listed, **Contractor** is required to provide the following information: maximum contract value, description of **Subcontractor's** Work, start and end date of the subcontract and identification of the **Subcontractor**'s industry. Thereafter, **Contractor** will be required to report in the system the payments made to each **Subcontractor** within 30 days of making the payment. If any of the required information changes throughout the Term of the **Contract**, **Contractor** will be required to revise the information in the system.

Failure of the **Contractor** to list a **Subcontractor** and/or to report **Subcontractor** payments in a timely fashion may result in the **Commissioner** declaring the **Contractor** in default of the **Contract** and will subject **Contractor** to liquidated damages in the amount of $100 per day for each day that the **Contractor** fails to identify a **Subcontractor** along with the required information about the **Subcontractor** and/or fails to report payments to a **Subcontractor**, beyond the time frames set forth herein or in the notice from the **City**. Article 15 shall govern the issue of liquidated damages.

17.4 If an approved **Subcontractor** elects to subcontract any portion of its subcontract, the proposed sub-subcontract shall be submitted in the same manner as directed above.

17.5 The **Commissioner** will notify the **Contractor** in writing whether the proposed **Subcontractor** is approved. If the proposed **Subcontractor** is not approved, the **Contractor** may submit another proposed **Subcontractor** unless the **Contractor** decides to do the **Work**. No **Subcontractor** shall be permitted to enter or perform any work on the **Site** unless approved.

17.6 Before entering into any subcontract hereunder, the **Contractor** shall provide the proposed **Subcontractor** with a complete copy of this document and inform the proposed **Subcontractor** fully and completely of all provisions and requirements of this **Contract** relating either directly or indirectly to the **Work** to be performed and the materials to be furnished under such subcontract, and every such

[1] In order to use the new system, a PIP account will be required. Detailed instructions on creating a PIP account and using the new system are also available at www.nyc.gov/pip. Additional assistance with PIP may be obtained by emailing the Financial Information Services Agency Help Desk at pip@fisa.nyc.gov.

Subcontractor shall expressly stipulate that all labor performed and materials furnished by the **Subcontractor** shall strictly comply with the requirements of this **Contract**.

17.7 Documents given to a prospective **Subcontractor** for the purpose of soliciting the **Subcontractor's** bid shall include either a copy of the bid cover or a separate information sheet setting forth the **Project** name, the **Contract** number (if available), the **Agency** (as noted in Article 2.1.6), and the **Project's** location.

17.8 The **Commissioner's** approval of a **Subcontractor** shall not relieve the **Contractor** of any of its responsibilities, duties, and liabilities hereunder. The **Contractor** shall be solely responsible to the **City** for the acts or defaults of its **Subcontractor** and of such **Subcontractor's** officers, agents, and employees, each of whom shall, for this purpose, be deemed to be the agent or employee of the **Contractor** to the extent of its subcontract.

17.9 If the **Subcontractor** fails to maintain the necessary facilities, skill, integrity, past experience, and financial resources (other than due to the **Contractor's** failure to make payments where required) to perform the **Work** in accordance with the terms and conditions of this **Contract**, the **Contractor** shall promptly notify the **Commissioner** and replace such **Subcontractor** with a newly approved **Subcontractor** in accordance with this Article 17.

17.10 The **Contractor** shall be responsible for ensuring that all **Subcontractors** performing **Work** at the **Site** maintain all insurance required by **Law**.

17.11 The **Contractor** shall promptly, upon request, file with the **Engineer** a conformed copy of the subcontract and its cost. The subcontract shall provide the following:

17.11.1 Payment to **Subcontractors**: The agreement between the **Contractor** and its **Subcontractor** shall contain the same terms and conditions as to method of payment for **Work**, labor, and materials, and as to retained percentages, as are contained in this **Contract**.

17.11.2 Prevailing Rate of Wages: The agreement between the **Contractor** and its **Subcontractor** shall include the prevailing wage rates and supplemental benefits to be paid in accordance with Labor Law Section 220.

17.11.3 Section 6-123 of the Administrative Code: Pursuant to the requirements of Section 6-123 of the Administrative Code, every agreement between the **Contractor** and a **Subcontractor** in excess of fifty thousand ($50,000) dollars shall include a provision that the **Subcontractor** shall not engage in any unlawful discriminatory practice as defined in Title VIII of the Administrative Code (Section 8-101 *et seq.*).

17.11.4 All requirements required pursuant to federal and/or state grant agreement(s), if applicable to the **Work**.

17.12 The **Commissioner** may deduct from the amounts certified under this **Contract** to be due to the **Contractor**, the sum or sums due and owing from the **Contractor** to the **Subcontractors** according to the terms of the said subcontracts, and in case of dispute between the **Contractor** and its **Subcontractor**, or **Subcontractors**, as to the amount due and owing, the **Commissioner** may deduct and withhold from the amounts certified under this **Contract** to be due to the **Contractor** such sum or sums as may be claimed by such **Subcontractor**, or **Subcontractors**, in a sworn affidavit, to be due and owing until such time as such claim or claims shall have been finally resolved.

17.13 On contracts where performance bonds and payment bonds are executed, the **Contractor** shall include on each requisition for payment the following data: **Subcontractor's** name, value of the subcontract, total amount previously paid to **Subcontractor** for **Work** previously requisitioned, and the amount, including retainage, to be paid to the **Subcontractor** for **Work** included in the requisition.

17.14 On **Contracts** where performance bonds and payment bonds are not executed, the **Contractor** shall include with each requisition for payment submitted hereunder, a signed statement from each and every **Subcontractor** and/or **Materialman** for whom payment is requested in such requisition. Such signed statement shall be on the letterhead of the **Subcontractor** and/or **Materialman** for whom payment is requested and shall (i) verify that such **Subcontractor** and/or **Materialman** has been paid in full for all **Work** performed and/or material supplied to date, exclusive of any amount retained and any amount included on the current requisition, and (ii) state the total amount of retainage to date, exclusive of any amount retained on the current requisition.

ARTICLE 18. ASSIGNMENTS

18.1 The **Contractor** shall not assign, transfer, convey or otherwise dispose of this **Contract**, or the right to execute it, or the right, title or interest in or to it or any part thereof, or assign, by power of attorney or otherwise any of the monies due or to become due under this **Contract**, unless the previous written consent of the **Commissioner** shall first be obtained thereto, and the giving of any such consent to a particular assignment shall not dispense with the necessity of such consent to any further or other assignments.

18.2 Such assignment, transfer, conveyance or other disposition of this **Contract** shall not be valid until filed in the office of the **Commissioner** and the **Comptroller**, with the written consent of the **Commissioner** endorsed thereon or attached thereto.

18.3 Failure to obtain the previous written consent of the **Commissioner** to such an assignment, transfer, conveyance or other disposition, may result in the revocation and annulment of this **Contract**. The **City** shall thereupon be relieved and discharged from any further liability to the **Contractor**, its assignees, transferees or sublessees, who shall forfeit and lose all monies therefor earned under the **Contract**, except so much as may be required to pay the **Contractor's** employees.

18.4 The provisions of this clause shall not hinder, prevent, or affect an assignment by the **Contractor** for the benefit of its creditors made pursuant to the **Laws** of the State of New York.

18.5 This **Contract** may be assigned by the **City** to any corporation, agency or instrumentality having authority to accept such assignment.

CHAPTER V: CONTRACTOR'S SECURITY AND GUARANTEE

ARTICLE 19. SECURITY DEPOSIT

19.1 If performance and payment bonds are required, the **City** shall retain the bid security to ensure that the successful bidder executes the **Contract** and furnishes the required payment and performance security within ten (10) **Days** after notice of the award of the **Contract**. If the successful bidder fails to execute the **Contract** and furnish the required payment and performance security, the **City** shall retain such bid security as set forth in the Information for Bidders. If the successful bidder executes the

Contract and furnishes the required payment and performance security, the **City** shall return the bid security within a reasonable time after the furnishing of such bonds and execution of the **Contract** by the **City**.

19.2 If performance and payment bonds are not required, the bid security shall be retained by the **City** as security for the **Contractor**'s faithful performance of the **Contract**. If partial payments are provided, the bid security will be returned to the **Contractor** after the sum retained under Article 21 equals the amount of the bid security, subject to other provisions of this **Contract**. If partial payments are not provided, the bid security will be released when final payment is certified by the **City** for payment.

19.3 If the **Contractor** is declared in default under Article 48 prior to the return of the deposit, or if any claim is made such as referred to in Article 23, the amount of such deposit, or so much thereof as the **Comptroller** may deem necessary, may be retained and then applied by the **Comptroller**:

19.3.1 To compensate the **City** for any expense, loss or damage suffered or incurred by reason of or resulting from such default, including the cost of re-letting and liquidated damages; or

19.3.2 To indemnify the **City** against any and all claims.

ARTICLE 20. PAYMENT GUARANTEE

20.1 On **Contracts** where one hundred (100%) percent performance bonds and payment bonds are executed, this Article 20 does not apply.

20.2 In the event the terms of this **Contract** do not require the **Contractor** to provide a payment bond or where the **Contract** does not require a payment bond for one hundred (100%) percent of the **Contract** price, the **City** shall, in accordance with the terms of this Article 20, guarantee payment of all lawful claims for:

20.2.1 Wages and compensation for labor performed and/or services rendered; and

20.2.2 Materials, equipment, and supplies provided, whether incorporated into the **Work** or not, when demands have been filed with the **City** as provided hereinafter by any person, firm, or corporation which furnished labor, material, equipment, supplies, or any combination thereof, in connection with the **Work** performed hereunder (hereinafter referred to as the "beneficiary") at the direction of the **City** or the **Contractor**.

20.3 The provisions of Article 20.2 are subject to the following limitations and conditions:

20.3.1 If the **Contractor** provides a payment bond for a value that is less than one hundred (100%) percent of the value of the **Contract Work**, the payment bond provided by the **Contractor** shall be primary (and non-contributing) to the payment guarantee provided under this Article 20.

20.3.2 The guarantee is made for the benefit of all beneficiaries as defined in Article 20.2 provided that those beneficiaries strictly adhere to the terms and conditions of Article 20.3.4 and 20.3.5.

20.3.3 Nothing in this Article 20 shall prevent a beneficiary providing labor, services or material for the **Work** from suing the **Contractor** for any amounts due and owing the beneficiary by the **Contractor**.

20.3.4 Every person who has furnished labor or material, to the **Contractor** or to a **Subcontractor** of the **Contractor**, in the prosecution of the **Work** and who has not been paid in full therefor before the expiration of a period of ninety (90) **Days** after the date on which the last of the labor was performed or material was furnished by him/her for which the claim is made, shall have the right to sue on this payment guarantee in his/her own name for the amount, or the balance thereof, unpaid at the time of commencement of the action; provided, however, that a person having a direct contractual relationship with a **Subcontractor** of the **Contractor** but no contractual relationship express or implied with the **Contractor** shall not have a right of action upon the guarantee unless he/she shall have given written notice to the **Contractor** within one hundred twenty (120) **Days** from the date on which the last of the labor was performed or the last of the material was furnished, for which his/her claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the material was furnished or for whom the labor was performed. The notice shall be served by delivering the same personally to the **Contractor** or by mailing the same by registered mail, postage prepaid, in an envelope addressed to the **Contractor** at any place where it maintains an office or conducts its business; provided, however, that where such notice is actually received by the **Contractor** by other means, such notice shall be deemed sufficient.

20.3.5 Except as provided in Labor Law Section 220-g, no action on this payment guarantee shall be commenced after the expiration of the one-year limitations period set forth in Section 137(4)(b) of the State Finance Law.

20.3.6 The **Contractor** shall promptly forward to the **City** any notice or demand received pursuant to Article 20.3.4. The **Contractor** shall inform the **City** of any defenses to the notice or demand and shall forward to the **City** any documents the **City** requests concerning the notice or demand.

20.3.7 All demands made against the **City** by a beneficiary of this payment guarantee shall be presented to the **Engineer** along with all written documentation concerning the demand which the **Engineer** deems reasonably appropriate or necessary, which may include, but shall not be limited to: the subcontract; any invoices presented to the **Contractor** for payment; the notarized statement of the beneficiary that the demand is due and payable, that a request for payment has been made of the **Contractor** and that the demand has not been paid by the **Contractor** within the time allowed for such payment by the subcontract; and copies of any correspondence between the beneficiary and the **Contractor** concerning such demand. The **City** shall notify the **Contractor** that a demand has been made. The **Contractor** shall inform the **City** of any defenses to the demand and shall forward to the **City** any documents the **City** requests concerning the demand.

20.3.8 The **City** shall make payment only if, after considering all defenses presented by the **Contractor**, it determines that the payment is due and owing to the beneficiary making the demand.

20.3.9 No beneficiary shall be entitled to interest from the **City**, or to any other costs, including, but not limited to, attorneys' fees, except to the extent required by State Finance Law Section 137.

20.4 Upon the receipt by the **City** of a demand pursuant to this Article 20, the **City** may withhold from any payment otherwise due and owing to the **Contractor** under this **Contract** an amount sufficient to satisfy the demand.

20.4.1 In the event the **City** determines that the demand is valid, the **City** shall notify the **Contractor** of such determination and the amount thereof and direct the **Contractor** to immediately pay such amount to the beneficiary. In the event the **Contractor**, within seven (7) **Days** of receipt of such notification from the **City**, fails to pay the beneficiary, such failure shall constitute an automatic and irrevocable assignment of payment by the **Contractor** to the beneficiary for the amount of the demand determined by the **City** to be valid. The **Contractor**, without further notification or other process, hereby gives its unconditional consent to such assignment of payment to the beneficiary and authorizes the **City**, on its behalf, to take all necessary actions to implement such assignment of payment, including without limitation the execution of any instrument or documentation necessary to effectuate such assignment.

20.4.2 In the event that the amount otherwise due and owing to the **Contractor** by the **City** is insufficient to satisfy such demand, the **City** may, at its option, require payment from the **Contractor** of an amount sufficient to cover such demand and exercise any other right to require or recover payment which the **City** may have under **Law** or **Contract**.

20.4.3 In the event the **City** determines that the demand is invalid, any amount withheld pending the **City**'s review of such demand shall be paid to the **Contractor**; provided, however, no lien has been filed. In the event a claim or an action has been filed, the terms and conditions set forth in Article 23 shall apply. In the event a lien has been filed, the parties will be governed by the provisions of the Lien Law of the State of New York.

20.5 The provisions of this Article 20 shall not prevent the **City** and the **Contractor** from resolving disputes in accordance with the **PPB** Rules, where applicable.

20.6 In the event the **City** determines that the beneficiary is entitled to payment pursuant to this Article 20, such determination and any defenses and counterclaims raised by the **Contractor** shall be taken into account in evaluating the **Contractor's** performance.

20.7 Nothing in this Article 20 shall relieve the **Contractor** of the obligation to pay the claims of all persons with valid and lawful claims against the **Contractor** relating to the **Work**.

20.8 The **Contractor** shall not require any performance, payment or other bonds of any **Subcontractor** if this **Contract** does not require such bonds of the **Contractor**.

20.9 The payment guarantee made pursuant to this Article 20 shall be construed in a manner consistent with Section 137 of the State Finance Law and shall afford to persons furnishing labor or materials to the **Contractor** or its **Subcontractors** in the prosecution of the **Work** under this **Contract** all of the rights and remedies afforded to such persons by such section, including but not limited to, the right to commence an action against the **City** on the payment guarantee provided by this Article 20 within the one-year limitations period set forth in Section 137(4)(b).

ARTICLE 21. RETAINED PERCENTAGE

21.1 If this **Contract** requires one hundred (100%) percent performance and payment security, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and

retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.2 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded does not exceed one million ($1,000,000) dollars, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.3 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded exceeds one million ($1,000,000) dollars, then as further security for the faithful performance of this **Contract,** the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, up to ten (10%) percent of the value of **Work** certified for payment in each partial payment voucher. The percentage to be retained is set forth in Schedule A of the General Conditions.

ARTICLE 22. INSURANCE

22.1 Types of Insurance: The **Contractor** shall procure and maintain the following types of insurance if, and as indicated, in Schedule A of the General Conditions (with the minimum limits and special conditions specified in Schedule A). Such insurance shall be maintained from the date the **Contractor** is required to provide Proof of Insurance pursuant to Article 22.3.1 through the date of completion of all required **Work** (including punch list work as certified in writing by the **Resident Engineer**), except for insurance required pursuant to Article 22.1.4, which may terminate upon **Substantial Completion** of the **Contract**. All insurance shall meet the requirements set forth in this Article 22. Wherever this Article requires that insurance coverage be "at least as broad" as a specified form (including all ISO forms), there is no obligation that the form itself be used, provided that the **Contractor** can demonstrate that the alternative form or endorsement contained in its policy provides coverage at least as broad as the specified form.

22.1.1 Commercial General Liability Insurance: The **Contractor** shall provide Commercial General Liability Insurance covering claims for property damage and/or bodily injury, including death, which may arise from any of the operations under this **Contract**. Coverage under this insurance shall be at least as broad as that provided by the latest edition of Insurance Services Office ("ISO") Form CG 0001. Such insurance shall be "occurrence" based rather than "claims-made" and include, without limitation, the following types of coverage: premises operations; products and completed operations; contractual liability (including the tort liability of another assumed in a contract); broad form property damage; independent contractors; explosion, collapse and underground (XCU); construction means and methods; and incidental malpractice. Such insurance shall contain a "per project" aggregate limit, as specified in Schedule A, that applies separately to operations under this **Contract**.

22.1.1(a) Such Commercial General Liability Insurance shall name the **City** as an Additional Insured. Coverage for the City shall specifically include the **City's** officials and employees, be at least as broad as the latest edition of ISO Form CG 20 10 and provide completed operations coverage at least as broad as the latest edition of ISO Form CG 20 37.

22.1.1(b) Such Commercial General Liability Insurance shall name all other entities designated as additional insureds in Schedule A but only for claims arising from the

Contractor's operations under this **Contract**, with coverage at least as broad as the latest edition of ISO Form CG 20 26.

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

22.1.1(d) If any of the **Work** includes repair of a waterborne vessel owned by or to be delivered to the **City**, such Commercial General Liability shall include, or be endorsed to include, Ship Repairer's Legal Liability Coverage to protect against, without limitation, liability arising from navigation of such vessels prior to delivery to and acceptance by the **City**.

22.1.2 Workers' Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance: The **Contractor** shall provide, and shall cause its **Subcontractors** to provide, Workers Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance in accordance with the **Laws** of the State of New York on behalf of all employees providing services under this **Contract** (except for those employees, if any, for which the **Laws** require insurance only pursuant to Article 22.1.3).

22.1.3 United States Longshoremen's and Harbor Workers Act and/or Jones Act Insurance: If specified in Schedule A of the General Conditions or if required by **Law**, the **Contractor** shall provide insurance in accordance with the United States Longshoremen's and Harbor Workers Act and/or the Jones Act, on behalf of all qualifying employees providing services under this **Contract**.

22.1.4 Builders Risk Insurance: If specified in Schedule A of the General Conditions, the **Contractor** shall provide Builders Risk Insurance on a completed value form for the total value of the **Work** through **Substantial Completion** of the **Work** in its entirety. Such insurance shall be provided on an All Risk basis and include coverage, without limitation, for windstorm (including named windstorm), storm surge, flood and earth movement. Unless waived by the **Commissioner**, it shall include coverage for ordinance and law, demolition and increased costs of construction, debris removal, pollutant clean up and removal, and expediting costs. Such insurance shall cover, without limitation, (a) all buildings and/or structures involved in the **Work**, as well as temporary structures at the **Site**, and (b) any property that is intended to become a permanent part of such building or structure, whether such property is on the **Site**, in transit or in temporary storage. Policies shall name the **Contractor** as Named Insured and list the **City** as both an Additional Insured and a Loss Payee as its interest may appear.

22.1.4(a) Policies of such insurance shall specify that, in the event a loss occurs at an occupied facility, occupancy of such facility is permitted without the consent of the issuing insurance company.

22.1.4(b) Such insurance may be provided through an Installation Floater, at the **Contractor's** option, if it otherwise conforms with the requirements of this Article 22.1.4.

22.1.5 Commercial Automobile Liability Insurance: The **Contractor** shall provide Commercial Automobile Liability Insurance for liability arising out of ownership,

maintenance or use of any owned (if any), non-owned and hired vehicles to be used in connection with this **Contract**. Coverage shall be at least as broad as the latest edition of ISO Form CA0001. If vehicles are used for transporting hazardous materials, the Automobile Liability Insurance shall be endorsed to provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90.

22.1.6 Contractors Pollution Liability Insurance: If specified in Schedule A of the General Conditions, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Contractors Pollution Liability Insurance covering bodily injury and property damage. Such insurance shall provide coverage for actual, alleged or threatened emission, discharge, dispersal, seepage, release or escape of pollutants (including asbestos), including any loss, cost or expense incurred as a result of any cleanup of pollutants (including asbestos) or in the investigation, settlement or defense of any claim, action, or proceedings arising from the operations under this **Contract**. Such insurance shall be in the **Contractor's** name and list the **City** as an Additional Insured and any other entity specified in Schedule A. Coverage shall include, without limitation, (a) loss of use of damaged property or of property that has not been physically injured, (b) transportation, and (c) non-owned disposal sites.

22.1.6(a) Coverage for the **City** as Additional Insured shall specifically include the **City's** officials and employees and be at least as broad as provided to the **Contractor** for this **Project**.

22.1.6(b) If such insurance is written on a claims-made policy, such policy shall have a retroactive date on or before the effective date of this **Contract**, and continuous coverage shall be maintained, or an extended discovery period exercised, for a period of not less than three (3) years from the time the **Work** under this **Contract** is completed.

22.1.7 Marine Insurance:

22.1.7(a) Marine Protection and Indemnity Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such Work to maintain, Marine Protection and Indemnity Insurance with coverage at least as broad as Form SP-23. The insurance shall provide coverage for the **Contractor** or **Subcontractor** (whichever is doing this **Work**) and for the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured for bodily injury and property damage arising from marine operations under this **Contract**. Coverage shall include, without limitation, injury or death of crew members (if not fully provided through other insurance), removal of wreck, damage to piers, wharves and other fixed or floating objects and loss of or damage to any other vessel or craft, or to property on such other vessel or craft.

22.1.7(b) Hull and Machinery Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Hull and Machinery Insurance with coverage for the **Contractor** or **Subcontractor** (whichever is doing this Work) and for the **City** (together with its officials and employees) as Additional Insured at least as broad as the latest edition of American Institute Tug Form for all tugs used under this

Contract and Collision Liability at least as broad as the latest edition of American Institute Hull Clauses.

22.1.7(c) Marine Pollution Liability Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such Work to maintain, Marine Pollution Liability Insurance covering itself (or the Subcontractor doing such Work) as Named Insured and the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured. Coverage shall be at least as broad as that provided by the latest edition of Water Quality Insurance Syndicate Form and include, without limitation, liability arising from the discharge or substantial threat of a discharge of oil, or from the release or threatened release of a hazardous substance including injury to, or economic losses resulting from, the destruction of or damage to real property, personal property or natural resources.

22.1.8 The **Contractor** shall provide such other types of insurance, at such minimum limits and with such conditions, as are specified in Schedule A of the General Conditions.

22.2 General Requirements for Insurance Coverage and Policies:

22.2.1 All required insurance policies shall be maintained with companies that may lawfully issue the required policy and have an A.M. Best rating of at least A-/VII or a Standard and Poor's rating of at least A, unless prior written approval is obtained from the **City** Corporation Counsel.

22.2.2 The **Contractor** shall be solely responsible for the payment of all premiums for all required policies and all deductibles and self-insured retentions to which such policies are subject, whether or not the **City** is an insured under the policy.

22.2.3 In his/her sole discretion, the **Commissioner** may, subject to the approval of the **Comptroller** and the **City** Corporation Counsel, accept Letters of Credit and/or custodial accounts in lieu of required insurance.

22.2.4 The **City's** limits of coverage for all types of insurance required pursuant to Schedule A of the General Conditions shall be the greater of (i) the minimum limits set forth in Schedule A or (ii) the limits provided to the **Contractor** as Named Insured under all primary, excess, and umbrella policies of that type of coverage.

22.2.5 The **Contractor** may satisfy its insurance obligations under this Article 22 through primary policies or a combination of primary and excess/umbrella policies, so long as all policies provide the scope of coverage required herein.

22.2.6 Policies of insurance provided pursuant to this Article 22 shall be primary and non-contributing to any insurance or self-insurance maintained by the **City**.

22.3 Proof of Insurance:

22.3.1 For all types of insurance required by Article 22.1 and Schedule A, except for insurance required by Articles 22.1.4 and 22.1.7, the **Contractor** shall file proof of insurance in accordance with this Article 22.3 within ten (10) **Days** of award. For insurance

provided pursuant to Articles 22.1.4 and 22.1.7, proof shall be filed by a date specified by the **Commissioner** or ten (10) **Days** prior to the commencement of the portion of the **Work** covered by such policy, whichever is earlier.

22.3.2 For Workers' Compensation Insurance provided pursuant to Article 22.1.2, the **Contractor** shall submit one of the following forms: C-105.2 Certificate of Workers' Compensation Insurance; U-26.3 - State Insurance Fund Certificate of Workers' Compensation Insurance; Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. For Disability Benefits Insurance provided pursuant to Article 22.1.2, the Contractor shall submit DB-120.1 - Certificate Of Insurance Coverage Under The NYS Disability Benefits Law, Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. ACORD forms are not acceptable.

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

22.3.4 Documentation confirming renewals of insurance shall be submitted to the **Commissione**r prior to the expiration date of coverage of policies required under this **Contract**. Such proofs of insurance shall comply with the requirements of Articles 22.3.2 and 22.3.3.

22.3.5 The **Contractor** shall be obligated to provide the **City** with a copy of any policy of insurance provided pursuant to this Article 22 upon the demand for such policy by the **Commissioner** or the **City** Corporation Counsel.

22.4 Operations of the **Contractor**:

22.4.1 The **Contractor** shall not commence the **Work** unless and until all required certificates have been submitted to and accepted by the **Commissioner**. Acceptance by the **Commissioner** of a certificate does not excuse the **Contractor** from securing insurance consistent with all provisions of this Article 22 or of any liability arising from its failure to do so.

22.4.2 The **Contractor** shall be responsible for providing continuous insurance coverage in the manner, form, and limits required by this **Contract** and shall be authorized to perform **Work** only during the effective period of all required coverage.

22.4.3 In the event that any of the required insurance policies lapse, are revoked, suspended or otherwise terminated, for whatever cause, the **Contractor** shall immediately stop all **Work**, and shall not recommence **Work** until authorized in writing to do so by the **Commissioner**. Upon quitting the **Site**, except as otherwise directed by the **Commissioner**, the **Contractor** shall leave all plant, materials, equipment, tools, and supplies on the **Site**. **Contract** time shall continue to run during such periods and no extensions of time will be granted. The **Commissioner** may also declare the **Contractor** in default for failure to maintain required insurance.

22.4.4 In the event the **Contractor** receives notice, from an insurance company or other person, that any insurance policy required under this Article 22 shall be cancelled or terminated (or has been cancelled or terminated) for any reason, the **Contractor** shall immediately forward a copy of such notice to both the **Commissioner** and the New York City Comptroller, attn: Office of Contract Administration, Municipal Building, One Centre Street, room 1005, New York, New York 10007. Notwithstanding the foregoing, the **Contractor** shall ensure that there is no interruption in any of the insurance coverage required under this Article 22.

22.4.5 Where notice of loss, damage, occurrence, accident, claim or suit is required under an insurance policy maintained in accordance with this Article 22, the **Contractor** shall notify in writing all insurance carriers that issued potentially responsive policies of any such event relating to any operations under this **Contract** (including notice to Commercial General Liability insurance carriers for events relating to the **Contractor**'s own employees) no later than 20 days after such event. For any policy where the **City** is an Additional Insured, such notice shall expressly specify that "this notice is being given on behalf of the City of New York as Insured as well as the Named Insured." Such notice shall also contain the following information: the number of the insurance policy, the name of the named insured, the date and location of the damage, occurrence, or accident, and the identity of the persons or things injured, damaged or lost. The **Contractor** shall simultaneously send a copy of such notice to the City of New York c/o Insurance Claims Specialist, Affirmative Litigation Division, New York City Law Department, 100 Church Street, New York, New York 10007.

22.4.6 In the event of any loss, accident, claim, action, or other event that does or can give rise to a claim under any insurance policy required under this Article 22, the **Contractor** shall at all times fully cooperate with the **City** with regard to such potential or actual claim.

22.5 **Subcontractor** Insurance: In the event the **Contractor** requires any **Subcontractor** to procure insurance with regard to any operations under this **Contract** and requires such **Subcontractor** to name the **Contractor** as an **Additional Insured** thereunder, the **Contractor** shall ensure that the **Subcontractor** name the **City**, including its officials and employees, as an Additional Insured with coverage at least as broad as the most recent edition of ISO Form CG 20 26.

22.6 Wherever reference is made in Article 7 or this Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents shall be sent to the address set forth in Schedule A of the General Conditions. In the event no address is set forth in Schedule A, such documents are to be sent to the **Commissioner's** address as provided elsewhere in this **Contract**.

22.7 Apart from damages or losses covered by insurance provided pursuant to Articles 22.1.2, 22.1.3, or 22.1.5, the **Contractor** waives all rights against the **City**, including its officials and employees, for any damages or losses that are covered under any insurance required under this Article 22 (whether or

not such insurance is actually procured or claims are paid thereunder) or any other insurance applicable to the operations of the **Contractor** and/or its employees, agents, or **Subcontractors**.

22.8 In the event the **Contractor** utilizes a self-insurance program to satisfy any of the requirements of this Article 22, the **Contractor** shall ensure that any such self-insurance program provides the **City** with all rights that would be provided by traditional insurance under this Article 22, including but not limited to the defense and indemnification obligations that insurers are required to undertake in liability policies.

22.9 Materiality/Non-Waiver: The **Contractor's** failure to secure policies in complete conformity with this Article 22, or to give an insurance company timely notice of any sort required in this **Contract** or to do anything else required by this Article 22 shall constitute a material breach of this **Contract**. Such breach shall not be waived or otherwise excused by any action or inaction by the **City** at any time.

22.10 Pursuant to General Municipal Law Section 108, this **Contract** shall be void and of no effect unless **Contractor** maintains Workers' Compensation Insurance for the term of this **Contract** to the extent required and in compliance with the New York State Workers' Compensation Law.

22.11 Other Remedies: Insurance coverage provided pursuant to this Article 22 or otherwise shall not relieve the **Contractor** of any liability under this **Contract**, nor shall it preclude the **City** from exercising any rights or taking such other actions available to it under any other provisions of this **Contract** or **Law**.

ARTICLE 23. MONEY RETAINED AGAINST CLAIMS

23.1 If any claim shall be made by any person or entity (including **Other Contractors** with the **City** on this **Project**) against the **City** or against the **Contractor** and the **City** for any of the following:

(a) An alleged loss, damage, injury, theft or vandalism of any of the kinds referred to in Articles 7 and 12, plus the reasonable costs of defending the **City**, which in the opinion of the **Comptroller** may not be paid by an insurance company (for any reason whatsoever); or

(b) An infringement of copyrights, patents or use of patented articles, tools, etc., as referred to in Article 57; or

(c) Damage claimed to have been caused directly or indirectly by the failure of the **Contractor** to perform the **Work** in strict accordance with this **Contract,**

the amount of such claim, or so much thereof as the **Comptroller** may deem necessary, may be withheld by the **Comptroller**, as security against such claim, from any money due hereunder. The **Comptroller**, in his/her discretion, may permit the **Contractor** to substitute other satisfactory security in lieu of the monies so withheld.

23.2 If an action on such claim is timely commenced and the liability of the **City**, or the **Contractor**, or both, shall have been established therein by a final judgment of a court of competent jurisdiction, or if such claim shall have been admitted by the **Contractor** to be valid, the **Comptroller** shall pay such judgment or admitted claim out of the monies retained by the **Comptroller** under the provisions of this Article 23, and return the balance, if any, without interest, to the **Contractor**.

ARTICLE 24. MAINTENANCE AND GUARANTY

24.1 The **Contractor** shall promptly repair, replace, restore or rebuild, as the **Commissioner** may determine, any finished **Work** in which defects of materials or workmanship may appear or to which damage may occur because of such defects, during the one (1) year period subsequent to the date of **Substantial Completion** (or use and occupancy in accordance with Article 16), except where other periods of maintenance and guaranty are provided for in Schedule A.

24.2 As security for the faithful performance of its obligations hereunder, the **Contractor**, upon filing its requisition for payment on **Substantial Completion**, shall deposit with the **Commissioner** a sum equal to one (1%) percent of the price (or the amount fixed in Schedule A of the General Conditions) in cash or certified check upon a state or national bank and trust company or a check of such bank and trust company signed by a duly authorized officer thereof and drawn to the order of the **Comptroller**, or obligations of the **City**, which the **Comptroller** may approve as of equal value with the sum so required.

24.3 In lieu of the above, the **Contractor** may make such security payment to the **City** by authorizing the **Commissioner** in writing to deduct the amount from the **Substantial Completion** payment which shall be deemed the deposit required above.

24.4 If the **Contractor** has faithfully performed all of its obligations hereunder the **Commissioner** shall so certify to the **Comptroller** within five (5) **Days** after the expiration of one (1) year from the date of **Substantial Completion** and acceptance of the **Work** or within thirty (30) **Days** after the expiration of the guarantee period fixed in the **Specifications**. The security payment shall be repaid to the **Contractor** without interest within thirty (30) **Days** after certification by the **Commissioner** to the **Comptroller** that the **Contractor** has faithfully performed all of its obligations hereunder.

24.5 Notice by the **Commissioner** to the **Contractor** to repair, replace, rebuild or restore such defective or damaged **Work** shall be timely, pursuant to this article, if given not later than ten (10) **Days** subsequent to the expiration of the one (1) year period or other periods provided for herein.

24.6 If the **Contractor** shall fail to repair, replace, rebuild or restore such defective or damaged **Work** promptly after receiving such notice, the **Commissioner** shall have the right to have the **Work** done by others in the same manner as provided for in the completion of a defaulted **Contract**, under Article 51.

24.7 If the security payment so deposited is insufficient to cover the cost of such **Work**, the **Contractor** shall be liable to pay such deficiency on demand by the **Commissioner**.

24.8 The **Engineer's** certificate setting forth the fair and reasonable cost of repairing, replacing, rebuilding or restoring any damaged or defective **Work** when performed by one other than the **Contractor**, shall be binding and conclusive upon the **Contractor** as to the amount thereof.

24.9 The **Contractor** shall obtain all manufacturers' warranties and guaranties of all equipment and materials required by this **Contract** in the name of the **City** and shall deliver same to the **Commissioner**. All of the **City's** rights and title and interest in and to said manufacturers' warranties and guaranties may be assigned by the **City** to any subsequent purchasers of such equipment and materials or lessees of the premises into which the equipment and materials have been installed.

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

ARTICLE 25. CHANGES

25.1 Changes may be made to this **Contract** only as duly authorized in writing by the **Commissioner** in accordance with the **Law** and this **Contract**. All such changes, modifications, and amendments will become a part of the **Contract**. **Work** so ordered shall be performed by the **Contractor**.

25.2 **Contract** changes will be made only for **Work** necessary to complete the **Work** included in the original scope of the **Contract** and/or for non-material changes to the scope of the **Contract**. Changes are not permitted for any material alteration in the scope of **Work** in the **Contract**.

25.3 The **Contractor** shall be entitled to a price adjustment for **Extra Work** performed pursuant to a written change order. Adjustments to price shall be computed in one or more of the following ways:

25.3.1 By applicable unit prices specified in the **Contract**; and/or

25.3.2 By agreement of a fixed price; and/or

25.3.3 By time and material records; and/or

25.3.4 In any other manner approved by the **CCPO**.

25.4 All payments for change orders are subject to pre-audit by the **Engineering Audit Officer** and may be post-audited by the **Comptroller** and/or the **Agency**.

ARTICLE 26. METHODS OF PAYMENT FOR OVERRUNS AND EXTRA WORK

26.1 Overrun of Unit Price Item: An overrun is any quantity of a unit price item which the **Contractor** is directed to provide which is in excess of one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule.

26.1.1 For any unit price item, the **Contractor** will be paid at the unit price bid for any quantity up to one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule. If during the progress of the **Work**, the actual quantity of any unit price item required to complete the **Work** approaches the estimated quantity for that item, and for any reason it appears that the actual quantity of any unit price item necessary to complete the **Work** will exceed the estimated quantity for that item by twenty-five (25%) percent, the **Contractor** shall immediately notify the **Engineer** of such anticipated overrun. The **Contractor** shall not be compensated for any quantity of a unit price item provided which is in excess of one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule without written authorization from the **Engineer**.

26.1.2 If the actual quantity of any unit price item necessary to complete the **Work** will exceed one hundred twenty five (125%) percent of the estimated quantity for that item set forth in the bid schedule, the **City** reserves the right and the **Contractor** agrees to negotiate a new unit price for such item. In no event shall such negotiated new unit price exceed the unit bid price. If the **City** and **Contractor** cannot agree on a new unit price, then the **City** shall order the **Contractor** and the **Contractor** agrees to provide additional quantities of

the item on the basis of time and material records for the actual and reasonable cost as determined under Article 26.2, but in no event at a unit price exceeding the unit price bid.

26.2 **Extra Work:** For **Extra Work** where payment is by agreement on a fixed price in accordance with Article 25.3.2, the price to be paid for such **Extra Work** shall be based on the fair and reasonable estimated cost of the items set forth below. For **Extra Work** where payment is based on time and material records in accordance with Article 25.3.3, the price to be paid for such **Extra Work** shall be the actual and reasonable cost of the items set forth below, calculated in accordance with the formula specified therein, if any.

26.2.1 Necessary materials (including transportation to the **Site**); plus

26.2.2 Necessary direct labor, including payroll taxes (subject to statutory wage caps) and supplemental benefits; plus

26.2.3 Sales and personal property taxes, if any, required to be paid on materials not incorporated into such **Extra Work**; plus

26.2.4 Reasonable rental value of **Contractor**-owned (or **Subcontractor**-owned, as applicable), necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per operating hour: (.035) x (HP rating) x (Fuel cost/gallon). Reasonable rental value is defined as the lower of either seventy-five percent of the monthly prorated rental rates established in "The AED Green Book, Rental Rates and Specifications for Construction Equipment" published by Equipment Watch (the "Green Book"), or seventy-five percent of the monthly prorated rental rates established in the "Rental Rate Blue Book for Construction Equipment" published by Equipment Watch (the "Blue Book") (the applicable Blue Book rate being for rental only without the addition of any operational costs listed in the Blue Book). The reasonable rental value is deemed to be inclusive of all operating costs except for fuel/energy consumption and equipment operator's wages/costs. For multiple shift utilization, reimbursement shall be calculated as follows: first shift shall be seventy-five (75%) percent of such rental rates; second shift shall be sixty (60%) percent of the first shift rate; and third shift shall be forty (40%) percent of the first shift rate. Equipment on standby shall be reimbursed at one-third (1/3) the prorated monthly rental rate. **Contractor**-owned (or **Subcontractor**-owned, as applicable) equipment includes equipment from rental companies affiliated with or controlled by the **Contractor** (or **Subcontractor**, as applicable)**,** as determined by the **Commissioner**. In establishing cost reimbursement for non-operating **Contractor**-owned (or **Subcontractor**-owned, as applicable) equipment (scaffolding, sheeting systems, road plates, etc.), the **City** may restrict reimbursement to a purchase-salvage/life cycle basis if less than the computed rental costs; plus

26.2.5 Necessary installation and dismantling of such plant and equipment, including transportation to and from the **Site**, if any, provided that, in the case of non-**Contractor**-owned (or non-**Subcontractor**-owned, as applicable) equipment rented from a third party, the cost of installation and dismantling are not allowable if such costs are included in the rental rate; plus

26.2.6 Necessary fees charged by governmental entities; plus

26.2.7 Necessary construction-related service fees charged by non-governmental entities, such as landfill tipping fees; plus

26.2.8 Reasonable rental costs of non-**Contractor**-owned (or non-**Subcontractor**-owned, as applicable) necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per hour of operation: (.035) x (HP rating) x (Fuel cost/gallon). In lieu of renting, the **City** reserves the right to direct the purchase of non-operating equipment (scaffolding, sheeting systems, road plates, etc.), with payment on a purchase-salvage/life cycle basis, if less than the projected rental costs; plus

26.2.9 Workers' Compensation Insurance, and any insurance coverage expressly required by the **City** for the performance of the **Extra Work** which is different than the types of insurance required by Article 22 and Schedule A of the General Conditions. The cost of Workers' Compensation Insurance is subject to applicable payroll limitation caps and shall be based upon the carrier's Manual Rate for such insurance derived from the applicable class Loss Cost ("LC") and carrier's Lost Cost Multiplier ("LCM") approved by the New York State Department of Financial Services, and with the exception of experience rating, rate modifiers as promulgated by the New York Compensation Insurance Rating Board ("NYCIRB"); plus

26.2.10 Additional costs incurred as a result of the **Extra Work** for performance and payment bonds; plus

26.2.11 Twelve percent (12%) percent of the total of items in Articles 26.2.1 through 26.2.5 as compensation for overhead, except that no percentage for overhead will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes. Overhead shall include without limitation, all costs and expenses in connection with administration, management superintendence, small tools, and insurance required by Schedule A of the General Conditions other than Workers' Compensation Insurance; plus

26.2.12 Ten (10%) percent of the total of items in Articles 26.2.1 through 26.2.5, plus the items in Article 26.2.11, as compensation for profit, except that no percentage for profit will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes; plus

26.2.13 Five (5%) percent of the total of items in Articles 26.2.6 through 26.2.10 as compensation for overhead and profit.

26.3 Where the **Extra Work** is performed in whole or in part by other than the **Contractor's** own forces pursuant to Article 26.2, the **Contractor** shall be paid, subject to pre-audit by the **Engineering Audit Officer**, the cost of such **Work** computed in accordance with Article 26.2 above, plus an additional allowance of five (5%) percent to cover the **Contractor's** overhead and profit.

26.4 Where a change is ordered, involving both **Extra Work** and omitted or reduced **Contract Work,** the **Contract** price shall be adjusted, subject to pre-audit by the **EAO**, in an amount based on the difference between the cost of such **Extra Work** and of the omitted or reduced **Work**.

26.5 Where the **Contractor** and the **Commissioner** can agree upon a fixed price for **Extra Work** in accordance with Article 25.3.2 or another method of payment for **Extra Work** in accordance with

Article 25.3.4, or for **Extra Work** ordered in connection with omitted **Work**, such method, subject to pre-audit by the **EAO**, may, at the option of the **Commissioner**, be substituted for the cost plus a percentage method provided in Article 26.2; provided, however, that if the **Extra Work** is performed by a **Subcontractor**, the **Contractor** shall not be entitled to receive more than an additional allowance of five (5%) percent for overhead and profit over the cost of such **Subcontractor's Work** as computed in accordance with Article 26.2.

ARTICLE 27. RESOLUTION OF DISPUTES

27.1 All disputes between the **City** and the **Contractor** of the kind delineated in this Article 27.1 that arise under, or by virtue of, this **Contract** shall be finally resolved in accordance with the provisions of this Article 27 and the **PPB** Rules. This procedure for resolving all disputes of the kind delineated herein shall be the exclusive means of resolving any such disputes.

27.1.1 This Article 27 shall not apply to disputes concerning matters dealt with in other sections of the **PPB** Rules, or to disputes involving patents, copyrights, trademarks, or trade secrets (as interpreted by the courts of New York State) relating to proprietary rights in computer software.

27.1.2 This Article 27 shall apply only to disputes about the scope of **Work** delineated by the **Contract**, the interpretation of **Contract** documents, the amount to be paid for **Extra Work** or disputed work performed in connection with the **Contract**, the conformity of the **Contractor's Work** to the **Contract**, and the acceptability and quality of the **Contractor's Work**; such disputes arise when the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** makes a determination with which the **Contractor** disagrees.

27.2 All determinations required by this Article 27 shall be made in writing clearly stated, with a reasoned explanation for the determination based on the information and evidence presented to the party making the determination. Failure to make such determination within the time required by this Article 27 shall be deemed a non-determination without prejudice that will allow application to the next level.

27.3 During such time as any dispute is being presented, heard, and considered pursuant to this Article 27, the **Contract** terms shall remain in force and the **Contractor** shall continue to perform **Work** as directed by the **ACCO** or the **Engineer**. Failure of the **Contractor** to continue **Work** as directed shall constitute a waiver by the **Contractor** of its claim.

27.4 Presentation of Disputes to **Commissioner**.

Notice of Dispute and Agency Response. The **Contractor** shall present its dispute in writing ("Notice of Dispute") to the **Commissioner** within thirty (30) Days of receiving written notice of the determination or action that is the subject of the dispute. This notice requirement shall not be read to replace any other notice requirements contained in the **Contract**. The Notice of Dispute shall include all the facts, evidence, documents, or other basis upon which the **Contractor** relies in support of its position, as well as a detailed computation demonstrating how any amount of money claimed by the **Contractor** in the dispute was arrived at. Within thirty (30) Days after receipt of the detailed written submission comprising the complete Notice of Dispute, the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** shall submit to the **Commissioner** all materials he or she deems pertinent to the dispute. Following initial submissions to the **Commissioner**, either party may demand of the other the production of any document or other material the demanding party believes may be relevant to the dispute. The requested party shall produce all relevant materials that are not otherwise

protected by a legal privilege recognized by the courts of New York State. Any question of relevancy shall be determined by the **Commissioner** whose decision shall be final. Willful failure of the **Contractor** to produce any requested material whose relevancy the **Contractor** has not disputed, or whose relevancy has been affirmatively determined, shall constitute a waiver by the **Contractor** of its claim.

27.4.1 **Commissioner** Inquiry. The **Commissioner** shall examine the material and may, in his or her discretion, convene an informal conference with the **Contractor**, the **ACCO**, and the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** to resolve the issue by mutual consent prior to reaching a determination. The **Commissioner** may seek such technical or other expertise as he or she shall deem appropriate, including the use of neutral mediators, and require any such additional material from either or both parties as he or she deems fit. The **Commissioner's** ability to render, and the effect of, a decision hereunder shall not be impaired by any negotiations in connection with the dispute presented, whether or not the **Commissioner** participated therein. The **Commissioner** may or, at the request of any party to the dispute, shall compel the participation of any **Other Contractor** with a contract related to the **Work** of this **Contract**, and that **Contractor** shall be bound by the decision of the **Commissioner**. Any **Other Contractor** thus brought into the dispute resolution proceeding shall have the same rights and obligations under this Article 27 as the **Contractor** initiating the dispute.

27.4.2 **Commissioner** Determination. Within thirty (30) **Days** after the receipt of all materials and information, or such longer time as may be agreed to by the parties, the **Commissioner** shall make his or her determination and shall deliver or send a copy of such determination to the **Contractor**, the **ACCO,** and **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner**, as applicable, together with a statement concerning how the decision may be appealed.

27.4.3 Finality of **Commissioner's** Decision. The **Commissioner's** decision shall be final and binding on all parties, unless presented to the Contract Dispute Resolution Board pursuant to this Article 27. The **City** may not take a petition to the Contract Dispute Resolution Board. However, should the **Contractor** take such a petition, the **City** may seek, and the Contract Dispute Resolution Board may render, a determination less favorable to the **Contractor** and more favorable to the **City** than the decision of the **Commissioner**.

27.5 Presentation of Dispute to the **Comptroller**. Before any dispute may be brought by the **Contractor** to the Contract Dispute Resolution Board, the **Contractor** must first present its claim to the **Comptroller** for his or her review, investigation, and possible adjustment.

27.5.1 Time, Form, and Content of Notice. Within thirty (30) **Days** of its receipt of a decision by the **Commissioner,** the **Contractor** shall submit to the **Comptroller** and to the **Commissioner** a Notice of Claim regarding its dispute with the **Agency**. The Notice of Claim shall consist of (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written decision of the **Commissioner**; and (iii) a copy of all materials submitted by the **Contractor** to the **Agency**, including the Notice of Dispute. The **Contractor** may not present to the **Comptroller** any material not presented to the **Commissioner**, except at the request of the **Comptroller**.

27.5.2 Response. Within thirty (30) **Days** of receipt of the Notice of Claim, the **Agency** shall make available to the **Comptroller** a copy of all material submitted by the **Agency** to the **Commissioner** in connection with the dispute. The **Agency** may not present to the **Comptroller** any material not presented to the **Commissioner** except at the request of the **Comptroller**.

27.5.3 **Comptroller** Investigation. The **Comptroller** may investigate the claim in dispute and, in the course of such investigation, may exercise all powers provided in Sections 7-201 and 7-203 of the Administrative Code. In addition, the **Comptroller** may demand of either party, and such party shall provide, whatever additional material the **Comptroller** deems pertinent to the claim, including original business records of the **Contractor**. Willful failure of the **Contractor** to produce within fifteen (15) **Days** any material requested by the **Comptroller** shall constitute a waiver by the **Contractor** of its claim. The **Comptroller** may also schedule an informal conference to be attended by the **Contractor**, **Agency** representatives, and any other personnel desired by the **Comptroller**.

27.5.4 Opportunity of **Comptroller** to Compromise or Adjust Claim. The **Comptroller** shall have forty-five (45) **Days** from his or her receipt of all materials referred to in Article 27.5.3 to investigate the disputed claim. The period for investigation and compromise may be further extended by agreement between the **Contractor** and the **Comptroller**, to a maximum of ninety (90) **Days** from the **Comptroller's** receipt of all materials. The **Contractor** may not present its petition to the Contract Dispute Resolution Board until the period for investigation and compromise delineated in this Article 27.5.4 has expired. In compromising or adjusting any claim hereunder, the **Comptroller** may not revise or disregard the terms of the **Contract** between the parties.

27.6 Contract Dispute Resolution Board. There shall be a Contract Dispute Resolution Board composed of:

27.6.1 The chief administrative law judge of the Office of Administrative Trials and Hearings (OATH) or his/her designated OATH administrative law judge, who shall act as chairperson, and may adopt operational procedures and issue such orders consistent with this Article 27 as may be necessary in the execution of the Contract Dispute Resolution Board's functions, including, but not limited to, granting extensions of time to present or respond to submissions;

27.6.2 The **CCPO** or his/her designee; any designee shall have the requisite background to consider and resolve the merits of the dispute and shall not have participated personally and substantially in the particular matter that is the subject of the dispute or report to anyone who so participated; and

27.6.3 A person with appropriate expertise who is not an employee of the **City**. This person shall be selected by the presiding administrative law judge from a prequalified panel of individuals, established and administered by OATH with appropriate background to act as decision-makers in a dispute. Such individual may not have a contract or dispute with the **City** or be an officer or employee of any company or organization that does, or regularly represents persons, companies, or organizations having disputes with the **City**.

27.7 Petition to the Contract Dispute Resolution Board. In the event the claim has not been settled or adjusted by the **Comptroller** within the period provided in this Article 27, the **Contractor**,

within thirty (30) **Days** thereafter, may petition the Contract Dispute Resolution Board to review the **Commissioner's** determination.

27.7.1 Form and Content of Petition by **Contractor**. The **Contractor** shall present its dispute to the Contract Dispute Resolution Board in the form of a petition, which shall include (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed, and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written Decision of the **Commissioner,** (iii) copies of all materials submitted by the **Contractor** to the Agency; (iv) a copy of the written decision of the **Comptroller**, if any, and (v) copies of all correspondence with, or written material submitted by the **Contractor**, to the **Comptroller**. The **Contractor** shall concurrently submit four (4) complete sets of the Petition: one set to the **City** Corporation Counsel (Attn: Commercial and Real Estate Litigation Division) and three (3) sets to the Contract Dispute Resolution Board at OATH's offices with proof of service on the **City** Corporation Counsel. In addition, the **Contractor** shall submit a copy of the written statement of the substance of the dispute, cited in (i) above, to both the **Commissioner** and the **Comptroller**.

27.7.2 **Agency** Response. Within thirty (30) **Days** of its receipt of the Petition by the **City** Corporation Counsel, the **Agency** shall respond to the brief written statement of the **Contractor** and make available to the Contract Dispute Resolution Board all material it submitted to the **Commissioner** and **Comptroller**. Three (3) complete copies of the **Agency** response shall be provided to the Contract Dispute Resolution Board and one to the **Contractor**. Extensions of time for submittal of the **Agency** response shall be given as necessary upon a showing of good cause or, upon consent of the parties, for an initial period of up to thirty (30) Days.

27.7.3 Further Proceedings. The Contract Dispute Resolution Board shall permit the **Contractor** to present its case by submission of memoranda, briefs, and oral argument. The Contract Dispute Resolution Board shall also permit the **Agency** to present its case in response to the **Contractor** by submission of memoranda, briefs, and oral argument. If requested by the **City** Corporation Counsel, the **Comptroller** shall provide reasonable assistance in the preparation of the **Agency's** case. Neither the **Contractor** nor the **Agency** may support its case with any documentation or other material that was not considered by the **Comptroller**, unless requested by the Contract Dispute Resolution Board. The Contract Dispute Resolution Board, in its discretion, may seek such technical or other expert advice as it shall deem appropriate and may seek, on its own or upon application of a party, any such additional material from any party as it deems fit. The Contract Dispute Resolution Board, in its discretion, may combine more than one dispute between the parties for concurrent resolution.

27.7.4 Contract Dispute Resolution Board Determination. Within forty-five (45) **Days** of the conclusion of all written submissions and oral arguments, the Contract Dispute Resolution Board shall render a written decision resolving the dispute. In an unusually complex case, the Contract Dispute Resolution Board may render its decision in a longer period, not to exceed ninety (90) **Days**, and shall so advise the parties at the commencement of this period. The Contract Dispute Resolution Board's decision must be consistent with the terms of the **Contract**. Decisions of the Contract Dispute Resolution Board shall only resolve matters before the Contract Dispute Resolution Board and shall not have precedential effect with respect to matters not before the Contract Dispute Resolution Board.

27.7.5 Notification of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution Board shall send a copy of its decision to the **Contractor**, the **ACCO**, the Engineer, the **Comptroller**, the **City** Corporation Counsel, the CCPO, and the **PPB**. A decision in favor of the **Contractor** shall be subject to the prompt payment provisions of the **PPB** Rules. The Required Payment Date shall be thirty (30) Days after the date the parties are formally notified of the Contract Dispute Resolution Board's decision.

27.7.6 Finality of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution Board's decision shall be final and binding on all parties. Any party may seek review of the Contract Dispute Resolution Board's decision solely in the form of a challenge, filed within four (4) months of the date of the Contract Dispute Resolution Board's decision, in a court of competent jurisdiction of the State of New York, County of New York pursuant to Article 78 of the Civil Practice Law and Rules. Such review by the court shall be limited to the question of whether or not the Contract Dispute Resolution Board's decision was made in violation of lawful procedure, was affected by an error of **Law**, or was arbitrary and capricious or an abuse of discretion. No evidence or information shall be introduced or relied upon in such proceeding that was not presented to the Contract Dispute Resolution Board in accordance with this Article 27.

27.8 Any termination, cancellation, or alleged breach of the **Contract** prior to or during the pendency of any proceedings pursuant to this Article 27 shall not affect or impair the ability of the **Commissioner** or Contract Dispute Resolution Board to make a binding and final decision pursuant to this Article 27.

ARTICLE 28. RECORD KEEPING FOR EXTRA OR DISPUTED WORK OR WORK ON A TIME & MATERIALS BASIS

28.1 While the **Contractor** or any of its **Subcontractors** is performing **Work** on a time and material basis or **Extra Work** on a time and material basis ordered by the **Commissioner** under Article 25, or where the **Contractor** believes that it or any of its **Subcontractors** is performing **Extra Work** but a final determination by **Agency** has not been made, or the **Contractor** or any of its **Subcontractors** is performing disputed **Work** (whether on or off the **Site**), or complying with a determination or order under protest in accordance with Articles 11, 27, and 30, in each such case the **Contractor** shall furnish the **Resident Engineer** daily with three (3) copies of written statements signed by the **Contractor's** representative at the **Site** showing:

28.1.1 The name, trade, and number of each worker employed on such **Work** or engaged in complying with such determination or order, the number of hours employed, and the character of the **Work** each is doing; and

28.1.2 The nature and quantity of any materials, plant and equipment furnished or used in connection with the performance of such **Work** or compliance with such determination or order, and from whom purchased or rented.

28.2 A copy of such statement will be countersigned by the **Resident Engineer**, noting thereon any items not agreed to or questioned, and will be returned to the **Contractor** within two (2) **Days** after submission.

28.3 The **Contractor** and its **Subcontractors**, when required by the **Commissioner**, or the **Comptroller**, shall also produce for inspection, at the office of the **Contractor** or **Subcontractor**, any and all of its books, bid documents, financial statements, vouchers, records, daily job diaries and reports,

and cancelled checks, and any other documents relating to showing the nature and quantity of the labor, materials, plant and equipment actually used in the performance of such **Work**, or in complying with such determination or order, and the amounts expended therefor, and shall permit the **Commissioner** and the **Comptroller** to make such extracts therefrom, or copies thereof, as they or either of them may desire.

28.4 In connection with the examination provided for herein, the **Commissioner**, upon demand therefor, will produce for inspection by the **Contractor** such records as the **Agency** may have with respect to such **Extra Work** or disputed **Work** performed under protest pursuant to order of the **Commissioner**, except those records and reports which may have been prepared for the purpose of determining the accuracy and validity of the **Contractor's** claim.

28.5 Failure to comply strictly with these requirements shall constitute a waiver of any claim for extra compensation or damages on account of the performance of such **Work** or compliance with such determination or order.

ARTICLE 29. OMITTED WORK

29.1 If any **Contract Work** in a lump sum **Contract**, or if any part of a lump sum item in a unit price, lump sum, or percentage-bid **Contract** is omitted by the **Commissioner** pursuant to Article 33, the **Contract** price, subject to audit by the EAO, shall be reduced by a pro rata portion of the lump sum bid amount based upon the percent of **Work** omitted subject to Article 29.4. For the purpose of determining the pro rata portion of the lump sum bid amount, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be the determining factor.

29.2 If the whole of a lump sum item or units of any other item is so omitted by the **Commissioner** in a unit price, lump sum, or percentage-bid **Contract**, then no payment will be made therefor except as provided in Article 29.4.

29.3 For units that have been ordered but are only partially completed, the unit price shall be reduced by a pro rata portion of the unit price bid based upon the percentage of **Work** omitted subject to Article 29.4.

29.4 In the event the **Contractor**, with respect to any omitted **Work**, has purchased any non-cancelable material and/or equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated into the **Work**, the **Contractor** shall be paid for such material and/or equipment in accordance with Article 64.2.1(b); provided, however, such payment is contingent upon the **Contractor's** delivery of such material and/or equipment in acceptable condition to a location designated by the **City**.

29.5 The **Contractor** agrees to make no claim for damages or for loss of overhead and profit with regard to any omitted **Work**.

ARTICLE 30. NOTICE AND DOCUMENTATION OF COSTS AND DAMAGES; PRODUCTION OF FINANCIAL RECORDS

30.1 If the **Contractor** shall claim to be sustaining damages by reason of any act or omission of the **City** or its agents, it shall submit to the **Commissioner** within forty-five (45) **Days** from the time such damages are first incurred, and every thirty (30) **Days** thereafter to the extent additional damages are being incurred for the same condition, verified statements of the details and the amounts of such

damages, together with documentary evidence of such damages. The **Contractor** may submit any of the above statements within such additional time as may be granted by the **Commissioner** in writing upon written request therefor. Failure of the **Commissioner** to respond in writing to a written request for additional time within thirty (30) **Days** shall be deemed a denial of the request. On failure of the **Contractor** to strictly comply with the foregoing provisions, such claims shall be deemed waived and no right to recover on such claims shall exist. Damages that the **Contractor** may claim in any action or dispute resolution procedure arising under or by reason of this **Contract** shall not be different from or in excess of the statements and documentation made pursuant to this Article 30. This Article 30.1 does not apply to claims submitted to the **Commissioner** pursuant to Article 11 or to claims disputing a determination under Article 27.

30.2 In addition to the foregoing statements, the **Contractor** shall, upon notice from the **Commissioner**, produce for examination at the **Contractor's** office, by the **Engineer**, **Architect** or **Project Manager**, all of its books of account, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**, and submit itself and persons in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.3 In addition to the statements required under Article 28 and this Article 30, the **Contractor** and/or its **Subcontractor** shall, within thirty (30) **Days** upon notice from the **Commissioner** or **Comptroller**, produce for examination at the **Contractor's** and/or **Subcontractor's** office, by a representative of either the **Commissioner** or **Comptroller**, all of its books of account, bid documents, financial statements, accountant workpapers, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**. Further, the **Contractor** and/or its **Subcontractor** shall submit any person in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.4 Unless the information and examination required under Article 30.3 is provided by the **Contractor** and/or its **Subcontractor** upon thirty (30) **Days'** notice from the **Commissioner** or **Comptroller**, or upon the **Commissioner's** or **Comptroller's** written authorization to extend the time to comply, the **City** shall be released from all claims arising under, relating to or by reason of this **Contract**, except for sums certified by the **Commissioner** to be due under the provisions of this **Contract**. It is further stipulated and agreed that no person has the power to waive any of the foregoing provisions and that in any action or dispute resolution procedure against the **City** to recover any sum in excess of the sums certified by the **Commissioner** to be due under or by reason of this **Contract**, the **Contractor** must allege in its complaint and prove, at trial or during such dispute resolution procedure, compliance with the provisions of this Article 30.

30.5 In addition, after the commencement of any action or dispute resolution procedure by the **Contractor** arising under or by reason of this **Contract**, the **City** shall have the right to require the **Contractor** to produce for examination under oath, up until the trial of the action or hearing before the Contract Dispute Resolution Board, the books and documents described in Article 30.3 and submit itself and all persons in its employ for examination under oath. If this Article 30 is not complied with as required, then the **Contractor** hereby consents to the dismissal of the action or dispute resolution procedure.

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

ARTICLE 31. THE RESIDENT ENGINEER

31.1 The **Resident Engineer** shall have the power to inspect, supervise, and control the performance of the **Work**, subject to review by the **Commissioner**. The **Resident Engineer** shall not, however, have the power to issue an **Extra Work** order, except as specifically designated in writing by the **Commissioner**.

ARTICLE 32. THE ENGINEER OR ARCHITECT OR PROJECT MANAGER

32.1 The **Engineer** or **Architect** or **Project Manager**, in addition to those matters elsewhere herein delegated to the **Engineer** and expressly made subject to his/her determination, direction or approval, shall have the power, subject to review by the **Commissioner**:

32.1.1 To determine the amount, quality, and location of the **Work** to be paid for hereunder; and

32.1.2 To determine all questions in relation to the **Work**, to interpret the **Contract Drawings**, **Specifications**, and **Addenda**, and to resolve all patent inconsistencies or ambiguities therein; and

32.1.3 To determine how the **Work** of this **Contract** shall be coordinated with **Work** of **Other Contractors** engaged simultaneously on this **Project**, including the power to suspend any part of the **Work**, but not the whole thereof; and

32.1.4 To make minor changes in the **Work** as he/she deems necessary, provided such changes do not result in a net change in the cost to the **City** or to the **Contractor** of the **Work** to be done under the **Contract**; and

32.1.5 To amplify the **Contract Drawings**, add explanatory information and furnish additional **Specifications** and drawings, consistent with this **Contract**.

32.2 The foregoing enumeration shall not imply any limitation upon the power of the **Engineer** or **Architect** or **Project Manager**, for it is the intent of this **Contract** that all of the **Work** shall generally be subject to his/her determination, direction, and approval, except where the determination, direction or approval of someone other than the **Engineer** or **Architect** or **Project Manager** is expressly called for herein.

32.3 The **Engineer** or **Architect** or **Project Manager** shall not, however, have the power to issue an **Extra Work** order, except as specifically designated in writing by the **Commissioner**.

ARTICLE 33. THE COMMISSIONER

33.1 The **Commissioner**, in addition to those matters elsewhere herein expressly made subject to his/her determination, direction or approval, shall have the power:

33.1.1 To review and make determinations on any and all questions in relation to this **Contract** and its performance; and

33.1.2 To modify or change this **Contract** so as to require the performance of **Extra Work** (subject, however, to the limitations specified in Article 25) or the omission of **Contract Work**; and

33.1.3 To suspend the whole or any part of the **Work** whenever in his/her judgment such suspension is required:

33.1.3(a) In the interest of the **City** generally; or

33.1.3(b) To coordinate the **Work** of the various contractors engaged on this **Project** pursuant to the provisions of Article 12; or

33.1.3(c) To expedite the completion of the entire **Project** even though the completion of this particular **Contract** may thereby be delayed.

ARTICLE 34. NO ESTOPPEL

34.1 Neither the **City** nor any **Agency**, official, agent or employee thereof, shall be bound, precluded or estopped by any determination, decision, approval, order, letter, payment or certificate made or given under or in connection with this **Contract** by the **City**, the **Commissioner**, the **Engineer**, the **Resident Engineer**, or any other official, agent or employee of the **City**, either before or after the final completion and acceptance of the **Work** and payment therefor:

34.1.1 From showing the true and correct classification, amount, quality or character of the **Work** actually done; or that any such determination, decision, order, letter, payment or certificate was untrue, incorrect or improperly made in any particular, or that the **Work**, or any part thereof, does not in fact conform to the requirements of this **Contract**; and

34.1.2 From demanding and recovering from the **Contractor** any overpayment made to it, or such damages as the **City** may sustain by reason of the **Contractor's** failure to perform each and every part of its **Contract**.

CHAPTER VIII: LABOR PROVISIONS

ARTICLE 35. EMPLOYEES

35.1 The **Contractor** and its **Subcontractors** shall not employ on the **Work**:

35.1.1 Anyone who is not competent, faithful and skilled in the **Work** for which he/she shall be employed; and whenever the **Commissioner** shall inform the **Contractor**, in writing, that any employee is, in his/her opinion, incompetent, unfaithful or disobedient, that employee shall be discharged from the **Work** forthwith, and shall not again be employed upon it; or

35.1.2 Any labor, materials or means whose employment, or utilization during the course of this **Contract**, may tend to or in any way cause or result in strikes, work stoppages, delays, suspension of **Work** or similar troubles by workers employed by the **Contractor** or its **Subcontractors**, or by any of the trades working in or about the buildings and premises where **Work** is being performed under this **Contract**, or by **Other Contractors** or their **Subcontractors** pursuant to other contracts, or on any other building or premises owned or operated by the **City**, its **Agencies**, departments, boards or authorities. Any violation by the **Contractor** of this requirement may, upon certification of the **Commissioner**, be considered as proper and sufficient cause for declaring the **Contractor** to be in default, and for the **City** to take action against it as set forth in Chapter X of this **Contract**, or such other article of this **Contract** as the Commissioner may deem proper; or

35.1.3 In accordance with Section 220.3-e of the Labor Law of the State of New York (hereinafter "Labor Law"), the **Contractor** and its **Subcontractors** shall not employ on the **Work** any apprentice, unless he/she is a registered individual, under a bona fide program registered with the New York State Department of Labor. The allowable ratio of apprentices to journey-level workers in any craft classification shall not be greater than the ratio permitted to the **Contractor** as to its work force on any job under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered as above, shall be paid the wage rate determined by the **Comptroller** of the **City** for the classification of **Work** actually performed. The **Contractor** or **Subcontractor** will be required to furnish written evidence of the registration of its program and apprentices as well as all the appropriate ratios and wage rates, for the area of the construction prior to using any apprentices on the **Contract Work**.

35.2 If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand ($250,000) dollars, all laborers, workers, and mechanics employed in the performance of the **Contract** on the public work site, either by the **Contractor**, **Subcontractor** or other person doing or contracting to do the whole or a part of the **Work** contemplated by the **Contract**, shall be certified prior to performing any **Work** as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration.

35.3 In accordance with Local Law Nos. 30-2012 and 33-2012, codified at sections 6-132 and 12-113 of the Administrative Code, respectively,

35.3.1 The **Contractor** shall not take an adverse personnel action with respect to an officer or employee in retaliation for such officer or employee making a report of information concerning conduct which such officer or employee knows or reasonably believes to involve corruption, criminal activity, conflict of interest, gross mismanagement or abuse of authority by any officer or employee relating to this **Contract** to (a) the Commissioner of the Department of Investigation, (b) a member of the New York City Council, the Public Advocate, or the **Comptroller**, or (c) the **CCPO**, **ACCO**, **Agency** head, or **Commissioner**.

35.3.2 If any of the **Contractor**'s officers or employees believes that he or she has been the subject of an adverse personnel action in violation of Article 35.3.1, he or she shall be entitled to bring a cause of action against the **Contractor** to recover all relief necessary to make him or her whole. Such relief may include but is not limited to: (a) an injunction to restrain continued retaliation, (b) reinstatement to the position such employee would have had but for the retaliation or to an equivalent position, (c) reinstatement of full fringe benefits and seniority rights, (d) payment of two times back

pay, plus interest, and (e) compensation for any special damages sustained as a result of the retaliation, including litigation costs and reasonable attorney's fees.

35.3.3 The **Contractor** shall post a notice provided by the **City** in a prominent and accessible place on any site where work pursuant to the **Contract** is performed that contains information about:

35.3.3(a) how its employees can report to the New York City Department of Investigation allegations of fraud, false claims, criminality or corruption arising out of or in connection with the **Contract**; and

35.3.3(b) the rights and remedies afforded to its employees under Administrative Code sections 7-805 (the New York City False Claims Act) and 12-113 (the Whistleblower Protection Expansion Act) for lawful acts taken in connection with the reporting of allegations of fraud, false claims, criminality or corruption in connection with the **Contract**.

35.3.4 For the purposes of this Article 35.3, "adverse personnel action" includes dismissal, demotion, suspension, disciplinary action, negative performance evaluation, any action resulting in loss of staff, office space, equipment or other benefit, failure to appoint, failure to promote, or any transfer or assignment or failure to transfer or assign against the wishes of the affected officer or employee.

35.3.5 This Article 35.3 is applicable to all of the **Contractor**'s **Subcontractors** having subcontracts with a value in excess of $100,000; accordingly, the **Contractor** shall include this rider in all subcontracts with a value a value in excess of $100,000.

35.4 Article 35.3 is not applicable to this **Contract** if it is valued at $100,000 or less. Articles 35.3.1, 35.3.2, 35.3.4, and 35.3.5 are not applicable to this **Contract** if it was solicited pursuant to a finding of an emergency.

35.5 Paid Sick Leave Law.

35.5.1 Introduction and General Provisions.

35.5.1(a) The Earned Sick Time Act, also known as the Paid Sick Leave Law ("PSLL"), requires covered employees who annually perform more than 80 hours of work in New York City to be provided with paid sick time.[2] Contractors of the **City** or of other governmental entities may be required to provide sick time pursuant to the PSLL.

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

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

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

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

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

35.5.2 Pursuant to the PSLL and the Rules: Applicability, Accrual, and Use.

35.5.2(a) An employee who works within the City of New York for more than eighty hours in any consecutive 12-month period designated by the employer as its "calendar year" pursuant to the PSLL ("Year") must be provided sick time. Employers must provide a minimum of one hour of sick time for every 30 hours worked by an employee and compensation for such sick time must be provided at the greater of the employee's regular hourly rate or the minimum wage. Employers are not required to provide more than 40 hours of sick time to an employee in any Year.

35.5.2(b) An employee has the right to determine how much sick time he or she will use, provided that employers may set a reasonable minimum increment for the use of sick time not to exceed four hours per **Day**. In addition, an employee may carry over up to 40 hours of unused sick time to the following Year, provided that no employer is required to allow the use of more than forty hours of sick time in a Year or carry over unused paid sick time if the employee is paid for such unused sick time and the employer provides the employee with at least the legally required amount of paid sick time for such employee for the immediately subsequent Year on the first **Day** of such Year.

35.5.2(c) An employee entitled to sick time pursuant to the PSLL may use sick time for any of the following:

i. such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;
ii. such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild or grandparent, or the child or parent of an employee's spouse or domestic partner) who has a mental

illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;

iii. closure of such employee's place of business by order of a public official due to a public health emergency; or

iv. such employee's need to care for a child whose school or childcare provider has been closed due to a public health emergency.

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

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

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

35.5.3 Exemptions and Exceptions. Notwithstanding the above, the PSLL does not apply to any of the following:

35.5.3(a) an independent contractor who does not meet the definition of employee under section 190(2) of the New York State Labor Law;

35.5.3(b) an employee covered by a valid collective bargaining agreement in effect on April 1, 2014, until the termination of such agreement;

35.5.3(c) an employee in the construction or grocery industry covered by a valid collective bargaining agreement if the provisions of the PSLL are expressly waived in such collective bargaining agreement;

35.5.3(d) an employee covered by another valid collective bargaining agreement if such provisions are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the PSLL for such employee;

35.5.3(e) an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines his or her own schedule, has the ability to reject or accept any assignment referred to him or her, and is paid an average hourly wage that is at least four times the federal minimum wage;

35.5.3(f) an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;

35.5.3(g) an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or

35.5.3(h) a participant in a Work Experience Program (WEP) under section 336-c of the New York State Social Services Law.

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

35.5.5 Notice of Rights.

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

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

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

35.5.7 Enforcement and Penalties.

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

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

35.5.8 More Generous Polices and Other Legal Requirements. Nothing in the PSLL is intended to discourage, prohibit, diminish, or impair the adoption or retention of a more generous sick time policy, or the obligation of an employer to comply with any contract,

collective bargaining agreement, employment benefit plan or other agreement providing more generous sick time. The PSLL provides minimum requirements pertaining to sick time and does not preempt, limit or otherwise affect the applicability of any other law, regulation, rule, requirement, policy or standard that provides for greater accrual or use by employees of sick leave or time, whether paid or unpaid, or that extends other protections to employees. The PSLL may not be construed as creating or imposing any requirement in conflict with any federal or state law, rule or regulation.

35.6 HireNYC: Hiring and Reporting Requirements. This Article 35.6 applies to construction contracts of $1,000,000 or more. The **Contractor** shall comply with the requirements of Articles 35.6.1-35.6.5 for all non-trades jobs (e.g., for an administrative position arising out of **Work** ant located in New York City). The **Contractor** shall reasonably cooperate with SBS and the **City** on specific outreach events, including "Hire-on-the-Spot" events, for the hiring of trades workers in connection with the **Work**. If provided elsewhere in this **Contract**, this **Contract** is subject to a project labor agreement.

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

35.6.2 Job Posting Requirements.

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

35.6.2(b) After enrollment through HireNYC and submission of relevant information, SBS will work with the **Contractor** to develop a recruitment plan which will outline the candidate screening process, and will provide clear instructions as to when, where, and how interviews will take place. HireNYC will screen applicants based on employer requirements and refer applicants whom it believes are qualified to the **Contractor** for interviews. The **Contractor** must interview referred applicants whom it believes are qualified.

35.6.2(c) After completing an interview of a candidate referred by HireNYC, the **Contractor** must provide feedback via the portal within twenty (20) business days to indicate which candidates were interviewed and hired, if any. In addition, the **Contractor** shall provide the start date of new hires, and additional information

reasonably related to such hires, within twenty (20) business days after the start date. In the event the **Contractor** does not have any job openings covered by this Rider in any given year, the **Contractor** shall be required to provide an annual update to HireNYC to that effect. For this purpose, the reporting year shall run from the date of the registration of the **Contract** pursuant to Charter section 328 and each anniversary date.

35.6.2(d) These requirements do not limit the **Contractor's** ability to assess the qualifications of prospective workers, and to make final hiring and retention decisions. No provision of this Article 35.6 shall be interpreted so as to require the **Contractor** to employ any particular worker.

35.6.2(e) In addition, the provisions of this Article 35.6 shall not apply to positions that the **Contractor** intends to fill with employees employed pursuant to the job retention provision of Section 22-505 of the Administrative Code of the City of New York. The **Contractor** shall not be required to report such openings with HireNYC. However, the **Contractor** shall enroll with the HireNYC system pursuant to Article 35.6.1, above, and, if such positions subsequently become open, then the remaining provisions of this Article 35.6 will apply.

35.6.3 Breach and Liquidated Damages. If the **Contractor** fails to comply with the terms of the **ContrSact** and this Article 35.6 (l) by not enrolling its business with HireNYC; (2) by not informing HireNYC, as required, of open positions; or (3) by failing to interview a qualified candidate, the **Agency** may assess liquidated damages in the amount of two-thousand five hundred dollars ($2,500) per breach. For all other events of noncompliance with the terms of this Article 35.6, the **Agency** may assess liquidated damages in the amount of five hundred dollars ($500) per breach. Furthermore, in the event the **Contractor** breaches the requirements of this Article 35.6 during the term of the **Contract**, the **City** may hold the **Contractor** in default of this **Contract**.

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

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

35.6.6 Federal Hiring Requirements. If this **Contract** is federally funded (as indicated elsewhere in this Contract), the **Contractor** shall comply with all federal hiring requirements as may be set forth in this **Contract**, including, as applicable: (a) Section 3 of the HUD Act of 1968, which requires, to the greatest extent feasible, economic opportunities for 30 percent of new hires be given to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing and Executive Order 11246, which prohibits discrimination in employment due to race, color, religion, sex or national origin, and requires the implementation of goals for minority and female participation for work involving any construction trade.

ARTICLE 36. NO DISCRIMINATION

36.1 The **Contractor** specifically agrees, as required by Labor Law Section 220-e, as amended, that:

36.1.1 In the hiring of employees for the performance of **Work** under this **Contract** or any subcontract hereunder, neither the **Contractor**, **Subcontractor**, nor any person acting on behalf of such **Contractor** or **Subcontractor**, shall by reason of race, creed, color or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the **Work** to which the employment relates;

36.1.2 Neither the **Contractor**, **Subcontractor**, nor any person on its behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of **Work** under this **Contract** on account of race, creed, color or national origin;

36.1.3 There may be deducted from the amount payable to the **Contractor** by the **City** under this **Contract** a penalty of fifty ($50.00) dollars for each person for each **Day** during which such person was discriminated against or intimidated in violation of the provisions of this **Contract**; and

36.1.4 This **Contract** may be cancelled or terminated by the **City** and all moneys due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this Article 36.

36.1.5 This Article 36 covers all construction, alteration and repair of any public building or public work occurring in the State of New York and the manufacture, sale, and distribution of materials, equipment, and supplies to the extent that such operations are performed within the State of New York pursuant to this **Contract**.

36.2 The **Contractor** specifically agrees, as required by Section 6-108 of the Administrative Code, as amended, that:

36.2.1 It shall be unlawful for any person engaged in the construction, alteration or repair of buildings or engaged in the construction or repair of streets or highways pursuant to a **Contract** with the **City** or engaged in the manufacture, sale or distribution of materials, equipment or supplies pursuant to a **Contract** with the **City** to refuse to employ or to refuse to continue in any employment any person on account of the race, color or creed of such person.

36.2.2 It shall be unlawful for any person or any servant, agent or employee of any person, described in Article 36.1.2, to ask, indicate or transmit, orally or in writing, directly or indirectly, the race, color or creed or religious affiliation of any person employed or seeking employment from such person, firm or corporation.

36.2.3 Breach of the foregoing provisions shall be deemed a violation of a material provision of this **Contract**.

36.2.4 Any person, or the employee, manager or owner of or officer of such firm or corporation who shall violate any of the provisions of this Article 36.2 shall, upon

conviction thereof, be punished by a fine of not more than one hundred ($100.00) dollars or by imprisonment for not more than thirty (30) **Days**, or both.

36.3 This **Contract** is subject to the requirements of Executive Order No. 50 (1980) ("E.O. 50"), as revised, and the rules and regulations promulgated thereunder. No contract will be awarded unless and until these requirements have been complied with in their entirety. By signing this **Contract**, the **Contractor** agrees that it:

36.3.1 Will not engage in any unlawful discrimination against any employee or applicant for employment because of race, creed, color, national origin, sex, age, disability, marital status or sexual orientation with respect to all employment decisions including, but not limited to, recruitment, hiring, upgrading, demotion, downgrading, transfer, training, rates of pay or other forms of compensation, layoff, termination, and all other terms and conditions of employment; and

36.3.2 Will not engage in any unlawful discrimination in the selection of **Subcontractors** on the basis of the owner's race, color, creed, national origin, sex, age, disability, marital status or sexual orientation; and

36.3.3 Will state in all solicitations or advertisements for employees placed by or on behalf of the **Contractor** that all qualified applicants will receive consideration for employment without unlawful discrimination based on race, creed, color, national origin, sex, age, citizens status, disability, marital status, sexual orientation, or that it is an equal employment opportunity employer; and

36.3.4 Will send to each labor organization or representative of workers with which it has a collective bargaining agreement or other contract or memorandum of understanding, written notification of its equal employment opportunity commitments under E.O. 50 and the rules and regulations promulgated thereunder; and

36.3.5 Will furnish, before the award of the **Contract**, all information and reports, including an employment report, that are required by E.O. 50, the rules and regulations promulgated thereunder, and orders of the **City** Department of Business Services, Division of Labor Services (**DLS**) and will permit access to its books, records, and accounts by the **DLS** for the purposes of investigation to ascertain compliance with such rules, regulations, and orders.

36.4 The **Contractor** understands that in the event of its noncompliance with the nondiscrimination clauses of this **Contract** or with any of such rules, regulations, or orders, such noncompliance shall constitute a material breach of this **Contract** and noncompliance with E.O. 50 and the rules and regulations promulgated thereunder. After a hearing held pursuant to the rules of the **DLS**, the Director of the **DLS** may direct the **Commissioner** to impose any or all of the following sanctions:

36.4.1 Disapproval of the **Contractor**; and/or

36.4.2 Suspension or termination of the **Contract**; and/or

36.4.3 Declaring the **Contractor** in default; and/or

36.4.4 In lieu of any of the foregoing sanctions, the Director of the **DLS** may impose an employment program.

In addition to any actions taken under this **Contract**, failure to comply with E.O. 50 and the rules and regulations promulgated thereunder, in one or more instances, may result in a **City Agency** declaring the **Contractor** to be non-responsible in future procurements. The **Contractor** further agrees that it will refrain from entering into any **Contract** or **Contract** modification subject to E.O. 50 and the rules and regulations promulgated thereunder with a **Subcontractor** who is not in compliance with the requirements of E.O. 50 and the rules and regulations promulgated thereunder.

36.5 The **Contractor** specifically agrees, as required by Section 6-123 of the Administrative Code, that:

36.5.1 The **Contractor** will not engage in any unlawful discriminatory practice in violation of Title 8 of the Administrative Code; and

36.5.2 Any failure to comply with this Article 36.5 may subject the **Contractor** to the remedies set forth in Section 6-123 of the Administrative Code, including, where appropriate, sanctions such as withholding of payment, imposition of an employment program, finding the **Contractor** to be in default, cancellation of the **Contract**, or any other sanction or remedy provided by **Law** or **Contract**.

ARTICLE 37. LABOR LAW REQUIREMENTS

37.1 The **Contractor** shall strictly comply with all applicable provisions of the Labor Law, as amended. Such compliance is a material term of this **Contract**.

37.2 The **Contractor** specifically agrees, as required by Labor Law Sections 220 and 220-d, as amended, that:

37.2.1 Hours of **Work**: No laborer, worker, or mechanic in the employ of the **Contractor**, **Subcontractor** or other person doing or contracting to do the whole or a part of the **Work** contemplated by this **Contract** shall be permitted or required to work more than eight (8) hours in any one (1) **Day**, or more than five (5) **Days** in any one (1) week, except as provided in the Labor Law and in cases of extraordinary emergency including fire, flood, or danger to life or property, or in the case of national emergency when so proclaimed by the President of the United States of America.

37.2.2 In situations in which there are not sufficient laborers, workers, and mechanics who may be employed to carry on expeditiously the **Work** contemplated by this **Contract** as a result of such restrictions upon the number of hours and **Days** of labor, and the immediate commencement or prosecution or completion without undue delay of the **Work** is necessary for the preservation of the **Site** and/or for the protection of the life and limb of the persons using the same, such laborers, workers, and mechanics shall be permitted or required to work more than eight (8) hours in any one (1) **Day**; or five (5) **Days** in any one (1) week; provided, however, that upon application of any **Contractor**, the **Commissioner** shall have first certified to the Commissioner of Labor of the State of New York (hereinafter "Commissioner of Labor") that such public **Work** is of an important nature and that a delay in carrying it to completion would result in serious disadvantage to the public; and provided, further, that such Commissioner of Labor shall have determined that such an emergency does in fact exist as provided in Labor Law Section 220.2.

37.2.3 Failure of the **Commissioner** to make such a certification to the Commissioner of Labor shall not entitle the **Contractor** to damages for delay or for any cause whatsoever.

37.2.4 Prevailing Rate of Wages: The wages to be paid for a legal day's **Work** to laborers, workers, or mechanics employed upon the **Work** contemplated by this **Contract** or upon any materials to be used thereon shall not be less than the "prevailing rate of wage" as defined in Labor Law Section 220, and as fixed by the **Comptroller** in the attached Schedule of Wage Rates and in updated schedules thereof. The prevailing wage rates and supplemental benefits to be paid are those in effect at the time the **Work** is being performed.

37.2.5 Requests for interpretation or correction in the Information for Bidders includes all requests for clarification of the classification of trades to be employed in the performance of the **Work** under this **Contract**. In the event that a trade not listed in the **Contract** is in fact employed during the performance of this **Contract**, the **Contractor** shall be required to obtain from the **Agency** the prevailing wage rates and supplementary benefits for the trades used and to complete the performance of this **Contract** at the price at which the **Contract** was awarded.

37.2.6 Minimum Wages: Except for employees whose wage is required to be fixed pursuant to Labor Law Section 220, all persons employed by the **Contractor** and any **Subcontractor** in the manufacture or furnishing of the supplies, materials, or equipment, or the furnishing of work, labor, or services, used in the performance of this **Contract**, shall be paid, without subsequent deduction or rebate unless expressly authorized by **Law**, not less than the sum mandated by **Law**.

37.3 Working Conditions: No part of the **Work**, labor or services shall be performed or rendered by the **Contractor** in any plants, factories, buildings or surroundings or under working conditions which are unsanitary or hazardous or dangerous to the health and safety of employees engaged in the performance of this **Contract**. Compliance with the safety, sanitary, and factory inspection **Laws** of the state in which the **Work** is to be performed shall be prima facie evidence of compliance with this Article 37.3.

37.4 Prevailing Wage Enforcement: The **Contractor** agrees to pay for all costs incurred by the **City** in enforcing prevailing wage requirements, including the cost of any investigation conducted by or on behalf of the **Agency** or the **Comptroller,** where the **City** discovers a failure to comply with any of the requirements of this Article 37 by the **Contractor** or its **Subcontractor(s)**. The **Contractor** also agrees that, should it fail or refuse to pay for any such investigation, the **Agency** is hereby authorized to deduct from a **Contractor's** account an amount equal to the cost of such investigation.

37.4.1 The Labor Law Section 220 and Section 220-d, as amended, provide that this **Contract** shall be forfeited and no sum paid for any **Work** done hereunder on a second conviction for willfully paying less than:

37.4.1(a) The stipulated prevailing wage scale as provided in Labor Law section 220, as amended, or

37.4.1(b) The stipulated minimum hourly wage scale as provided in Labor Law section 220-d, as amended.

37.4.2 For any breach or violation of either working conditions (Article 37.3) or minimum wages (Article 37.2.6) provisions, the party responsible therefor shall be liable to the **City** for liquidated damages, which may be withheld from any amounts due on any contracts with the **City** of such party responsible, or may be recovered in actions brought by the **City**

Corporation Counsel in the name of the **City**, in addition to damages for any other breach of this **Contract**, for a sum equal to the amount of any underpayment of wages due to any employee engaged in the performance of this **Contract**. In addition, the **Commissioner** shall have the right to cancel contracts and enter into other contracts for the completion of the original contract, with or without public letting, and the original **Contractor** shall be liable for any additional cost. All sums withheld or recovered as deductions, rebates, refunds, or underpayment of wages hereunder, shall be held in a special deposit account and shall be paid without interest, on order of the **Comptroller**, directly to the employees who have been paid less than minimum rates of pay as set forth herein and on whose account such sums were withheld or recovered, provided that no claims by employees for such payments shall be entertained unless made within two (2) years from the date of actual notice to the **Contractor** of the withholding or recovery of such sums by the **City**.

37.4.3 A determination by the **Comptroller** that a **Contractor** and/or its **Subcontractor** willfully violated Labor Law Section 220 will be forwarded to the **City's** five District Attorneys for review.

37.4.4 The **Contractor's** or **Subcontractor's** noncompliance with this Article 37.4 and Labor Law Section 220 may result in an unsatisfactory performance evaluation and the **Comptroller** may also find and determine that the **Contractor** or **Subcontractor** willfully violated the New York Labor **Law**.

37.4.4(a) An unsatisfactory performance evaluation for noncompliance with this Article 37.4 may result in a determination that the **Contractor** is a non-responsible bidder on subsequent procurements with the **City** and thus a rejection of a future award of a contract with the **City**, as well as any other sanctions provided for by **Law**.

37.4.4(b) Labor Law Section 220-b, as amended, provides that when two (2) final determinations have been rendered against a **Contractor** or **Subcontractor** within any consecutive six (6) year period determining that such **Contractor** or **Subcontractor** has willfully failed to pay the prevailing rate of wages or to provide supplements in accordance with the Labor Law and this Article 37.4, whether such failures were concurrent or consecutive and whether or not such final determinations concerning separate public works projects are rendered simultaneously, such **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the **City** for a period of five (5) years from the second final determination. If the final determination involves the falsification of payroll records or the kickback of wages or supplements, the **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the **City** for a period of five (5) years from the first final determination.

37.4.4(c) Labor Law Section 220, as amended, provides that the **Contractor** or **Subcontractor** found to have violated this Article 37.4 may be directed to make payment of wages or supplements including interest found to be due, and the **Contractor** or **Subcontractor** may be directed to make payment of a further sum as a civil penalty in an amount not exceeding twenty-five (25%) percent of the total amount found to be due.

37.5 The **Contractor** and its **Subcontractors** shall within ten (10) **Days** after mailing of a Notice of Award or written order, post in prominent and conspicuous places in each and every plant, factory, building, and structure where employees of the **Contractor** and its **Subcontractors** engaged in the

performance of this **Contract** are employed, notices furnished by the **City**, in relation to prevailing wages and supplements, minimum wages, and other stipulations contained in Sections 220 and 220-h of the Labor Law, and the **Contractor** and its **Subcontractors** shall continue to keep such notices posted in such prominent and conspicuous places until **Final Acceptance** of the supplies, materials, equipment, or **Work**, labor, or services required to be furnished or rendered under this **Contract**.

37.6 The **Contractor** shall strictly comply with all of the provisions of Articles 37.6.1 through 37.6.5, and provide for all workers, laborers or mechanics in its employ, the following:

37.6.1 Notices Posted At **Site**: Post, in a location designated by the **City**, schedules of prevailing wages and supplements for this **Project**, a copy of all re-determinations of such schedules for the **Project**, the Workers' Compensation **Law** Section 51 notice, all other notices required by **Law** to be posted at the **Site**, the **City** notice that this **Project** is a public works project on which each worker is entitled to receive the prevailing wages and supplements for the occupation at which he or she is working, and all other notices which the **City** directs the **Contractor** to post. The **Contractor** shall provide a surface for such notices which is satisfactory to the **City**. The **Contractor** shall maintain and keep current such notices in a legible manner and shall replace any notice or schedule which is damaged, defaced, illegible or removed for any reason. The **Contractor** shall post such notices before commencing any **Work** on the **Site** and shall maintain such notices until all **Work** on the **Site** is complete; and

37.6.2 Daily **Site** Sign-in Sheets: Maintain daily **Site** sign-in sheets, and require that **Subcontractors** maintain daily **Site** sign-in sheets for its employees, which include blank spaces for an employee's name to be both printed and signed, job title, date started and Social Security number, the time the employee began work and the time the employee left work, until **Final Acceptance** of the supplies, materials, equipment, or **Work**, labor, or services to be furnished or rendered under this **Contract** unless exception is granted by the **Comptroller** upon application by the **Agency**. In the alternative, subject to the approval of the **CCPO**, the **Contractor** and **Subcontractor** may maintain an electronic or biometric sign-in system, which provides the information required by this Article 37.6.2; and

37.6.3 Individual Employee Information Notices: Distribute a notice to each worker, laborer or mechanic employed under this **Contract**, in a form provided by the **Agency**, that this **Project** is a public works project on which each worker, laborer or mechanic is entitled to receive the prevailing rate of wages and supplements for the occupation at which he or she is working. If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand ($250,000) dollars, such notice shall also include a statement that each worker, laborer or mechanic must be certified prior to performing any **Work** as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration. Such notice shall be distributed to each worker before he or she starts performing any **Work** of this **Contract** and with the first paycheck after July first of each year. "Worker, laborer or mechanic" includes employees of the **Contractor** and all **Subcontractors** and all employees of suppliers entering the **Site**. At the time of distribution, the **Contractor** shall have each worker, laborer or mechanic sign a statement, in a form provided by the **Agency**, certifying that the worker has received the notice required by this Article 37.6.3, which signed statement shall be maintained with the payroll records required by this **Contract**; and

37.6.3(a) The **Contractor** and each **Subcontractor** shall notify each worker, laborer or mechanic employed under this **Contract** in writing of the prevailing rate of

wages for their particular job classification. Such notification shall be given to every worker, laborer, and mechanic on their first pay stub and with every pay stub thereafter; and

37.6.4 **Site** Laminated Identification Badges: The **Contractor** shall provide laminated identification badges which include a photograph of the worker's, laborer's or mechanic's face and indicate the worker's, laborer's or mechanic's name, trade, employer's name, and employment starting date (month/day/year). Further, the **Contractor** shall require as a condition of employment on the **Site**, that each and every worker, laborer or mechanic wear the laminated identification badge at all times and that it may be seen by any representative of the **City**. The **Commissioner** may grant a written waiver from the requirement that the laminated identification badge include a photograph if the **Contractor** demonstrates that the identity of an individual wearing a laminated identification badge can be easily verified by another method; and

37.6.5 Language Other Than English Used On **Site**: Provide the **ACCO** notice when three (3) or more employees (worker and/or laborer and/or mechanic) on the **Site**, at any time, speak a language other than English. The **ACCO** will then provide the **Contractor** the notices described in Article 37.6.1 in that language or languages as may be required. The **Contractor** is responsible for all distributions under this Article 37; and

37.6.6 Provision of Records: The **Contractor** and **Subcontractor(s)** shall produce within five (5) **Days** on the **Site** of the **Work** and upon a written order of the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, or the **Comptroller,** such records as are required to be kept by this Article 37.6; and

37.6.7 The **Contractor** and **Subcontractor(s)** shall pay employees by check or direct deposit. If this **Contract** is for an amount greater than one million ($1,000,000) dollars, checks issued by the **Contractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be used if approved by the **Agency**). For any subcontract for an amount greater than seven hundred fifty thousand ($750,000) dollars, checks issued by a **Subcontractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be used if approved by the **Agency**); and

37.6.8 The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of Articles 37.6.1 through 37.6.7 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

37.7 The **Contractor** and its **Subcontractors** shall keep such employment and payroll records as are required by Section 220 of the Labor Law. The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of this Article 37.7 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract.**

37.8 At the time the **Contractor** makes application for each partial payment and for final payment, the **Contractor** shall submit to the **Commissioner** a written payroll certification, in the form provided by this **Contract**, of compliance with the prevailing wage, minimum wage, and other provisions and stipulations required by Labor Law Section 220 and of compliance with the training requirements of Labor Law Section 220-h set forth in Article 35.2. This certification of compliance shall be a condition precedent to payment and no payment shall be made to the **Contractor** unless and until each such certification shall have been submitted to and received by the **Commissioner**.

37.9 This **Contract** is executed by the **Contractor** with the express warranty and representation that the **Contractor** is not disqualified under the provisions of Section 220 of the Labor Law from the award of the **Contract**.

37.10 Any breach or violation of any of the foregoing shall be deemed a breach or violation of a material provision of this **Contract**, and grounds for cancellation thereof by the **City**.

ARTICLE 38. PAYROLL REPORTS

38.1 The **Contractor** and its **Subcontractor(s)** shall maintain on the **Site** during the performance of the **Work** the original payrolls or transcripts thereof which the **Contractor** and its **Subcontractor(s)** are required to maintain and shall submit such original payrolls or transcripts, subscribed and affirmed by it as true, within thirty (30) **Days** after issuance of its first payroll, and every thirty (30) **Days** thereafter, pursuant to Labor Law Section 220(3-a)(a)(iii). The **Contractor** and **Subcontractor(s)** shall submit such original payrolls or transcripts along with each and every payment requisition. If payment requisitions are not submitted at least once a month, the **Contractor** and its **Subcontractor(s)** shall submit original payrolls and transcripts both along with its payment requisitions and independently of its payment requisitions.

38.2 The **Contractor** shall maintain payrolls or transcripts thereof for six (6) years from the date of completion of the **Work** on this **Contract**. If such payrolls and transcripts are maintained outside of New York City after the completion of the **Work** and their production is required pursuant to this Article 38, the **Contractor** shall produce such records in New York City upon request by the City.

38.3 The **Contractor** and **Subcontractor(s)** shall comply with any written order, direction, or request made by the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)**, or the **Comptroller**, to provide to the requesting party any of the following information and/or records within five (5) **Days** of such written order, direction, or request:

38.3.1 Such original payrolls or transcripts thereof subscribed and affirmed by it as true and the statements signed by each worker pursuant to this Chapter VIII; and/or

38.3.2 Attendance sheets for each **Day** on which any employee of the **Contractor** and/or any of the **Subcontractor(s)** performed **Work** on the **Site**, which attendance sheet shall be in a form acceptable to the **Agency** and shall provide information acceptable to the **Agency** to identify each such employee; and/or

38.3.3 Any other information to satisfy the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)** or the **Comptroller**, that this Chapter VIII and the Labor Law, as to the hours of employment and prevailing rates of wages and/or supplemental benefits, are being observed.

38.4 The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of Articles 38.1 and/or 38.2 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

ARTICLE 39. DUST HAZARDS

39.1 Should a harmful dust hazard be created in performing the **Work** of this **Contract**, for the elimination of which appliances or methods have been approved by the Board of Standards and Appeals

of the City of New York, such appliances and methods shall be installed, maintained, and effectively operated during the continuance of such harmful dust hazard. Failure to comply with this provision after notice shall make this **Contract** voidable at the sole discretion of the **City**.

CHAPTER IX: PARTIAL AND FINAL PAYMENTS

ARTICLE 40. CONTRACT PRICE

40.1 The **City** shall pay, and the **Contractor** agrees to accept, in full consideration for the **Contractor's** performance of the **Work** subject to the terms and conditions hereof, the lump sum price or unit prices for which this **Contract** was awarded, plus the amount required to be paid for any **Extra Work** ordered by the **Commissioner** under Article 25, less credit for any **Work** omitted pursuant to Article 29.

ARTICLE 41. BID BREAKDOWN ON LUMP SUM

41.1 Within fifteen (15) **Days** after the commencement date specified in the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Resident Engineer**, the **Contractor** shall submit to the **Resident Engineer** a breakdown of its bid price, or of lump sums bid for items of the **Contract**, showing the various operations to be performed under the **Contract**, as directed in the progress schedule required under Article 9, and the value of each of such operations, the total of such items to equal the lump sum price bid. Said breakdown must be approved in writing by the **Resident Engineer**.

41.2 No partial payment will be approved until the **Contractor** submits a bid breakdown that is acceptable to the **Resident Engineer**.

41.3 The **Contractor** shall also submit such other information relating to the bid breakdown as directed by the **Resident Engineer**. Thereafter, the breakdown may be used only for checking the **Contractor's** applications for partial payments hereunder, but shall not be binding upon the **City**, the **Commissioner**, or the **Engineer** for any purpose whatsoever.

ARTICLE 42. PARTIAL PAYMENTS

42.1 From time to time as the **Work** progresses satisfactorily, but not more often than once each calendar month (except where the **Commissioner** approves in writing the submission of invoices on a more frequent basis and for invoices relating to **Work** performed pursuant to a change order), the **Contractor** may submit to the **Engineer** a requisition for a partial payment in the prescribed form, which shall contain an estimate of the quantity and the fair value of the **Work** done during the payment period.

42.2 Partial payments may be made for materials, fixtures, and equipment in advance of their actual incorporation in the **Work**, as the **Commissioner** may approve, and upon the terms and conditions set forth in the General Conditions.

42.3 The **Contractor** shall also submit to the **Commissioner** in connection with every application for partial payment a verified statement in the form prescribed by the **Comptroller** setting forth the information required under Labor Law Section 220-a.

42.4 Within thirty (30) **Days** after receipt of a satisfactory payment application, and within sixty (60) **Days** after receipt of a satisfactory payment application in relation to **Work** performed pursuant to a change order, the **Engineer** will prepare and certify, and the **Commissioner** will approve, a voucher for a partial payment in the amount of such approved estimate, less any and all deductions authorized to be made by the **Commissioner** under the terms of this **Contract** or by **Law**.

ARTICLE 43. PROMPT PAYMENT

43.1 The Prompt Payment provisions of the **PPB** Rules in effect at the time of the bid will be applicable to payments made under this **Contract**. The provisions require the payment to the **Contractor** of interest on payments made after the required payment date, except as set forth in the **PPB** Rules.

43.2 The **Contractor** shall submit a proper invoice to receive payment, except where the **Contract** provides that the **Contractor** will be paid at predetermined intervals without having to submit an invoice for each scheduled payment.

43.3 Determination of interest due will be made in accordance with the **PPB** Rules.

43.4 If the **Contractor** is paid interest, the proportionate share(s) of that interest shall be forwarded by the **Contractor** to its **Subcontractor(s)**.

43.5 The **Contractor** shall pay each **Subcontractor** or **Materialman** not later than seven (7) **Days** after receipt of payment out of amounts paid to the **Contractor** by the **City** for **Work** performed by the **Subcontractor** or **Materialman** under this **Contract**.

> 43.5.1 If **Contractor** fails to make any payment to any **Subcontractor** or **Materialman** within seven (7) **Days** after receipt of payment by the **City** pursuant to this Article 43.5, then the **Contractor** shall pay interest on amounts due to such **Subcontractor** or **Materialman** at the rate of interest in effect on the date such payment is made by the **Contractor** computed in accordance with Section 756-b (1)(b) of the New York General Business Law. Accrual of interest shall commence on the **Day** immediately following the expiration of the seventh **Day** following receipt of payment by the **Contractor** from the **City** and shall end on the date on which payment is made.

43.6 The **Contractor** shall include in each of its subcontracts a provision requiring each **Subcontractor** to make payment to each of its **Subcontractors** or **Materialmen** for **Work** performed under this **Contract** in the same manner and within the same time period set forth above.

ARTICLE 44. SUBSTANTIAL COMPLETION PAYMENT

44.1 The **Contractor** shall submit with the **Substantial Completion** requisition:

> 44.1.1 A final verified statement of any pending Article 27 disputes in accordance with the **PPB** Rules and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) setting forth with respect to each such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the

Contractor claims the performance of the **Work** or a particular part thereof was delayed, and an itemized statement and breakdown of the amount claimed for each such delay.

44.1.1(a) With respect to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City** Corporation Counsel shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 44.1.1(a) is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor** upon acceptance of the **Substantial Completion** payment pursuant to this Article 44, will have waived any such claims.

44.1.2 A **Final Approved Punch List**.

44.1.3 Where required, a request for an extension of time to achieve **Substantial Completion** or final extension of time.

44.2 The **Commissioner** shall issue a voucher calling for payment of any part or all of the balance due for **Work** performed under the **Contract**, including monies retained under Article 21, less any and all deductions authorized to be made by the **Commissioner**, under this **Contract** or by **Law**, and less twice the amount the **Commissioner** considers necessary to ensure the completion of the balance of the **Work** by the **Contractor**. Such a payment shall be considered a partial and not a final payment. No **Substantial Completion** payment shall be made under this Article 44 where the **Contractor** failed to complete the **Work** within the time fixed for such completion in the Schedule A of the General Conditions, or within the time to which completion may have been extended, until an extension or extensions of time for the completion of **Work** have been acted upon pursuant to Article 13.

44.3 No further partial payments shall be made to the **Contractor** after **Substantial Completion**, except the **Substantial Completion** payment and payment pursuant to any **Contractor's** requisition that were properly filed with the **Commissioner** prior to the date of **Substantial Completion**; however, the **Commissioner** may grant a waiver for further partial payments after the date of **Substantial Completion** to permit payments for change order **Work** and/or release of retainage and deposits pursuant to Articles 21 and 24. Such waiver shall be in writing.

44.4 The **Contractor** acknowledges that nothing contained in this Article 44 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 45. FINAL PAYMENT

45.1 After completion and **Final Acceptance** of the **Work**, the **Contractor** shall submit all required certificates and documents, together with a requisition for the balance claimed to be due under the **Contract**, less the amount authorized to be retained for maintenance under Article 24. Such submission shall be within 90 days of the date of the **Commissioner's** written determination of **Final Acceptance**, or within such additional time as may be granted by the **Commissioner** in writing. If the **Contractor** fails to submit all required certificates and documents within the time allowed, no payment of the balance claimed shall be made to the **Contractor** and the **Contractor** shall be deemed to have forfeited its right to payment of any balance claimed. A verified statement similar to that required in connection with applications for partial payments shall also be submitted to the **Commissioner**.

45.2 Amended Verified Statement of Claims: The **Contractor** shall also submit with the final requisition any amendments to the final verified statement of any pending dispute resolution procedures in accordance with the **PPB** Rules and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) that have occurred subsequent to **Substantial Completion**, setting forth with respect to each such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each such item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the **Contractor** claims the performance of the **Work** or a particular part thereof was delayed, and an itemized statement and breakdown of the amount claimed for each such delay. With reference to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City** Corporation Counsel shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 45.2, is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor**, upon acceptance of the Final Payment pursuant to Article 46, will have waived any such claims.

45.3 Preparation of Final Voucher: Upon determining the balance due hereunder other than on account of claims, the **Engineer** will prepare and certify, for the Commissioner's approval, a voucher for final payment in that amount less any and all deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**. In the case of a lump sum **Contract**, the **Commissioner** shall certify the voucher for final payment within thirty (30) **Days** from the date of completion and acceptance of the **Work**, provided all requests for extensions of time have been acted upon.

45.3.1 All prior certificates and vouchers upon which partial payments were made, being merely estimates made to enable the **Contractor** to prosecute the **Work** more advantageously, shall be subject to correction in the final voucher, and the certification of the **Engineer** thereon and the approval of the **Commissioner** thereof, shall be conditions precedent to the right of the **Contractor** to receive any money hereunder. Such final voucher shall be binding and conclusive upon the **Contractor**.

45.3.2 Payment pursuant to such final voucher, less any deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**, shall constitute the final payment, and shall be made by the **Comptroller** within thirty (30) **Days** after the filing of such voucher in his/her office.

45.4 The **Contractor** acknowledges that nothing contained in this Article 45 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 46. ACCEPTANCE OF FINAL PAYMENT

46.1 The acceptance by the **Contractor**, or by anyone claiming by or through it, of the final payment, whether such payment be made pursuant to any judgment of any court, or otherwise, shall constitute and operate as a release of the **City** from any and all claims of and liability to the **Contractor** for anything heretofore done or furnished for the **Contractor** relating to or arising out of this **Contract** and the **Work** done hereunder, and for any prior act, neglect or default on the part of the **City** or any of its officials, agents or employees, excepting only a claim against the **City** for the amounts deducted or retained in accordance with the terms and provisions of this **Contract** or by **Law**, and excepting any claims, not otherwise waived, or any pending dispute resolution procedures which are contained in the

verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 44 and 45.

46.2 The **Contractor** is warned that the execution by it of a release, in connection with the acceptance of the final payment, containing language purporting to reserve claims other than those herein specifically excepted from the operation of this Article 46, or those for amounts deducted by the **Commissioner** from the final requisition or from the final payment as certified by the **Engineer** and approved by the **Commissioner**, shall not be effective to reserve such claims, anything stated to the **Contractor** orally or in writing by any official, agent or employee of the **City** to the contrary notwithstanding.

46.3 Should the **Contractor** refuse to accept the final payment as tendered by the **Comptroller**, it shall constitute a waiver of any right to interest thereon.

46.4 The **Contractor**, however, shall not be barred by this Article 46 from commencing an action for breach of **Contract** to the extent permitted by **Law** and by the terms of the **Contract** for any claims that are contained in the verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 44 and 45 or that arose after submission of the final payment requisition, provided that a detailed and verified statement of claim is served upon the contracting **Agency** and **Comptroller** not later than forty (40) **Days** after the making of such final payment by electronic funds transfer (EFT) or the mailing of such final payment. The statement shall specify the items upon which the claim will be based and any such claim shall be limited to such items.

ARTICLE 47. APPROVAL BY PUBLIC DESIGN COMMISSION

47.1 All works of art, including paintings, mural decorations, stained glass, statues, bas-reliefs, and other sculptures, monuments, fountains, arches, and other structures of a permanent character intended for ornament or commemoration, and every design of the same to be used in the performance of this **Contract**, and the design of all bridges, approaches, buildings, gates, fences, lamps, or structures to be erected, pursuant to the terms of this **Contract**, shall be submitted to the Art Commission, d/b/a the Public Design Commission of the City of New York, and shall be approved by the Public Design Commission prior to the erection or placing in position of the same. The final payment shall not become due or payable under this **Contract** unless and until the Public Design Commission shall certify that the design for the **Work** herein contracted for has been approved by the said Public Design Commission, and that the same has been executed in substantial accordance with the design so approved, pursuant to the provisions of Chapter 37, Section 854 of the **City** Charter, as amended.

CHAPTER X: CONTRACTOR'S DEFAULT

ARTICLE 48. COMMISSIONER'S RIGHT TO DECLARE CONTRACTOR IN DEFAULT

48.1 In addition to those instances specifically referred to in other Articles herein, the **Commissioner** shall have the right to declare the **Contractor** in default of this **Contract** if:

48.1.1 The **Contractor** fails to commence **Work** when notified to do so by the **Commissioner**; or if

48.1.2 The **Contractor** shall abandon the **Work**; or if

48.1.3 The **Contractor** shall refuse to proceed with the **Work** when and as directed by the **Commissioner**; or if

48.1.4 The **Contractor** shall, without just cause, reduce its working force to a number which, if maintained, would be insufficient, in the opinion of the **Commissioner**, to complete the **Work** in accordance with the progress schedule; or if

48.1.5 The **Contractor** shall fail or refuse to increase sufficiently such working force when ordered to do so by the **Commissioner**; or if

48.1.6 The **Contractor** shall sublet, assign, transfer, convert or otherwise dispose of this **Contract** other than as herein specified; or sell or assign a majority interest in the **Contractor**; or if

48.1.7 The **Contractor** fails to secure and maintain all required insurance; or if

48.1.8 A receiver or receivers are appointed to take charge of the **Contractor's** property or affairs; or if

48.1.9 The **Commissioner** shall be of the opinion that the **Contractor** is or has been unnecessarily or unreasonably or willfully delaying the performance and completion of the **Work**, or the award of necessary subcontracts, or the placing of necessary material and equipment orders; or if

48.1.10 The **Commissioner** shall be of the opinion that the **Contractor** is or has been willfully or in bad faith violating any of the provisions of this **Contract**; or if

48.1.11 The **Commissioner** shall be of the opinion that the **Work** cannot be completed within the time herein provided therefor or within the time to which such completion may have been extended; provided, however, that the impossibility of timely completion is, in the **Commissioner's** opinion, attributable to conditions within the **Contractor's** control; or if

48.1.12 The **Work** is not completed within the time herein provided therefor or within the time to which the **Contractor** may be entitled to have such completion extended; or if

48.1.13 Any statement or representation of the **Contractor** in the **Contract** or in any document submitted by the **Contractor** with respect to the **Work**, the **Project**, or the **Contract** (or for purposes of securing the **Contract**) was untrue or incorrect when made; or if

48.1.14 The **Contractor** or any of its officers, directors, partners, five (5%) percent shareholders, principals, or other persons substantially involved in its activities, commits any of the acts or omissions specified as the grounds for debarment in the **PPB** Rules.

48.2 Before the **Commissioner** shall exercise his/her right to declare the **Contractor** in default, the **Commissioner** shall give the **Contractor** an opportunity to be heard, upon not less than two (2) **Days**' notice.

ARTICLE 49. EXERCISE OF THE RIGHT TO DECLARE DEFAULT

49.1 The right to declare the **Contractor** in default for any of the grounds specified or referred to in Article 48 shall be exercised by sending the **Contractor** a notice, signed by the **Commissioner**, setting forth the ground or grounds upon which such default is declared (hereinafter referred to as a "Notice of Default").

49.2 The **Commissioner's** determination that the **Contractor** is in default shall be conclusive, final, and binding on the parties and such a finding shall preclude the **Contractor** from commencing a plenary action for any damages relating to the **Contract**. If the **Contractor** protests the determination of the **Commissioner**, the **Contractor** may commence an action in a court of competent jurisdiction of the State of New York under Article 78 of the New York Civil Practice Law and Rules.

ARTICLE 50. QUITTING THE SITE

50.1 Upon receipt of such notice the **Contractor** shall immediately discontinue all further operations under this **Contract** and shall immediately quit the **Site**, leaving untouched all plant, materials, equipment, tools, and supplies then on the **Site**.

ARTICLE 51. COMPLETION OF THE WORK

51.1 The **Commissioner**, after declaring the **Contractor** in default, may then have the **Work** completed by such means and in such manner, by contract with or without public letting, or otherwise, as he/she may deem advisable, utilizing for such purpose such of the **Contractor's** plant, materials, equipment, tools, and supplies remaining on the **Site**, and also such **Subcontractors**, as he/she may deem advisable.

51.2 After such completion, the **Commissioner** shall make a certificate stating the expense incurred in such completion, which shall include the cost of re-letting and also the total amount of liquidated damages (at the rate provided for in the **Contract**) from the date when the **Work** should have been completed by the **Contractor** in accordance with the terms hereof to the date of actual completion of the **Work**. Such certificate shall be binding and conclusive upon the **Contractor**, its sureties, and any person claiming under the **Contractor**, as to the amount thereof.

51.3 The expense of such completion, including any and all related and incidental costs, as so certified by the **Commissioner**, and any liquidated damages assessed against the **Contractor**, shall be charged against and deducted out of monies which are earned by the **Contractor** prior to the date of default. Should the expense of such completion, as certified by the **Commissioner**, exceed the total sum which would have been payable under the **Contract** if it had been completed by the **Contractor**, any excess shall be paid by the **Contractor**.

ARTICLE 52. PARTIAL DEFAULT

52.1 In case the **Commissioner** shall declare the **Contractor** in default as to a part of the **Work** only, the **Contractor** shall discontinue such part, shall continue performing the remainder of the **Work** in strict conformity with the terms of this **Contract**, and shall in no way hinder or interfere with any **Other Contractor(s)** or persons whom the **Commissioner** may engage to complete the **Work** as to which the **Contractor** was declared in default.

52.2 The provisions of this Chapter relating to declaring the **Contractor** in default as to the entire **Work** shall be equally applicable to a declaration of partial default, except that the **Commissioner** shall be entitled to utilize for completion of the part of the **Work** as to which the **Contractor** was declared in default only such plant, materials, equipment, tools, and supplies as had been previously used by the **Contractor** on such part.

ARTICLE 53. PERFORMANCE OF UNCOMPLETED WORK

53.1 In completing the whole or any part of the **Work** under the provisions of this Chapter X, the **Commissioner** shall have the power to depart from or change or vary the terms and provisions of this **Contract**, provided, however, that such departure, change or variation is made for the purpose of reducing the time or expense of such completion. Such departure, change or variation, even to the extent of accepting a lesser or different performance, shall not affect the conclusiveness of the **Commissioner's** certificate of the cost of completion referred to in Article 51, nor shall it constitute a defense to an action to recover the amount by which such certificate exceeds the amount which would have been payable to the **Contractor** hereunder but for its default.

ARTICLE 54. OTHER REMEDIES

54.1 In addition to the right to declare the **Contractor** in default pursuant to this Chapter X, the **Commissioner** shall have the absolute right, in his/her sole discretion and without a hearing, to complete or cause to be completed in the same manner as described in Articles 51 and 53, any or all unsatisfactory or uncompleted punch list **Work** that remains after the completion date specified in the **Final Approved Punch List**. A written notice of the exercise of this right shall be sent to the **Contractor** who shall immediately quit the **Site** in accordance with the provisions of Article 50.

54.2 The expense of completion permitted under Article 54.1, including any and all related and incidental costs, as so certified by the **Commissioner**, shall be charged against and deducted out of monies which have been earned by the **Contractor** prior to the date of the exercise of the right set forth in Article 54.1; the balance of such monies, if any, subject to the other provisions of this **Contract**, to be paid to the **Contractor** without interest after such completion. Should the expense of such completion, as certified by the **Commissioner**, exceed the total sum which would have been payable under the **Contract** if it had been completed by the **Contractor**, any excess shall be paid by the **Contractor**.

54.3 The previous provisions of this Chapter X shall be in addition to any and all other remedies available under **Law** or in equity.

54.4 The exercise by the **City** of any remedy set forth herein shall not be deemed a waiver by the **City** of any other legal or equitable remedy contained in this **Contract** or provided under **Law**.

CHAPTER XI: MISCELLANEOUS PROVISIONS

ARTICLE 55. CONTRACTOR'S WARRANTIES

55.1 In consideration of, and to induce, the award of this **Contract** to the **Contractor**, the **Contractor** represents and warrants:

55.1.1 That it is financially solvent, sufficiently experienced and competent to perform the **Work**; and

55.1.2 That the facts stated in its bid and the information given by it pursuant to the Information for Bidders is true and correct in all respects; and

55.1.3 That it has read and complied with all requirements set forth in the **Contract**.

ARTICLE 56. CLAIMS AND ACTIONS THEREON

56.1 Any claim, that is not subject to dispute resolution under the **PPB** Rules or this **Contract**, against the **City** for damages for breach of **Contract** shall not be made or asserted in any action, unless the **Contractor** shall have strictly complied with all requirements relating to the giving of notice and of information with respect to such claims, as herein before provided.

56.2 Nor shall any action be instituted or maintained on any such claims unless such action is commenced within six (6) months after **Substantial Completion**; except that:

56.2.1 Any claims arising out of events occurring after **Substantial Completion** and before **Final Acceptance** of the **Work** shall be asserted within six (6) months of **Final Acceptance** of the **Work**;

56.2.2 If the **Commissioner** exercises his/her right to complete or cause to complete any or all unsatisfactory or uncompleted punch list **Work** that remains after the completion date specified in the **Final Approved Punch List** pursuant to Article 54, any such action shall be commenced within six (6) months from the date the **Commissioner** notifies the **Contractor** in writing that he/she has exercised such right. Any claims for monies deducted, retained or withheld under the provisions of this **Contract** shall be asserted within six (6) months after the date when such monies otherwise become due and payable hereunder; and

56.2.3 If the **Commissioner** exercises his/her right to terminate the **Contract** pursuant to Article 64, any such action shall be commenced within six (6) months of the date the **Commissioner** exercises said right.

ARTICLE 57. INFRINGEMENT

57.1 The **Contractor** shall be solely responsible for and shall defend, indemnify, and hold the **City** harmless from any and all claims (even if the allegations of the lawsuit are without merit) and judgments for damages and from costs and expenses to which the **City** may be subject to or which it may suffer or incur allegedly arising out of or in connection with any infringement by the **Contractor** of any copyright, trade secrets, trademark or patent rights or any other property or personal right of any third party by the **Contractor** and/or its **Subcontractors** in the performance or completion of the **Work**. Insofar as the facts or **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent permitted by **Law**.

ARTICLE 58. NO CLAIM AGAINST OFFICIALS, AGENTS OR EMPLOYEES

58.1 No claim whatsoever shall be made by the **Contractor** against any official, agent or employee of the **City** for, or on account of, anything done or omitted to be done in connection with this **Contract**.

ARTICLE 59. SERVICE OF NOTICES

59.1 The **Contractor** hereby designates the business address, fax number, and email address specified in its bid, as the place where all notices, directions or other communications to the **Contractor** may be delivered, or to which they may be mailed. Any notice, direction, or communication from either party to the other shall be in writing and shall be deemed to have been given when (i) delivered personally; (ii) sent by certified mail, return receipt requested; (iii) delivered by overnight or same day courier service in a properly addressed envelope with confirmation; or (iv) sent by fax or email and, unless receipt of the fax or e-mail is acknowledged by the recipient by fax or e-mail, deposited in a post office box regularly maintained by the United States Postal Service in a properly addressed, postage pre-paid envelope.

59.2 **Contractor's** notice address, email address, or fax number may be changed at any time by an instrument in writing, executed and acknowledged by the **Contractor**, and delivered to the **Commissioner**.

59.3 Nothing herein contained shall, however, be deemed to preclude or render inoperative the service of any notice, direction or other communication upon the **Contractor** personally, or, if the **Contractor** is a corporation, upon any officer thereof.

ARTICLE 60. UNLAWFUL PROVISIONS DEEMED STRICKEN FROM CONTRACT

60.1 If this **Contract** contains any unlawful provision not an essential part of the **Contract** and which shall not appear to have been a controlling or material inducement to the making thereof, the same shall be deemed of no effect and shall, upon notice by either party, be deemed stricken from the **Contract** without affecting the binding force of the remainder.

ARTICLE 61. ALL LEGAL PROVISIONS DEEMED INCLUDED

61.1 It is the intent and understanding of the parties to this **Contract** that each and every provision of **Law** required to be inserted in this **Contract** shall be and is inserted herein. Furthermore, it is hereby stipulated that every such provision is to be deemed to be inserted herein, and if, through mistake or otherwise, any such provision is not inserted, or is not inserted in correct form, then this **Contract** shall forthwith upon the application of either party be amended by such insertion so as to comply strictly with the **Law** and without prejudice to the rights of either party hereunder.

ARTICLE 62. TAX EXEMPTION

62.1 The **City** is exempt from payment of Federal, State, and local taxes, including sales and compensating use taxes of the State of New York and its cities and counties on all tangible personal property sold to the **City** pursuant to the provisions of this **Contract**. These taxes are not to be included in bids. However, this exemption does not apply to tools, machinery, equipment or other property leased by or to the **Contractor**, **Subcontractor** or **Materialman** or to tangible personal property which, even

though it is consumed, is not incorporated into the completed **Work** (consumable supplies) and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**. The **Contractor** and its **Subcontractors** and **Materialmen** shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property and upon all such consumable supplies and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**.

62.2 The **Contractor** agrees to sell and the **City** agrees to purchase all tangible personal property, other than consumable supplies and other tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**, that is required, necessary or proper for or incidental to the construction of the **Project** covered by this **Contract**. The sum paid under this **Contract** for such tangible personal property shall be in full payment and consideration for the sale of such tangible personal property.

62.2.1 The **Contractor** agrees to construct the **Project** and to perform all **Work**, labor and services rendered, necessary, proper or incidental thereto for the sum shown in the bid for the performance of such **Work**, labor, and services, and the sum so paid pursuant to this **Contract** for such **Work**, labor, and services, shall be in full consideration for the performance by the **Contractor** of all its duties and obligations under this **Contract** in connection with said **Work,** labor, and services.

62.3 20 NYCRR Section 541.3(d) provides that a **Contractor**'s purchases of tangible personal property that is either incorporated into real property owned by a governmental entity or purchased for and sold to a governmental entity are exempt from sales and use tax. The **City** shall not pay sales tax for any such tangible personal property that it purchases from the **Contractor** pursuant to the **Contract.** With respect to such tangible personal property, the **Contractor**, at the request of the **City**, shall furnish to the **City** such bills of sale and other instruments as may be required by the **City**, properly executed, acknowledged and delivered assuring to the **City** title to such tangible personal property, free of liens and/or encumbrances, and the **Contractor** shall mark or otherwise identify all such tangible personal property as the property of the **City**.

62.4 Title to all tangible personal property to be sold by the **Contractor** to the **City** pursuant to the provisions of the **Contract** shall immediately vest in and become the sole property of the **City** upon delivery of such tangible personal property to the **Site**. Notwithstanding such transfer of title, the **Contractor** shall have the full and continuing responsibility to install such tangible personal property in accordance with the provisions of this **Contract**, protect it, maintain it in a proper condition and forthwith repair, replace and make good any damage thereto, theft or disappearance thereof, and furnish additional tangible personal property in place of any that may be lost, stolen or rendered unusable, without cost to the **City**, until such time as the **Work** covered by the **Contract** is fully accepted by the **City**. Such transfer of title shall in no way affect any of the **Contractor's** obligations hereunder. In the event that, after title has passed to the **City**, any of the tangible personal property is rejected as being defective or otherwise unsatisfactory, title to all such tangible personal property shall be deemed to have been transferred back to the **Contractor**.

62.5 The purchase by **Subcontractors** or **Materialmen** of tangible personal property to be sold hereunder shall be a purchase or procurement for resale to the **Contractor** (either directly or through other **Subcontractors**) and therefore not subject to the aforesaid sales and compensating use taxes, provided that the subcontracts and purchase agreements provide for the resale of such tangible personal property and that such subcontracts and purchase agreements are in a form similar to this **Contract** with respect to the separation of the sale of consumable supplies and tangible personal property that the

Contractor is required to remove from the **Site** during or upon completion of the **Work** from the **Work** and labor, services, and any other matters to be provided, and provided further that the subcontracts and purchase agreements provide separate prices for tangible personal property and all other services and matters. Such separation shall actually be followed in practice, including the separation of payments for tangible personal property from the payments for other **Work** and labor and other things to be provided.

62.6 The **Contractor** and its **Subcontractors** and **Materialmen** shall furnish a **Contractor** Exempt Purchase Certificate to all persons, firms or corporations from which they purchase tangible personal property for the performance of the **Work** covered by this **Contract**.

62.7 In the event any of the provisions of this Article 62 shall be deemed to be in conflict with any other provisions of this **Contract** or create any ambiguity, then the provisions of this Article 62 shall control.

ARTICLE 63. INVESTIGATION(S) CLAUSE

63.1 The parties to this **Contract** agree to cooperate fully and faithfully with any investigation, audit or inquiry conducted by a United States, a State of New York (State) or a **City** governmental agency or authority that is empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath, or conducted by the Inspector General of a governmental agency that is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit or license that is the subject of the investigation, audit or inquiry.

63.2 If any person who has been advised that his/her statement, and any information from such statement, will not be used against him/her in any subsequent criminal proceeding refuses to testify before a grand jury or other governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath concerning the award of or performance under any transaction, agreement, lease, permit, contract, or license entered into with the **City**, the State, or any political subdivision or public authority thereof, or the Port Authority of New York and New Jersey, or any local development corporation within the **City**, or any public benefit corporation organized under the **Laws** of the State of New York, or;

63.3 If any person refuses to testify for a reason other than the assertion of his/her privilege against self incrimination in an investigation, audit or inquiry conducted by a **City** or State governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to take testimony under oath, or by the Inspector General of the governmental agency that is a party in interest in, and is seeking testimony concerning the award of, or performance under any transaction, agreement, lease, permit, contract, or license entered into with the **City**, the State, or any political subdivision thereof or any local development corporation within the **City**, then;

63.4 The **Commissioner** whose **Agency** is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit, or license shall convene a hearing, upon not less than five (5) **Days**' written notice to the parties involved to determine if any penalties should attach for the failure of a person to testify.

63.5 If any non-governmental party to the hearing requests an adjournment, the **Commissioner** who convened the hearing may, upon granting the adjournment, suspend any contract, lease, permit, or license, pending the final determination pursuant to Article 63.7 without the **City** incurring any penalty or damages for delay or otherwise.

63.6 The penalties which may attach after a final determination by the **Commissioner** may include but shall not exceed:

63.6.1 The disqualification for a period not to exceed five (5) years from the date of an adverse determination for any person, or any entity of which such person was a member at the time the testimony was sought, from submitting bids for, or transacting business with, or entering into or obtaining any contract, lease, permit or license with or from the **City**; and/or

63.6.2 The cancellation or termination of any and all such existing **City** contracts, leases, permits or licenses that the refusal to testify concerns and that have not been assigned as permitted under this **Contract**, nor the proceeds of which pledged, to an unaffiliated and unrelated institutional lender for fair value prior to the issuance of the notice scheduling the hearing, without the **City** incurring any penalty or damages on account of such cancellation or termination; monies lawfully due for goods delivered, work done, rentals, or fees accrued prior to the cancellation or termination shall be paid by the **City**.

63.7 The **Commissioner** shall consider and address in reaching his/her determination and in assessing an appropriate penalty the factors in Articles 63.7.1 and 63.7.2. The **Commissioner** may also consider, if relevant and appropriate, the criteria established in Articles 63.7.3 and 63.7.4, in addition to any other information which may be relevant and appropriate:

63.7.1 The party's good faith endeavors or lack thereof to cooperate fully and faithfully with any governmental investigation or audit, including but not limited to the discipline, discharge, or disassociation of any person failing to testify, the production of accurate and complete books and records, and the forthcoming testimony of all other members, agents, assignees or fiduciaries whose testimony is sought.

63.7.2 The relationship of the person who refused to testify to any entity that is a party to the hearing, including but not limited to, whether the person whose testimony is sought has an ownership interest in the entity and/or the degree of authority and responsibility the person has within the entity.

63.7.3 The nexus of the testimony sought to the subject entity and its contracts, leases, permits or licenses with the **City**.

63.7.4 The effect a penalty may have on an unaffiliated and unrelated party or entity that has a significant interest in an entity subject to penalties under Article 63.6, provided that the party or entity has given actual notice to the **Commissioner** upon the acquisition of the interest, or at the hearing called for in Article 63.4, gives notice and proves that such interest was previously acquired. Under either circumstance the party or entity shall present evidence at the hearing demonstrating the potential adverse impact a penalty will have on such person or entity.

63.8 Definitions:

63.8.1 The term "license" or "permit" as used in this Article 63 shall be defined as a license, permit, franchise or concession not granted as a matter of right.

63.8.2 The term "person" as used in this Article 63 shall be defined as any natural person doing business alone or associated with another person or entity as a partner, director, officer, principal or employee.

63.8.3 The term "entity" as used in this Article 63 shall be defined as any firm, partnership, corporation, association, joint venture, or person that receives monies, benefits, licenses, leases, or permits from or through the **City** or otherwise transacts business with the **City**.

63.8.4 The term "member" as used in this Article 63 shall be defined as any person associated with another person or entity as a partner, director, officer, principal or employee.

63.9 In addition to and notwithstanding any other provision of this **Contract**, the **Commissioner** may in his/her sole discretion terminate this **Contract** upon not less than three (3) **Days'** written notice in the event the **Contractor** fails to promptly report in writing to the **Commissioner** of the Department of Investigations ("DOI") of the **City** any solicitation of money, goods, requests for future employment or other benefit or thing of value, by or on behalf of any employee of the **City** or other person, firm, corporation or entity for any purpose which may be related to the procurement or obtaining of this **Contract** by the **Contractor**, or affecting the performance of this **Contract**.

ARTICLE 64. TERMINATION BY THE CITY

64.1 In addition to termination pursuant to any other article of this **Contract**, the **Commissioner** may, at any time, terminate this **Contract** by written notice to the **Contractor**. In the event of termination, the **Contractor** shall, upon receipt of such notice, unless otherwise directed by the **Commissioner**:

64.1.1 Stop **Work** on the date specified in the notice;

64.1.2 Take such action as may be necessary for the protection and preservation of the **City's** materials and property;

64.1.3 Cancel all cancelable orders for material and equipment;

64.1.4 Assign to the **City** and deliver to the **Site** or another location designated by the **Commissioner**, any non-cancelable orders for material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract** and not incorporated in the **Work**;

64.1.5 Take no action which will increase the amounts payable by the **City** under this **Contract**.

64.2 In the event of termination by the **City** pursuant to this Article 64, payment to the **Contractor** shall be in accordance with Articles 64.2.1, 64.2.2 or 64.2.3, to the extent that each respective article applies.

64.2.1 Lump Sum Contracts or Items: On all lump sum **Contracts**, or on lump sum items in a **Contract**, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.1(a) and 64.2.1(b), less all payments previously made pursuant to this **Contract**. On lump sum **Contracts** only, the **City** will also pay the **Contractor** an additional sum as provided in Article 64.2.1(c).

64.2.1(a) For **Work** completed prior to the notice of termination, the **Contractor** shall be paid a pro rata portion of the lump sum bid amount, plus approved change orders, based upon the percent completion of the **Work**, as determined by the

Commissioner. For the purpose of determining the pro rata portion of the lump sum bid amount to which the **Contractor** is entitled, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be dispositive. The **Commissioner's** determination hereunder shall be final, binding, and conclusive.

64.2.1(b) For non-cancelable material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated in the **Work**, the **Contractor** shall be paid the lesser of the following, less salvage value:

64.2.1(b)(i) The Direct Cost, as defined in Article 64.2.4; or

64.2.1(b)(ii) The fair and reasonable value, if less than Direct Cost, of such material and equipment, plus necessary and reasonable delivery costs.

64.2.1(b)(iii) In addition, the **Contractor** shall be paid five (5%) percent of the amount described in Article 64.2.1(b)(i) or Article 64.2.1(b)(ii), whichever applies.

64.2.1(c) Except as otherwise provided in Article 64.2.1(d), on all lump sum **Contracts**, the **Contractor** shall be paid the percentage indicated below applied to the difference between the total lump sum bid amount and the total of all payments made prior to the notice of termination plus all payments allowed pursuant to Articles 64.2.1(a) and 64.2.1(b):

64.2.1(c)(i) Five (5%) percent of the first five million ($5,000,000) dollars; and

64.2.1(c)(ii) Three (3%) percent of any amount between five million ($5,000,000) dollars and fifteen million ($15,000,000) dollars; plus

64.2.1(c)(iii) One (1%) percent of any amount over fifteen million ($15,000,000) dollars.

64.2.1(d) In the event the **City** terminates a lump sum **Contract** pursuant to this Article 64 within ninety (90) **Days** after registration of the **Contract** with the **Comptroller**, the **Contractor** shall be paid one (1%) percent of the difference between the lump sum bid amount and the total of all payments made pursuant to this Article 64.2.

64.2.2 Unit Price Contracts or Items: On all unit price **Contracts**, or on unit price items in a **Contract**, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.2(a) and 64.2.2(b), less all payments previously made pursuant to this **Contract**:

64.2.2(a) For all completed units, the unit price stated in the **Contract**, and

64.2.2(b) For units that have been ordered but are only partially completed, the **Contractor** will be paid:

64.2.2(b)(i) A pro rata portion of the unit price stated in the **Contract** based upon the percent completion of the unit and

64.2.2(b)(ii) For non-cancelable material and equipment, payment will be made pursuant to Article 64.2.1(b).

64.2.3 Time and Materials Contracts or Items Based on Time and Material Records: On all **Contracts** or items in a **Contract** where payment for the **Work** is based on time and material records, the **Contractor** shall be paid in accordance with Article 26, less all payments previously made pursuant to this **Contract**.

64.2.4 Direct Costs: Direct Costs as used in this Article 64.2 shall mean:

64.2.4(a) The actual purchase price of material and equipment, plus necessary and reasonable delivery costs,

64.2.4(b) The actual cost of labor involved in construction and installation at the **Site**, and

64.2.4(c) The actual cost of necessary bonds and insurance purchased pursuant to requirements of this **Contract** less any amounts that have been or should be refunded by the **Contractor's** sureties or insurance carriers.

64.2.4(d) Direct Costs shall not include overhead.

64.3 In no event shall any payments under this Article 64 exceed the **Contract** price for such items.

64.4 All payments pursuant to Article 64 shall be in the nature of liquidated damages and shall be accepted by the **Contractor** in full satisfaction of all claims against the **City**.

64.5 The **City** may deduct or set off against any sums due and payable pursuant to this Article 64, any deductions authorized by this **Contract** or by **Law** (including but not limited to liquidated damages) and any claims it may have against the **Contractor**. The **City's** exercise of the right to terminate the **Contract** pursuant to this Article 64 shall not impair or otherwise effect the **City's** right to assert any claims it may have against the **Contractor** in a plenary action.

64.6 Where the **Work** covered by the **Contract** has been substantially completed, as determined in writing by the **Commissioner**, termination of the **Work** shall be handled as an omission of **Work** pursuant to Articles 29 and 33, in which case a change order will be issued to reflect an appropriate reduction in the **Contract** sum, or if the amount is determined after final payment, such amount shall be paid by the **Contractor**.

ARTICLE 65. CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE

65.1 This **Contract** shall be deemed to be executed in the **City** regardless of the domicile of the **Contractor**, and shall be governed by and construed in accordance with the **Laws** of the State of New York and the **Laws** of the United States, where applicable.

65.2 The parties agree that any and all claims asserted against the **City** arising under this **Contract** or related thereto shall be heard and determined in the courts of the State of New York ("New York State Courts") located in the **City** and County of New York. To effect this **Contract** and intent, the **Contractor** agrees:

65.2.1 If the **City** initiates any action against the **Contractor** in Federal court or in a New York State Court, service of process may be made on the **Contractor** either in person, wherever such **Contractor** may be found, or by registered mail addressed to the **Contractor** at its address as set forth in this **Contract**, or to such other address as the **Contractor** may provide to the **City** in writing; and

65.2.2 With respect to any action between the **City** and the **Contractor** in a New York State Court, the **Contractor** hereby expressly waives and relinquishes any rights it might otherwise have:

65.2.2(a) To move to dismiss on grounds of forum non conveniens;

65.2.2(b) To remove to Federal Court; and

65.2.2(c) To move for a change of venue to a New York State Court outside New York County.

65.2.3 With respect to any action brought by the **City** against the **Contractor** in a Federal Court located in the **City**, the **Contractor** expressly waives and relinquishes any right it might otherwise have to move to transfer the action to a Federal Court outside the **City**.

65.2.4 If the **Contractor** commences any action against the **City** in a court located other than in the **City** and County of New York, upon request of the **City**, the **Contractor** shall either consent to a transfer of the action to a New York State Court of competent jurisdiction located in the **City** and County of New York or, if the Court where the action is initially brought will not or cannot transfer the action, the **Contractor** shall consent to dismiss such action without prejudice and may thereafter reinstate the action in a New York State Court of competent jurisdiction in New York County.

65.3 If any provision(s) of this Article 65 is held unenforceable for any reason, each and all other provision(s) shall nevertheless remain in full force and effect.

ARTICLE 66. PARTICIPATION IN AN INTERNATIONAL BOYCOTT

66.1 The **Contractor** agrees that neither the **Contractor** nor any substantially owned affiliated company is participating or shall participate in an international boycott in violation of the provisions of the Federal Export Administration Act of 1979, as amended, or the regulations of the United States Department of Commerce (Commerce Department) promulgated thereunder.

66.2 Upon the final determination by the Commerce Department or any other agency of the United States as to, or conviction of the **Contractor** or a substantially-owned affiliated company thereof for participation in an international boycott in violation of the provisions of the Export Administration Act of 1979, as amended, or the regulations promulgated thereunder, the **Comptroller** may, at his/her option, render forfeit and void this **Contract**.

66.3 The **Contractor** shall comply in all respects, with the provisions of Section 6-114 of the Administrative Code and the rules and regulations issued by the **Comptroller** thereunder.

ARTICLE 67. LOCALLY BASED ENTERPRISE PROGRAM

67.1 This **Contract** is subject to the requirements of Section 6-108.1 of the Administrative Code and regulations promulgated thereunder. No construction contract shall be awarded unless and until these requirements have been complied with in their entirety; however, compliance with this Article 67 is not required if the Agency sets Subcontractor Participation Goals for Minority- and Women-Owned Business Enterprises (M/WBEs).

67.2 Unless specifically waived by the **Commissioner** with the approval of the Division of Economic and Financial Opportunity of the **City** Department of Business Services, if any portion of the **Contract** is subcontracted, not less than ten (10%) percent of the total dollar amount of the **Contract** shall be awarded to locally based enterprises (LBEs); except that where less than ten (10%) percent of the total dollar amount of the **Contract** is subcontracted, such lesser percentage shall be so awarded.

67.3 The **Contractor** shall not require performance and payment bonds from LBE **Subcontractors**.

67.4 If the **Contractor** has indicated prior to award that no **Work** will be subcontracted, no **Work** shall be subcontracted without the prior approval of the **Commissioner**, which shall be granted only if the **Contractor** makes a good faith effort beginning at least six (6) weeks before the **Work** is to be performed to obtain LBE **Subcontractors** to perform the **Work**.

67.5 If the **Contractor** has not identified sufficient LBE **Subcontractors** prior to award, it shall sign a letter of compliance stating that it complies with Section 6-108.1 of the Administrative Code, recognizes that achieving the LBE requirement is a condition of its **Contract**, and shall submit documentation demonstrating its good faith efforts to obtain LBEs. After award, the **Contractor** shall begin to solicit LBE's to perform subcontracted **Work** at least six (6) weeks before the date such **Work** is to be performed and shall demonstrate that a good faith effort has been made to obtain LBEs on each subcontract until it meets the required percentage.

67.6 Failure of the **Contractor** to comply with the requirements of Section 6-108.1 of the Administrative Code and the regulations promulgated thereunder shall constitute a material breach of this **Contract**. Remedy for such breach may include the imposition of any or all of the following sanctions:

67.6.1 Reducing the **Contractor's** compensation by an amount equal to the dollar value of the percentage of the LBE subcontracting requirement not complied with;

67.6.2 Declaring the **Contractor** in default;

67.6.3 If the **Contractor** is an LBE, de-certifying and declaring the **Contractor** ineligible to participate in the LBE program for a period of up to three (3) years.

ARTICLE 68. ANTITRUST

68.1 The **Contractor** hereby assigns, sells, and transfers to the **City** all right, title, and interest in and to any claims and causes of action arising under the antitrust **Laws** of New York State or of the United States relating to the particular goods or services purchased or procured by the **City** under this **Contract**.

ARTICLE 69. MacBRIDE PRINCIPLES PROVISIONS

69.1 Notice To All Prospective **Contractors**:

69.1.1 Local Law No. 34 of 1991 became effective on September 10, 1991 and added Section 6-115.1 of the Administrative Code. The local **Law** provides for certain restrictions on **City Contracts** to express the opposition of the people of the **City** to employment discrimination practices in Northern Ireland to promote freedom of work-place opportunity.

69.1.2 Pursuant to Section 6-115.1, prospective **Contractors** for **Contracts** to provide goods or services involving an expenditure of an amount greater than ten thousand ($10,000.) dollars, or for construction involving an amount greater than fifteen thousand ($15,000.) dollars, are asked to sign a rider in which they covenant and represent, as a material condition of their **Contract**, that any business operations in Northern Ireland conducted by the **Contractor** and any individual or legal entity in which the **Contractor** holds a ten (10%) percent or greater ownership interest in the **Contractor** will be conducted in accordance with the MacBride Principles of nondiscrimination in employment.

69.1.3 Prospective **Contractors** are not required to agree to these conditions. However, in the case of **Contracts** let by competitive sealed bidding, whenever the lowest responsible bidder has not agreed to stipulate to the conditions set forth in this notice and another bidder who has agreed to stipulate to such conditions has submitted a bid within five (5%) percent of the lowest responsible bid for a **Contract** to supply goods, services or contraction of comparable quality, the **Agency** shall refer such bids to the Mayor, the Speaker or other officials, as appropriate, who may determine, in accordance with applicable **Law**, that it is in the best interest of the **City** that the **Contract** be awarded to other than the lowest responsible pursuant to Section 313(b)(2) of the **City** Charter.

69.1.4 In the case of **Contracts** let by other than competitive sealed bidding, if a prospective **Contractor** does not agree to these conditions, no **Agency**, elected official or the **City** Council shall award the **Contract** to that bidder unless the **Agency** seeking to use the goods, services or construction certifies in writing that the **Contract** is necessary for the **Agency** to perform its functions and there is no other responsible **Contractor** who will supply goods, services or construction of comparable quality at a comparable price.

69.2 In accordance with Section 6-115.1 of the Administrative Code, the **Contractor** stipulates that such **Contractor** and any individual or legal entity in which the **Contractor** holds a ten (10%) percent or greater ownership interest in the **Contractor** either:

69.2.1 Have no business operations in Northern Ireland, or

69.2.2 Shall take lawful steps in good faith to conduct any business operations they have in Northern Ireland in accordance with the MacBride Principles, and shall permit independent monitoring of their compliance with such principles.

69.3 For purposes of this Article, the following terms shall have the following meanings:

69.3.1 "MacBride Principles" shall mean those principles relating to nondiscrimination in employment and freedom of work-place opportunity which require employers doing business in Northern Ireland to:

69.3.1(a) increase the representation of individuals from under-represented religious groups in the workforce, including managerial, supervisory, administrative, clerical and technical jobs;

69.3.1(b) take steps to promote adequate security for the protection of employees from under-represented religious groups both at the work-place and while traveling to and from **Work**;

69.3.1(c) ban provocative religious or political emblems from the workplace;

69.3.1(d) publicly advertise all job openings and make special recruitment efforts to attract applicants from under-represented religious groups;

69.3.1(e) establish layoff, recall, and termination procedures which do not in practice favor a particular religious group;

69.3.1(f) abolish all job reservations, apprenticeship restrictions and different employment criteria which discriminate on the basis of religion;

69.3.1(g) develop training programs that will prepare substantial numbers of current employees from under-represented religious groups for skilled jobs, including the expansion of existing programs and the creation of new programs to train, upgrade, and improve the skills of workers from under-represented religious groups;

69.3.1(h) establish procedures to asses, identify, and actively recruit employees from under-represented religious groups with potential for further advancement; and

69.3.1(i) appoint a senior management staff member to oversee affirmative action efforts and develop a timetable to ensure their full implementation.

69.4 The **Contractor** agrees that the covenants and representations in Article 69.2 are material conditions to this **Contract**. In the event the **Agency** receives information that the **Contractor** who made the stipulation required by this Article 69 is in violation thereof, the **Agency** shall review such information and give the **Contractor** an opportunity to respond. If the **Agency** finds that a violation has occurred, the **Agency** shall have the right to declare the **Contractor** in default in default and/or terminate this **Contract** for cause and procure supplies, services or **Work** from another source in the manner the **Agency** deems proper. In the event of such termination, the **Contractor** shall pay to the **Agency**, or the **Agency** in its sole discretion may withhold from any amounts otherwise payable to the **Contractor**, the difference between the **Contract** price for the uncompleted portion of this **Contract** and the cost to the **Agency** of completing performance of this **Contract** either itself or by engaging another **Contractor** or **Contractors**. In the case of a requirement **Contract**, the **Contractor** shall be liable for such difference in price for the entire amount of supplies required by the **Agency** for the uncompleted term of **Contractor's Contract**. In the case of a construction **Contract**, the **Agency** shall also have the right to hold the **Contractor** in partial or total default in accordance with the default provisions of this **Contract**, and/or may seek debarment or suspension of the **Contractor**. The rights and remedies of the **Agency** hereunder shall be in addition to, and not in lieu of, any rights and remedies the **Agency** has pursuant to this **Contract** or by operation of **Law**.

ARTICLE 70. ELECTRONIC FILING/NYC DEVELOPMENT HUB

70.1 The **Contractor** shall electronically file all alteration type-2 and alteration type-3 applications via the New York City Development Hub Web site, except applications for the following types of minor alterations: enlargements, curb cuts, legalizations, fire alarms, builders pavement plans, and jobs filed on Landmark Preservation Commission calendared properties. All such filings must be professionally certified. Information about electronic filing via the New York City Development Hub is available on the **City** Department of Buildings Web site at www.nyc.gov/buildings.

ARTICLE 71. PROHIBITION OF TROPICAL HARDWOODS

71.1 Tropical hardwoods, as defined in Section 165 of the New York State Finance Law (Finance Law), shall not be utilized in the performance of this **Contract** except as expressly permitted by Section 165 of the Finance Law.

ARTICLE 72. CONFLICTS OF INTEREST

72.1 Section 2604 of the **City** Charter and other related provisions of the **City** Charter, the Administrative Code, and the Penal Law are applicable under the terms of this **Contract** in relation to conflicts of interest and shall be extended to **Subcontractors** authorized to perform **Work**, labor and services pursuant to this **Contract** and further, it shall be the duty and responsibility of the **Contractor** to so inform its respective **Subcontractors**. Notice is hereby given that, under certain circumstances, penalties may be invoked against the donor as well as the recipient of any form of valuable gift.

ARTICLE 73. MERGER CLAUSE

73.1 The written **Contract** herein, contains all the terms and conditions agreed upon by the parties hereto, and no other agreement, oral or otherwise, regarding the subject matter of this **Contract** shall be deemed to exist or to bind any of the parties hereto, or to vary any of the terms contained herein.

ARTICLE 74. STATEMENT OF WORK

74.1 The **Contractor** shall furnish all labor and materials and perform all **Work** in strict accordance with the **Specifications** and **Addenda** thereto, numbered as shown in Schedule A.

ARTICLE 75. COMPENSATION TO BE PAID TO CONTRACTOR

75.1 The **City** will pay and the **Contractor** will accept in full consideration for the performance of the **Contract**, subject to additions and deductions as provided herein, the total sum shown in Schedule A, this said sum being the amount at which the **Contract** was awarded to the **Contractor** at a public letting thereof, based upon the **Contractor's** bid for the **Contract**.

ARTICLE 76. ELECTRONIC FUNDS TRANSFER

76.1 In accordance with Section 6-107.1 of the Administrative Code, the **Contractor** agrees to accept payments under this **Contract** from the **City** by electronic funds transfer (EFT). An EFT is any

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

76.2 The **Commissioner** may waive the application of the requirements of this Article 76 to payments on contracts entered into pursuant to Section 315 of the **City** Charter. In addition, the Commissioner of the Department of Finance and the Comptroller may jointly issue standards pursuant to which the **Agency** may waive the requirements of this Article 76 for payments in the following circumstances: (i) for individuals or classes of individuals for whom compliance imposes a hardship; (ii) for classifications or types of checks; or (iii) in other circumstances as may be necessary in the interest of the **City**.

ARTICLE 77. RECORDS RETENTION

77.1 The **Contractor** agrees to retain all books, records, and other documents relevant to this **Contract** for six years after the final payment or termination of this **Contract**, whichever is later. **City**, state, and federal auditors and any other persons duly authorized by the **City** shall have full access to and the right to examine any such books, records, and other documents during the retention period.

ARTICLE 78. EXAMINATION AND VIEWING OF SITE, CONSIDERATION OF OTHER SOURCES OF INFORMATION AND CHANGED SITE CONDITIONS

78.1 Pre-Bidding (Investigation) Viewing of Site – Bidders must carefully view and examine the **Site** of the proposed **Work**, as well as its adjacent area, and seek other usual sources of information, for they will be conclusively presumed to have full knowledge of any and all conditions and hazards on, about or above the **Site** relating to or affecting in any way the performance of the **Work** to be done under the **Contract** that were or should have been known by a reasonably prudent bidder. To arrange a date for visiting the **Site**, bidders are to contact the **Agency** contact person specified in the bid documents.

78.2 Should the **Contractor** encounter during the progress of the Work 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. The **Commissioner** shall thereupon promptly investigate the conditions or hazards. If the **Commissioner** finds that they do so materially differ, and that they could not have been reasonably anticipated by the **Contractor**, the **Contract** may be modified with the **Commissioner**'s written approval.

2017 Standard Construction Contract Riders:

- NYC Earned Safe and Sick Time Act Contract Rider
- Rider to New York City Standard Construction Contract (March 2017) Regarding Non-Compensable Delays and Grounds for Extension
- Rider to New York City Standard Construction Contract (March 2017) Regarding Certified Payrolls
- New York City Mayoral Executive Order No. 39 Rider City Fleet and Truck Safety Requirements for City Contractors (version: November 19, 2024)
- Community Hiring Rider for Construction Contracts (version: February 20, 2025)

NYC EARNED SAFE AND SICK TIME ACT CONTRACT RIDER

(To supersede Section 4.06 of the November 2018 Appendix A and Section 35.5 of the March 2017 Standard Construction Contract and to be attached to other City contracts and solicitations)

A. *Introduction and General Provisions.*

1. The Earned Safe and Sick Time Act ("ESSTA"), codified at Title 20, Chapter 8 of the New York City Administrative Code, also known as the "Paid Safe and Sick Leave Law," requires covered employees (as defined in Admin. Code § 20-912) in New York City ("City") to be provided with paid safe and sick time. Contractors of the City or of other governmental entities may be required to provide safe and sick time pursuant to the ESSTA. The ESSTA is enforced by the City's Department of Consumer and Worker Protection ("DCWP"), which has promulgated 6 RCNY §§ 7-101 and 201 *et seq*. ("DCWP Rules").

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

3. The Contractor must notify (with a copy to DCWP at ComplianceMonitoring@dcwp.nyc.gov) the Agency Chief Contracting Officer of the City Agency or other entity with whom it is contracting in writing within 10 days of receipt of a complaint (whether oral or written) or notice of investigation regarding the ESSTA involving the performance of this agreement. Additionally, the Contractor must cooperate with DCWP's guidance and must comply with DCWP's subpoenas, requests for information, and other document demands as set forth in the ESSTA and the DCWP Rules. More information is available at https://www1.nyc.gov/site/dca/about/paid-sick-leave-what-employers-need-to-know.page.

4. Upon conclusion of a DCWP investigation, Contractor will receive a findings letter detailing any employee relief and civil penalties owed. Pursuant to the findings, Contractor will have the opportunity to settle any violations and cure the breach of this agreement caused by failure to comply with the ESSTA either i) without a trial by entering into a consent order or ii) appearing before an impartial judge at the City's administrative tribunal. In addition to and notwithstanding any other rights and remedies available to the City, non-payment of relief and penalties owed pursuant to a consent order or final adjudication within 30 days of such consent order or final adjudication may result in the termination of this agreement without further opportunity to settle or cure the violations.

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

B. *Pursuant to the ESSTA and DCWP Rules: Applicability, Accrual, and Use.*

1. An employee who works within the City must be provided paid safe and sick time.[1] Employers with one hundred or more employees are required to provide 56 hours of safe and sick time for an employee each calendar year. Employers with fewer than one hundred employees are required to provide 40 hours of sick leave each calendar year. Employers must provide a minimum of one hour of safe and sick time for every 30 hours worked by an employee and compensation for such safe and sick time must be provided at the greater of the employee's regular hourly rate or the minimum wage at the time the paid safe or sick time is taken. Employers are not discouraged or prohibited from providing more generous safe and sick time policies than what the ESSTA requires.

2. Employees have the right to determine how much safe and sick time they will use, provided that an employer may set a reasonable minimum increment for the use of safe and sick time not to exceed four hours per day. For the use of safe time or sick time beyond the set minimum increment, an employer may set fixed periods of up to thirty minutes beyond the minimum increment. In addition, an employee may carry over up to 40 or 56 hours of unused safe and sick time to the following calendar year, provided that no employer is required to carry over unused paid safe and sick time if the employee is paid for such unused safe and sick time and the employer provides the employee with at least the legally required amount of paid safe and sick time for such employee for the immediately subsequent calendar year on the first day of such calendar year.

3. An employee entitled to safe and sick time pursuant to the ESSTA may use safe and sick time for any of the following:

a. such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;

b. such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild, or grandparent, the child or parent of an employee's spouse or domestic partner, any other individual related by blood to the employee, and any other individual whose close association with the employee is the equivalent of a family relationship) who has a mental illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;

[1] Pursuant to the ESSTA, if fewer than five employees work for the same employer, and the employer had a net income of less than one million dollars during the previous tax year, such employer has the option of providing such employees uncompensated safe and sick time.

c. closure of such employee's place of business by order of a public official due to a public health emergency;

d. such employee's need to care for a child whose school or childcare provider has been closed due to a public health emergency; or

e. when the employee or a family member has been the victim of a family offense matter, sexual offense, stalking, or human trafficking:

1. to obtain services from a domestic violence shelter, rape crisis center, or other shelter or services program for relief from a family offense matter, sexual offense, stalking, or human trafficking;
2. to participate in safety planning, temporarily or permanently relocate, or take other actions to increase the safety of the employee or employee's family members from future family offense matters, sexual offenses, stalking, or human trafficking;
3. to meet with a civil attorney or other social service provider to obtain information and advice on, and prepare for or participate in any criminal or civil proceeding, including but not limited to, matters related to a family offense matter, sexual offense, stalking, human trafficking, custody, visitation, matrimonial issues, orders of protection, immigration, housing, discrimination in employment, housing or consumer credit;
4. to file a complaint or domestic incident report with law enforcement;
5. to meet with a district attorney's office;
6. to enroll children in a new school; or
7. to take other actions necessary to maintain, improve, or restore the physical, psychological, or economic, health or safety of the employee or the employee's family member or to protect those who associate or work with the employee.

4. An employer must not require an employee, as a condition of taking safe and sick time, to search for a replacement. However, where the employee's need for safe and sick time is foreseeable, an employer may require an employee to provide reasonable notice of the need to use safe and sick time. For an absence of more than three consecutive work days, an employer may require reasonable documentation that the use of safe and sick time was needed for a reason listed in Admin. Code § 20-914; and/or written confirmation that an employee used safe and sick time pursuant to the ESSTA. However, an employer may not require documentation specifying the nature of a medical condition, require disclosure of the details of a medical condition, or require disclosure of the details of a family offense matter, sexual offense, stalking, or human trafficking, as a condition of providing safe and sick time. Health information and information concerning family offenses, sexual offenses, stalking or human trafficking obtained solely due to an

employee's use of safe and sick time pursuant to the ESSTA must be treated by the employer as confidential. An employer must reimburse an employee for all reasonable costs or expenses incurred in obtaining such documentation for the employer.

5. An employer must provide to all employees a written policy explaining its method of calculating sick time, policies regarding the use of safe and sick time (including any permissible discretionary conditions on use), and policies regarding carry-over of unused time at the end of the year, among other topics. It must provide the policy to employees using a delivery method that reasonably ensures that employees receive the policy. If such employer has not provided its written policy, it may not deny safe and sick time to an employee because of non-compliance with such a policy.

6. An employer must provide a pay statement or other form of written documentation that informs the employee of the amount of safe/sick time accrued and used during the relevant pay period and the total balance of the employee's accrued safe/sick time available for use.

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

C. *Exemptions and Exceptions*. Notwithstanding the above, the ESSTA does not apply to any of the following:

1. an independent contractor who does not meet the definition of employee under N.Y. Labor Law § 190(2);

2. an employee covered by a valid collective bargaining agreement, if the provisions of the ESSTA are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the ESSTA for such employee;

3. an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines their own schedule, has the ability to reject or accept any assignment referred to them, and is paid an average hourly wage that is at least four times the federal minimum wage;

4. an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;

5. an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or

6. a participant in a Work Experience Program (WEP) under N.Y. Social Services Law § 336-c.

D. *Retaliation Prohibited.* An employer shall not take any adverse action against an employee that penalizes the employee for, or is reasonably likely to deter the employee from or interfere with the employee exercising or attempting in good faith to exercise any right provided by the ESSTA. In addition, an employer shall not interfere with any investigation, proceeding, or hearing pursuant to the ESSTA.

E. *Notice of Rights.*

1. An employer must provide its employees with written notice of their rights pursuant to the ESSTA. Such notice must be in English and the primary language spoken by an employee, provided that DCWP has made available a translation into such language. Downloadable notices are available on DCWP's website at https://www1.nyc.gov/site/dca/about/Paid-Safe-Sick-Leave-Notice-of-Employee-Rights.page. The notice must be provided to the employees by a method that reasonably ensures personal receipt by the employee.

2. Any person or entity that willfully violates these notice requirements is subject to a civil penalty in an amount not to exceed $50.00 for each employee who was not given appropriate notice.

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

G. *Enforcement and Penalties.*

1. Upon receiving a complaint alleging a violation of the ESSTA, DCWP must investigate such complaint. DCWP may also open an investigation to determine compliance with the ESSTA on its own initiative. Upon notification of a complaint or an investigation by DCWP, the employer must provide DCWP with a written response and any such other information as DCWP may request. If DCWP believes that a violation of the ESSTA has occurred, it has the right to issue a notice of violation to the employer .

2. DCWP has the power to grant an employee or former employee all appropriate relief as set forth in Admin. Code § 20-924(d). Such relief may include, but is not limited to, treble damages for the wages that should have been paid; statutory damages for unlawful retaliation; and damages, including statutory damages, full compensation for wages and benefits lost, and reinstatement, for unlawful discharge. In addition, DCWP may impose on an employer found to have violated the ESSTA civil penalties not to exceed $500.00 for a first violation, $750.00 for a second violation within two years of the first violation, and $1,000.00 for each succeeding violation within two years of the previous violation. When an employer has a policy or practice of not providing or refusing to allow the use of safe and sick time to its employees, DCWP may seek penalties and relief on a per employee basis.

3. Pursuant to Admin. Code § 20-924.2, (a) where reasonable cause exists to believe that an employer is engaged in a pattern or practice of violations of the ESSTA, the Corporation Counsel may commence a civil action on behalf of the City in a court of competent jurisdiction by filing a complaint setting forth facts relating to such pattern or practice and requesting relief, which may include injunctive relief, civil penalties and any other appropriate relief. Nothing in § 20-924.2 prohibits DCWP from exercising its authority under section 20-924 or the Charter, provided that a civil action pursuant to § 20-924.2 shall not have previously been commenced.

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

RIDER TO NEW YORK CITY STANDARD CONSTRUCTION CONTRACT (MARCH 2017) REGARDING NON-COMPENSABLE DELAYS AND GROUNDS FOR EXTENSION

[Instructions to Agencies: Please attach this Rider to the March 2017 version of the New York City Standard Construction Contract]

The following provisions supersede the corresponding provisions in the March 2017 version of the New York City Standard Construction Contract:

1. Section **11.5.1** provides as follows:

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

2. Section **11.5.6** provides as follows:

   11.5.6 Climatic conditions, storms, floods, droughts, tidal waves, fires, hurricanes, earthquakes, landslides or other catastrophes or acts of God; acts of war or of the public enemy or terrorist acts; disruption, outage or power failure caused by a utility's inability or failure to provide service, pandemics, epidemics, outbreaks of infectious disease or any other public health emergency; other states of emergency declared by the City, State or Federal government , quarantine restrictions, and freight embargoes; including the **City's** reasonable responses to any of the above; and

3. Section **13.3** provides as follows:

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

   13.3.1 By any of the acts or omissions of the **City**, its officials, agents or employees set forth in Articles **11.4.1.1** through **11.4.1.9**; or

   13.3.2 By or attributable to any of the items set forth in Articles **11.5.1** through **11.5.7**.

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

RIDER TO NEW YORK CITY STANDARD CONSTRUCTION CONTRACT (MARCH 2017) REGARDING CERTIFIED PAYROLLS

[Instructions to Agencies: Please attach this Rider to the March 2017 version of the New York City Standard Construction Contract]

The following provisions supersede the corresponding provisions in the March 2017 version of the New York City Standard Construction Contract. Article 38 provides as follows:

ARTICLE 38. PAYROLL REPORTS

38.1 The **Contractor** and its **Subcontractor(s)** shall maintain the original payrolls or transcripts thereof which the **Contractor** and its **Subcontractor(s)** are required to maintain and shall submit such original payrolls or transcripts, subscribed and affirmed by it as true, within thirty (30) **Days** after issuance of its first payroll, and every thirty (30) **Days** thereafter, pursuant to Labor Law Section 220(3-a)(a)(iii), as modified by Labor Law Section 220-j. The **Contractor** and **Subcontractor(s)** shall submit such original payrolls or transcripts into the Electronic Certified Payroll Database (as hereinafter defined). If payment requisitions are not submitted at least once a month, the **Contractor** and its **Subcontractor(s)** shall submit original payrolls and transcripts both at the same time payment requisitions are submitted and independently of its payment requisitions. For purposes of this Article 38, "Electronic Certified Payroll Record Database" means the City's publicly accessible online database of electronic certified payroll records through which contractors and subcontractors submit certified payroll reports in an electronic format. The database is accessible at the following link: https://nyc-oti.ecomply.us/

38.2 The **Contractor** shall maintain payrolls or transcripts thereof for six (6) years from the date of completion of the **Work** on this **Contract**. If such payrolls and transcripts are maintained outside of New York City after the completion of the **Work** and their production is required pursuant to this Article 38, the **Contractor** shall produce such records in New York City upon request by the City.

38.3 The **Contractor** and **Subcontractor(s)** shall comply with any written order, direction, or request made by the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)**, or the **Comptroller**, to provide to the requesting party any of the following information and/or records within five (5) **Days** of such written order, direction, or request:

38.3.1 Such original payrolls or transcripts thereof subscribed and affirmed by it as true and the statements signed by each worker pursuant to this Chapter VIII; and/or

38.3.2 Attendance sheets for each **Day** on which any employee of the **Contractor** and/or any of the **Subcontractor(s)** performed **Work** on the **Site**, which attendance sheet shall be in a form acceptable to the **Agency** and shall provide information acceptable to the **Agency** to identify each such employee; and/or

38.3.3 Any other information to satisfy the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)** or the **Comptroller**, that this Chapter VIII and the Labor Law, as to the hours of employment and prevailing rates of wages and/or supplemental benefits, are being observed.

New York City Mayoral Executive Order No. 39 Rider

City Fleet and Truck Safety Requirements for City Contractors

Version: 11/19/24

[Instruction to Agencies: Please attach this Rider to the following agreements: (1) Procurement Contracts that meet the criteria set forth in Executive Order 39 of February 1, 2024; and (2) to the March 2017 version of the New York City Standard Construction Contract.]

Section 1.01 Background

This rider is included in the Agreement and made a part thereof pursuant to the provisions of Mayoral Executive Order 39 of 2024.

Section 1.02 Definitions

A. Capitalized terms not otherwise defined in this rider shall have the meaning ascribed to them in the Agreement.

B. Agreement: The agreement between the City and the Contractor, to which this rider has been added and made a part.

C. City-contracted Vehicle means a Truck (as hereinafter defined) or any other motor vehicle that the Contractor anticipates providing in accordance with this Agreement or using in performing its obligations under this Agreement on a weekly or more frequent basis[1]. This includes those vehicles anticipated to be provided or used by subcontractors to fulfill the scope of a subcontract for work to be performed under a contract that is subject to the Executive Order, regardless of monetary value of the subcontract, if the vehicle is utilized on a weekly or more frequent basis.

D. Contracting Agency: the City agency or office through which the City of New York has entered into this Agreement.

[1] The following vehicles are not considered City-contracted vehicles and are thus not subject to Executive Order 39: any motor vehicle or truck that is utilized pursuant to (1) contracts registered prior to July 1, 2024, including the renewal, extension, or modification of such contracts; (2) an agency on-call emergency contract; (3) an emergency procurement made pursuant to section 3-06 of title 9 of the Rules of the City of New York or pursuant to an executive order of the Mayor or Governor issued under section 24 or section 29-A of the New York State Executive Law; (4) intergovernmental contracts; (5) government-to-government contracts between the City and any State or Federal government agency; and (6) a contract for utilities, as identified in subdivision (b) of section 825 of the New York City Charter.

E. Contractor: the entity providing services under this Agreement.

F. Executive Order: Mayoral Executive Order 39 of 2024, as it may be amended.

G. High Vision Truck: A Truck with a cab-over or cab-forward design wherein the driver sits in front of the front axle as opposed to conventional cab design wherein the engine and front axle are in front of the driver. The distance from the forward of the center of the vehicle bumper at which the driver can see the top of a 3-foot cone shall not exceed eight feet and the distance beyond the exterior of the passenger side door at which the driver can first see the top of the 4-foot cone shall not exceed six feet.

H. Registration: Registration of this Agreement pursuant to Section 328 of the New York City Charter.

I. Telematics: Automatic vehicle location systems that track vehicle location and speed and alert the driver and another designated person(s) to such location and speed in real time.

J. Truck: A City-contracted Vehicle with a manufacturer's gross vehicle weight rating exceeding 10,000 pounds. The term does not include off-road construction vehicles.

K. Truck Surround Cameras: A system of cameras, sensors, and alerts placed on a Truck that provides a Truck operator with a full view of all four sides of the Truck.

L. Vehicle Safety Plan: A plan with regard to City-contracted Vehicles, approved by the Contracting Agency, that includes the components listed in Section 2.03(A) through (F) of this rider.

Section 2.01 Vehicle Requirements

All City-contracted Vehicles shall conform to the following requirements:

A. Truck Surround Cameras: All Trucks, other than High Vision Trucks, shall be outfitted with truck surround cameras in accordance with the following schedule:
   a. Contracts involving 10 or fewer Trucks: No later than 12 months from Registration.
   b. Contracts involving more than 10 Trucks: No later than 18 months from Registration.
   c. New or replacement Truck acquired after work under this Agreement has begun: Truck must be outfitted with Truck Surround Cameras within 12 months from the date of first using such Truck.
   d. Contractor must submit to the Contracting Agency photographic and purchase order evidence, that is satisfactory to the Contracting Agency, of compliance with this Paragraph (A).

B. Truck Side-guards: Contractor shall provide side-guards for City-contracted Vehicles as applicable pursuant to Section 6-141 of the New York City Administrative Code.

C. Telematics: All City-contracted Vehicles must be installed with Telematics. Data gathered by Telematics must be made available in a manner that is satisfactory to the Contracting Agency.

Section 2.02 Safety Requirements

Contractor shall provide the following:

A. Licensing: Contractors shall ensure proper licensing for all drivers who operate City-contracted Vehicles. Contractors shall ensure that all drivers operating City-contracted Vehicles are enrolled in the New York State License Notification System (LENS) and that all out-of-state licenses are being monitored by Contractor. Contractor must notify the Contracting Agency of any license suspensions and/or arrests tied to unsafe or illegal vehicle operation by any drivers of City-contracted Vehicles.

B. Training: Contractor must provide the Contracting Agency documentation, satisfactory to the Contracting Agency, showing:
    a. That all drivers of City-contracted Vehicles have taken a New York State approved defensive driving class within six months after Registration; or
    b. That all drivers of City-contracted Vehicles have attended a New York State-approved defensive driving class within 3 years prior to Registration; or
    c. That all drivers of City-contracted Vehicles have received alternative safe driver training acceptable to the Contracting Agency that is documented to the satisfaction of the Contracting agency.

C. Crash tracking: Contractors must notify the Contracting Agency of any and all collisions that take place involving City-contracted Vehicles while performing services under this Agreement.

Section 2.03 Vehicle Safety Plan

Within one month after Registration, the Contractor must submit, for review and approval, to Contracting Agency, at the address set forth in the Agreement for notices to the City, and DCAS Fleet (C/O Chief Fleet Management Officer, 23rd Floor South, Municipal Building, 1 Centre Street, NY, NY 10007) a proposed vehicle safety plan that shall include at the minimum the components listed in Paragraphs (A) through (E) below. If directed by the Contracting Agency,

Contractor shall revise said proposed vehicle safety plan in accordance with the directions of the Contracting Agency, and until the Contracting Agency issues its approval thereof, Contractor shall submit a revised proposed vehicle safety plan to the Contracting Agency in each case, within 15 days after receipt by Contractor of directions to that effect from the Contracting Agency. Upon approval of the proposed vehicle safety plan, said proposed plan shall be considered the Vehicle Safety Plan and Contractor shall comply with the terms thereof. Each second anniversary of the approval of the Vehicle Safety Plan the Contractor shall submit an update thereof. The Vehicle Safety Plan shall include at the minimum the following components:

A. Vehicle List: List of City-contracted Vehicles, including the year, make, model, VIN and license plate number of each City-contracted Vehicle;

B. Safety Training: Documentation showing that all drivers of City-contracted Vehicles have completed the training detailed in section 2.02(B) of this Rider;

C. Technology: A list of all relevant technology investments installed on City-contracted vehicles, including but not limited to the technology listed in section 2.01 of this Rider;

D. Crash Tracking: An explanation of Contractor's process of monitoring and reviewing collisions including plans to notify Contracting Agency of collisions that take place while performing services under this Agreement;

E. Corrective Action: A corrective action program for drivers of City-contracted Vehicles that engage in unsafe or dangerous driving behaviors and license monitoring; and

F. Additional Safety Measures: Contractor must indicate if there are any additional safety technologies, safety practices, training, or other procedures that are utilized for City-contracted Vehicles during the term of this Agreement.

Section 3.01 Liquidated Damages

A. Contractor acknowledges that its failure to comply with the provisions of this Vehicle Safety Plan will cause loss and damage to the City, the precise extent of which is difficult to ascertain in monetary terms. For this reason, the parties desire to provide fair and reasonable compensation to the City for such losses, which compensation shall not be construed as a penalty. It is therefore agreed that, in addition to any other liquidated damages that the Contractor shall be required to pay to the City in accordance with the provisions of the Agreement, Contractor shall pay to the City the following:
    a. The sum of $500.00 for each instance of a failure by the Contractor to submit a Vehicle Safety Plan in accordance with the provisions of Section 2.03.

b. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.02(A) [Licensing].
c. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.02(B) [Training].
d. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.02(C) [Crash Tracking].
e. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.01(C) [Telematics].
f. The sum of $3,000 for each instance of a failure by the Contractor to comply with the provisions of Section 2.01(A).
g. The Contracting Agency will provide at least 5 working days of notice to the Contractor and opportunity to rectify before implementing these liquidated damages.

B. Liquidated damages received pursuant to this Agreement are not intended to be nor shall they be treated as either a partial or full waiver or discharge of the City's right to indemnification, or the Contractor's obligation to indemnify the City, or to any other remedy provided for in this Agreement or by Law. The City may deduct and retain out of the monies which may become due under this Agreement, the amount of any such liquidated damages; and in case the amount which may become due hereunder shall be less than the amount of liquidated damages suffered by the City, the Contractor shall be liable to pay the difference.

Community Hiring Rider

For Construction Contracts

Version: February 20, 2025

Program Description

Community Hiring, as authorized under Chapter 79 of the New York City Charter ("Charter"), is an initiative to set workforce goals on City procurement for contractors to employ low-income individuals and residents of economically disadvantaged communities.

The provisions set forth in this Rider shall apply to contracts with a total value exceeding three million dollars, unless otherwise exempt under the rules set forth under the Community Hiring Rules, adopted as Title 74 of the Rules of the City of New York (RCNY). Under 74 RCNY § 1-03(b), the following contracts are exempt: preferred source contracts; contracts for the performance of services by a city-affiliated not-for-profit corporation, goods contracts; contracts in an amount below the small purchase threshold; contracts for investigative or confidential services; contracts subject to federal or state funding requirements that preclude or substantially conflict with the application of Community Hiring Goals; contracts awarded through the United States General Services administration, or through the New York State Office of General Services; contracts for emergency demolition services procured by the Department of Housing Preservation and Development; contracts for which contractor selection is made by an elected official other than the Mayor or an agency other than a Mayoral Agency; contracts subject to 9 RCNY § 1-02(f); contracts designated for inclusion in a mentoring program as defined in Section 1206 or 1309 of the Charter; and contracts for banking services, electronic payment services, or other related services procured by the New York City Department of Finance.

The Community Hiring Rules are hereby incorporated in this Contract by reference and all terms used herein shall have the meanings given such terms in the Community Hiring Rules. In the event of any conflict between the Community Hiring Rules and this Rider, the rules shall control. As of the execution of this Contract, the Contactor represents that it has read, in its entirety, and agrees to comply with the Community Hiring Rules.

The Community Hiring program supersedes the HireNYC initiatives and the related riders, including, but not limited to references to the Public Assistance Commitment Rider and the HireNYC Hiring and Employment Rider. Article 35.6 of this Contract is amended and replaced with the Community Hiring Rules.

Community Hiring Requirements

The Contractor agrees to comply with the requirements of the Community Hiring Rules in the performance of this Contract.

A. Community Hiring Goal

Pursuant to 74 RCNY § 4-02(b), the Contractor shall make best efforts to meet the applicable Community Hiring Goal to employ Residence-Based Community Hires as defined in 74 RCNY § 2-01(a) for contracts involving construction work.

For each Contract involving Construction Work that is not subject to a Project Labor Agreement, the Contractor shall agree to make best efforts to meet the Community Hiring Goal of 30 percent of cumulative labor hours of construction work to be performed by Residence-Based Community Hires as established in 74 RCNY § 4-02(b)(1). For contracts involving Construction Work that are subject to a Project Labor Agreement, the Contractor shall agree to make best efforts to meet the numerical goal(s) regarding Residence-Based Community Hires and Apprentices established in such Project Labor Agreement.

In accordance with 74 RCNY § 5-01(b), the Contractor shall require its subcontractors, as defined under 74 RCNY § 1-02, to make best efforts to meet the applicable Community Hiring Goal.

B. Advertising Employment Opportunities

The Contractor, except those performing Construction Work pursuant to a Project Labor Agreement, agrees to advertise the Employment Opportunities, as defined in 74 RCNY § 1-02, in conspicuous places available to the public and in a manner reasonable for the industry.

For purposes of meeting a Community Hiring Goal, the Contractor shall notify a Referral Source, as provided in accordance with 74 RCNY § 3-02(a), of the job opportunities to be filled by Community Hires. The Contractor shall provide notice to the Office of Community Hiring and Workforce Development (OCH) when the Referral Source has impeded the Contractor's efforts to meet the Community Hiring Goal.

C. System Enrollment and Reporting

The Contractor shall enroll with an electronic system designated by the Director of OCH in accordance with 74 RCNY § 5-01(e).

Once enrolled into the system, the Contractor shall be responsible for updating the information in the system in a reasonable and timely manner.

The Contractor may fulfill the advertising requirement set forth in 74 RCNY § 5-01(c) by posting in such system all the relevant information of an Employment Opportunity to be filled by Community Hires. The Contractor shall also provide, upon request by the City with reasonable notice, any information related to the Contractor's compliance with or progress towards meeting the Community Hiring Goal.

Records

A. Retention

The Contractor shall maintain records in accordance with the applicable requirements set forth in 74 RCNY §§ 6-01 and 6-02.

For purposes of 74 RCNY § 6-01(b), the Contractor shall designate a representative to monitor all activity related to compliance to ensure that the Contractor is exercising best efforts to meet the Community Hiring Goal and maintain records to submit the documentation relating to the provisions herein.

B. Access to Records

The Contractor shall furnish, and require its subcontractors to furnish, all information and reports in accordance with the laws, rules, regulations or guidance from the City.

Compliance

Without limitation to any other provisions under this Contract and any other remedies available to the City, a failure to comply with the requirements under the Community Hiring Rules is a non-compliance that may be subject to civil penalties pursuant to Chapter 7 of the Community Hiring Rules and may be considered as a factor in evaluating contract performance in accordance with 9 RCNY § 4-01.

A. Best Efforts

Where the Contractor has failed to meet the Community Hiring Goal, the Contractor shall demonstrate that it exercised best efforts to meet the goal. Where determined, as set forth in 74 RCNY § 5-03, that the Contractor failed to make best efforts, the City shall send written notice to the Contractor's designated representative, notwithstanding the notice provisions in the Contract. The Contractor shall respond in accordance with the instructions in the notice. Failure to timely respond can result in a non-compliance determination subject to civil penalties as set forth in 74 RCNY § 7-01.

B. Corrective Action

Where the City determines that the non-compliance may be remedied through a corrective action and provides notice to the Contractor pursuant to 74 RCNY § 7-02(a)(2), the Contractor shall respond in accordance with the requirements outlined in the notice. The Contractor is responsible for timely demonstration of taking the requisite corrective action. Demonstration of corrective action to the satisfaction of the Director of OCH, may result in waiving of the civil penalties[1] as set forth in the Community Hiring Rules.

[1] Only civil penalties relating to non-compliance with the Community Hiring Rules can be waived in this instance.

C. Civil Penalties

Where Contractor is found non-compliant subject to civil penalties, the City can impose a civil penalty amount in accordance with the schedule set forth in 74 RCNY § 7-03.

The City may withhold from the Contractor the amount of the civil penalties upon final determination as set forth in 74 RCNY § 7-01(d).

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SIGNATURE OF THE CONTRACT

IN WITNESS WHEREOF, the Commissioner, on behalf of the City of New York and the Contractor, have executed **FIVE COPIES of this contract, three parts of which are to remain with the Commissioner, one other to be filed with the Comptroller of the City, and the fifth to be delivered to the Contractor.**

THE CITY OF NEW YORK

BY_____
COMMISSIONER

_____
NAME OF CONTRACTOR

BY_____
AUTHORIZED OFFICER OF THE FIRM OR CORPORATION

(Where Contractor is a Corporation, add):
Attest:

_____(Seal)
SECRETARY

ACKNOWLEDGMENT BY CORPORATION

State of_____, County of_____ ss:

On this_____ day of _____, _____

before me personally came_____

who affirms or being by me duly sworn, did depose and say that he/she resides in

the City of_____; that he/she is the_____

of the _____the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation, that the seal affixed to the said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that he/she signed his name thereto by like order.

_____
Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT BY COMMISSIONER

State of New York, County of Queens ss:

On this_____ day of_____,_____

before me personally came_____

to me known and known to me to be the_____ Commissioner of the Department Environmental Protection of the City of New York, the person described as such in and who as such executed the foregoing instrument and he/she acknowledged to me that he/she executed the same as Commissioner for the purposes therein mentioned.

_____
Notary Public or Commissioner of Deeds

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ACKNOWLEDGMENT BY PARTNERSHIP

State of_____, County of_____ ss:

On this_____ day of _____, _____

before me personally came _____,to be known

and known to me to be a member of_____, the firm described in and which executed the foregoing instrument and he/she acknowledged to me that he/she subscribed the name of said firm thereto on behalf of said firm for the purposes therein mentioned.

_____
Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT BY INDIVIDUAL

State of _____, County of _____ ss:

On this_____ day of_____,_____

before me personally came_____

to me known and known to me to be the same person described and who executed the foregoing instrument and he/she acknowledged to me that he/she executed the same for the purposes therein mentioned

_____
Notary Public or Commissioner of Deeds

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AUTHORITY

MAYOR'S CERTIFICATE NO. CBX _____ DATED_____

BUDGET DIRECTOR'S CERTIFICATE NO. CP/CAS_____ DATED_____

APPROPRIATION

COMMISSIONER'S CERTIFICATE

In conformity with the provisions of Section 6-101 of the Administrative Code of the City of New York, it is hereby certified that the estimated cost of the work, materials and supplies required by the within Contract, amounting to:

_____

$_____

is chargeable to the fund of the Department of Environmental Protection Budget Code(s):

_____

_____

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

_____

Commissioner of the Department of Environmental Protection

COMPTROLLER'S CERTIFICATE

The City of New York_____,_____

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

_____

Comptroller

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PERFORMANCE BOND

KNOW ALL PEOPLE BY THESE PRESENTS:,
That we,_____

_____

_____

hereinafter referred to as the "Principal,"
and,_____

_____

_____

hereinafter referred to as the "Surety" ("Sureties") are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "City" or to its successors and assigns in the penal sum of_____

_____

_____

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

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

_____

_____

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns, shall well and faithfully perform the said Contract and all modifications, amendments, additions and alterations thereto that may hereafter be made, according to its terms and its true intent and meaning, including repair and or replacement of defective work and guarantees of maintenance for the periods stated in the Contract, and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of the Principal's default of the Contract, and shall fully reimburse and repay the City for all outlay and expense which the City may incur in making

good any such default and shall protect the said City of New York against, and pay any and all amounts, damages, cost and judgments which may or shall be recovered against said City or its officers or agents or which the said City of New York may be called upon to pay any person or corporation by reason of any damages arising or growing out of the Principal's default of the Contract, then this obligation shall be null and void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the City that the City has determined that the Principal is in default of the Contract, to either (1) pay the full amount of the above penal sum in complete discharge and exoneration of this bond and of all the liabilities of the Surety relating to this bond, or (2) fully perform and complete the Work to be performed under the Contract, pursuant to the terms, conditions, and covenants thereof. The Surety (Sureties) further agrees, at its option, either to tender the penal sum or to commence and diligently perform the Work specified in the Contract, including physical site work, within twenty-five (25) business days after written notice thereof from the City and to complete all Work within the time set forth in the Contract or such other time as agreed to between the City and Surety in accordance with the Contract. The Surety and the City reserve all rights and defenses each may have against the other; provided, however, that the Surety expressly agrees that its reservation of rights shall not provide a basis for non-performance of its obligation to commence and to complete all Work as provided herein.

The Surety (Sureties), for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties) and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or to the said Contract or the Work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any Work to be performed or any moneys due or to become due thereunder; and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to said Surety (Sureties) as though done or omitted to be done by or in relation to said Principal.

IN WITNESS WHEREOF, The Principal and the Surety (Sureties) have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this

_____ day of _____ 20 _____ .

(Seal)

_____ (L.S.)

Principal

By _____.

(Seal)

Surety

By _____.

Performance Bond Greater Than $5 Million

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

Bond Premium Rate _____.

Bond Premium Cost _____.

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

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

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

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____; that he/she is the_____
of ___the corporation described in and which executed the foregoing instrument; and that he signed his name to the foregoing instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF A PARTNERSHIP

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____; that he/she is _____ partner of _____, a limited/general partnership existing under the laws of the State of _____, the partnership described in and which executed the foregoing instrument; and that he/she signed his/her name to the foregoing instrument as the duly authorized and binding act of said partnership.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF AN INDIVIDUAL

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____, and that he/she is the individual whose name is subscribed to the within instrument and acknowledged to me that by his/her signature on the instrument, said individual executed the instrument.

_____
Notary Public or Commissioner of Deeds.

Affix Acknowledgments and justification of Sureties

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PERFORMANCE BOND

KNOW ALL PEOPLE BY THESE PRESENTS:,
That we,_____

hereinafter referred to as the **"**Principal,**"**
and,_____

hereinafter referred to as the **"**Surety**"** (**"**Sureties**"**) are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the **"**City**"** or to its successors and assigns in the penal sum of_____

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

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

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns, shall well and faithfully perform the said Contract and all modifications, amendments, additions and alterations thereto that may hereafter be made, according to its terms and its true intent and meaning, including repair and or replacement of defective work and guarantees of maintenance for the periods stated in the Contract, and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of the Principal's default of the Contract, and shall fully reimburse and repay the City for all outlay and expense which the City may incur in making

good any such default and shall protect the said City of New York against, and pay any and all amounts, damages, cost and judgments which may or shall be recovered against said City or its officers or agents or which the said City of New York may be called upon to pay any person or corporation by reason of any damages arising or growing out of the Principal's default of the Contract, then this obligation shall be null and void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the City that the City has determined that the Principal is in default of the Contract, to (1) pay the City the cost to complete the contract as determined by the City in excess of the balance of the Contract held by the City, plus any damages or costs to which the City is entitled, up to the full amount of the above penal sum, (2) fully perform and complete the Work to be performed under the Contract, pursuant to the terms, conditions, and covenants thereof, or (3) tender a completion Contractor that is acceptable to the City. The Surety (Sureties) further agrees, at its option, either to notify the City that it elects to pay the city the cost of completion plus any applicable damages and costs under option (1) above, or to commence and diligently perform the Work specified in the Contract, including physical site work, within twenty-five (25) business days after written notice thereof from the City and, if the Surety elects to fully perform and complete the Work, then to complete all Work within the time set forth in the Contract or such other time as agreed to between the City and Surety in accordance with the Contract. If the Surety elects to tender payment pursuant to (1) above, then the Surety shall tender such amount within fifteen (15) business days notification from the City of the cost of completion. The Surety and the City reserve all rights and defenses each may have against the other; provided, however, that the Surety expressly agrees that its reservation of rights shall not provide a basis for non-performance of its obligation to pay the City the cost of completion, to commence and complete all Work as provided herein, or to tender a completion contractor.

The Surety (Sureties), for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties) and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or to the said Contract or the Work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or any moneys due or to become due thereunder; and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, and waivers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to subcontractors shall have the same effect as to said Surety (Sureties) as though done or omitted to be done by or in relation to said Principal. Notwithstanding the above, if the City makes payments to the Principal before the time required by the contract that in the aggregate exceed $100,000 or 10% of the Contract price, whichever is less, and that have not become earned prior to the Principal being found to be in default, then all payments made to the Principal before the time required by the Contract shall be added to the remaining contract value available to be paid for the completion of the Contract as if such sums had not been paid to the Principal, but shall not provide a basis for non-performance of its obligation to pay the City the cost of completion, to commence and to complete all Work as provided herein, or to tender a completion contractor

IN WITNESS WHEREOF, The Principal and the Surety (Sureties) have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this

_____ day of _____ 20 _____ .

(Seal)

_____ (L.S.)

Principal

By _____.

(Seal)

Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

_____.

(Seal) Surety

By _____.

Bond Premium Rate _____.

Bond Premium Cost _____.

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

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

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

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____; that he/she is the_____
of ___the corporation described in and which executed the foregoing instrument; and that he signed his name to the foregoing instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF A PARTNERSHIP

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____; that he/she is _____ partner of _____, a limited/general partnership existing under the laws of the State of _____, the partnership described in and which executed the foregoing instrument; and that he/she signed his/her name to the foregoing instrument as the duly authorized and binding act of said partnership.

_____
Notary Public or Commissioner of Deeds.

ACKNOWLEDGMENT OF PRINCIPAL IF AN INDIVIDUAL

State of _____County of _____ ss:

On this__day of _____ 20 _____before me personally came_____
to me known, who, being by me duly sworn did depose and say that he/she resides at_____
_____, and that he/she is the individual whose name is subscribed to the within instrument and acknowledged to me that by his/her signature on the instrument, said individual executed the instrument.

_____
Notary Public or Commissioner of Deeds.

Affix Acknowledgments and justification of Sureties

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PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, That we,

_____

_____

_____

hereinafter referred to as the "Principal" and

_____

_____

hereinafter referred to as the "Surety" ("Sureties") are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "City" or to its successors and assigns, in the penal sum of:

_____

$_____ .

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

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

_____

_____

_____

_____

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full.

PAYMENT BOND

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns and other Subcontractors to whom Work under this Contract is sublet and his or their successors and assigns shall promptly pay or cause to be paid all lawful claims for:

a) Wages and compensation for labor performed and services rendered by all persons engaged in the prosecution of the Work under said Contract, and any amendment or extension thereof or addition thereto, whether such persons be agents, servants or employees of the Principal or of any such Subcontractors, including all persons so engaged who perform the work of laborers or mechanics at or in the vicinity of the site of the Project regardless of any Contractual relationship between the Principal or such Subcontractors, or his or their successors or assigns, on the one hand and such laborers or mechanics on the other, but not including office employees not regularly stationed at the site of the Project, and

b) Materials and supplies (whether incorporated in the permanent (construction or not), as well as teams, fuels, oils, implements or machinery furnished, used or consumed by said Principal or any Subcontractors at or in the vicinity of the site of the Project in the prosecution of the Work under said Contract and any amendment or extension thereof or addition thereto; then this obligation shall be null and void; otherwise to remain in full force and effect. This bond is subject to the following additional conditions, limitations and agreements:

c) The Principal and Surety (Sureties) agree that this bond shall be for the benefit of any materialman or laborer having a just claim, as well as the City itself.

d) All persons who have performed labor, rendered services or furnished materials and supplies, as aforesaid, shall have a direct right of action against the Principal and his, its or their successors and assigns, and the Surety (Sureties) herein, or against either or both or any of them and their successors and assigns. Such persons may sue in their own name, and may prosecute the suit to judgment and execution without the necessity of joining with any other person as party plaintiff.

e) The Principal and Surety (Sureties) agree that neither of them will hold the City liable for any judgment for costs or otherwise, obtained against either or both of them by a laborer or materialman in a suit brought by either a laborer or materialman under this bond for moneys allegedly due for performing work or furnishing material.

f) The Surety (Sureties) or its successors and assigns shall not be liable for any compensation recoverable by an employee or laborer under the Workmen's Compensation Law.

PAYMENT BOND

g) In no event shall the Surety (Sureties), or its successors or assigns, be liable for a greater sum than the penalty of this bond or be subject to any suit, action or proceeding hereon that is instituted by any person, firm, or corporation hereunder later than two years after the complete performance of said Contract and final settlement thereof.

The Principal, for himself/herself and his successors and assigns, and the Surety (Sureties), for itself and its successors and assigns, do hereby expressly waive any objection that might be interposed as to the right of the City to require a bond containing the foregoing provisions, and they do hereby further expressly waive any defense which they or either of them might interpose to an action brought hereon by any person, firm or corporation, including Subcontractors, MATERIALMAN and third persons, for work, labor, services, supplies or material performed, rendered, or furnished as aforesaid upon the ground that there is no law authorizing the City to require the foregoing provisions to be placed in this bond.

And the Surety (Sureties) for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties) and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or of the said Contract or the Work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any part thereof, or of any Work to be performed, or any moneys due or to become due thereunder; and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, Subcontractors, and other transferees shall have the same effect as to said Surety (Sureties) as though done or omitted to be done by or in relation to said Principal.

PAYMENT BOND

IN WITNESS WHEREOF, the Principal and the Surety (Sureties) have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this_____day of_____,_____.

(SEAL) _____(L.S.)
Principal
By: _____

(SEAL) _____
Surety

By: _____

(SEAL) _____
Surety

By: _____

(SEAL) _____
Surety

By: _____

(SEAL) _____
Surety

By: _____

BOND PREMIUM RATE: _____

BOND PREMIUM COST: _____

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners. If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by a duly authorized officer, agent, or attorney-in-fact. There should be executed an appropriate member of counterparts of the bond corresponding to the number of counterparts of the Contract.

PAYMENT BOND

ACKNOWLEDGMENT OF PRINCIPAL - IF A CORPORATION

State of_____County of _____ss:

On this _____ day of _____, _____

before me personally came _____

to me known, who, affirms or being by me duly sworn did depose and say that he/she resides

at_____

_____

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

_____
Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT OF PRINCIPAL - IF A PARTNERSHIP

State of_____ County of _____ss.:

On this _____day of _____,_____

before me personally appeared _____

to me known and known to me to be one of the members of the firm

of: _____
described in and who executed the foregoing instrument and he/she acknowledged to me that he/she executed the same as and for the act and deed of said firm.

_____
Notary Public or Commissioner of Deeds

PAYMENT BOND

ACKNOWLEDGMENT OF PRINCIPAL - IF AN INDIVIDUAL

State of_____ County of _____SS.:

On this _____ day of _____ , _____

before me personally appeared _____ me known and known to me to be the

person described in and who executed the foregoing instrument and acknowledged that he/she executed

the same.

_____
Notary Public or Commissioner of Deeds

Each executed bond should be accompanied by:

a) appropriate acknowledgments of the respective parties;

b) appropriate duly certified copy of Power of Attorney or other certificate of authority where bond is executed by agent, officer or other representative of Principal or Surety;

c) a duly certified extract from By-Laws or resolutions of Surety under which Power of Attorney or other certificate of authority of its agent, officer or representative was issued; and

d) duly certified copy of latest published financial statement of assets and liabilities of Surety.

****

AFFIX ACKNOWLEDGMENTS AND JUSTIFICATIONS OF SURETIES

GENERAL CONDITIONS

ARTICLE 1 - SCOPE AND INTENT

Work Described. The Contractor shall furnish all labor, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies and other means of construction necessary or proper for performing and completing the Work in accordance with the Contract. The Contractor shall also obtain and pay for all required permits to complete the Work. Any labor, materials and equipment that have been omitted in the description of the Work, but that are necessary or proper for the completion of the Work, shall be furnished by the Contractor at its sole cost and expense. The Contractor shall protect the Work during construction, clean up the Site and maintain the Work until Final Acceptance.

Incidental work. The Contractor shall perform all tasks and pay all costs of cutting, protecting, supporting, maintaining, relocating and restoring all surface, sub-surface, and/or overhead structures, and all other property, including, but not limited to, pipes, conduits, ducts, tubes, chambers, and appurtenances, public or private, in the vicinity of and at the Site of the Work (except that which by law, franchise, permit, contract, consent or other agreement, the owner thereof is required to protect, support, maintain, relocate or restore), repair the same if damaged and restore to their original condition all areas disturbed. The Contractor shall perform all tasks and pay all costs of protecting, supporting, maintaining, relocating, replacing and restoring street equipment owned by the City and under the jurisdiction of the New York City Department of Transportation ("NYCDOT"), whether attached to utility company structures or connected to the underground electrical distribution system, including installing suitable temporary lighting equipment when the maintenance of permanent equipment is not feasible. All work done in connection with street lighting shall be in accordance with the requirements of NYCDOT or, for projects outside the City of New York, a local Authority Having Jurisdiction ("AHJ") over such work.

Duties of the Contractor. The Contractor shall ensure that the requirements of the Contract, including but not limited to, the Contract Drawings and Specifications, are fully and faithfully complied with by all subcontractors, materialmen and workmen at all times, that all of this Work is prosecuted with the utmost diligence, and that all materials are provided promptly in sufficient quantities in order not to delay the Work. The Contractor shall exercise the closest inspection of all materials delivered, promptly returning defective materials without waiting for their rejection by the Engineer. The Contractor shall also become thoroughly familiar with the Contract Drawings and Specifications and shall promptly report to the Engineer all errors, discrepancies or omissions discovered therein. The Contractor shall abide by the decisions and explanations of the Engineer made in regard to such matters.

Contractor Assumes Risk of Loss or Damage. The Contractor agrees to assume the risk and to make no claim on account of any and all loss or damage arising out of the nature of the Work to be done under this Contract, or for any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same, or from the effect of the elements, or from encumbrances on or near the line of the Work.

Local Laws. All materials, appliances and types or methods of construction shall be in accordance with the Contract and shall in no event be less than that necessary to conform to the requirements of the New York City Administrative Code, the Charter of the City of

New York (the "City Charter"), the Rules of the City of New York, and/or the applicable laws and rules of AHJs if the Work occurs outside the City of New York.

Ample quantities. The Contractor shall deliver materials in ample quantities to ensure speedy and uninterrupted progress of the Work in order to complete the Work within the Contract term.

Work and materials. All Work and materials mentioned in the Specifications and not shown on the Contract Drawings, and all Work and materials shown on the Contract Drawings and not mentioned in the Specifications, are to be furnished and performed as if the same were both mentioned in the Specifications and shown on the Contract Drawings.

Necessary and essential Work deemed included. In case any Work or materials shall be required for the more perfect performance of the Work, which are not specifically mentioned, specified or indicated on the Contract Drawings, in the Specifications, or other parts of this Contract, and which in the opinion of the Engineer are necessary and essential to a complete performance of this Contract, such Work or materials shall be deemed included within the requirements of this Contract. The Contractor hereby specifically promises, covenants and agrees to do and perform any and all such Work and to supply any and all such materials as if specifically provided for in this Contract.

Purport of schedules. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind and quality of materials and equipment included in Work to be performed under this Contract.

Order of Precedence. In the event of an actual conflict among the City of New York Standard Construction Contract, General Conditions, and the Contract Drawings and Specifications, the City of New York Standard Construction Contract will control, followed by the General Conditions, followed by the Contract Drawings and Specifications.

Conflicts between Contract Drawings and Specifications. If the Contract Drawings and/or the Specifications are in conflict, or, if the Contract Drawings or the Specifications, or both the Contract Drawings and the Specifications are not clear as to (a) the method of performing any part of the Work; (b) the types of materials or equipment necessary to perform the Work; or (c) the quantities required, the Contractor shall be deemed to have based its bid upon performing the Work and furnishing materials or equipment in the manner most expensive to the Contractor. If DEP determines that such conflict(s) exist or that a clarification is needed, the DEP will furnish the Contractor with supplementary drawings and/or specifications to address such conflict(s) or necessary clarification. In such event, the Contractor agrees to execute the Work in accordance with such interpretation, and to make no charge or claim for any extra or additional work or damage on account of such interpretation.

Understanding of the Contract Drawings and Specifications. The Contractor expressly declares and acknowledges that, before the signing of this Contract, it has carefully read the entire Contract, together and in connection with the Contract Drawings and Specifications, and that through such reading, the Contractor can determine the Work required pursuant to this Contract. The Contractor agrees that it will not hereafter make any claim or demand upon the City based upon or arising out of any alleged

misunderstanding or misconception of the said requirements, covenants, stipulations and restrictions of the Contract.

Deviations from Contract Drawings and Specifications. No deviation from the Contract Drawings and Specifications will be allowed, unless the same has been previously authorized in writing by the Commissioner or his/her designee.

ARTICLE 2 - PROVISIONS REFERENCED WITH INFORMATION FOR BIDDERS AND THE CITY OF NEW YORK STANDARD CONSTRUCTION CONTRACT

(A) SCHEDULE "A" AND LIQUIDATED DAMAGES

1. Schedule “A” requirements for the Contract follow these General Conditions.

2. In view of the difficulty of accurately ascertaining the loss(es) which the City will suffer because of the Contractor exceeding substantial completion time for the Work, or failing to complete a designated milestone within the scheduled time for completion of such milestone, or failing to meet other requirements for which liquidated damages have been provided, the amounts set forth in Schedule A are hereby fixed and agreed to as liquidated damages that the City will suffer by reason of any such failure, and not as a penalty. The City of New York Standard Construction Contract, incorporated herein, shall govern with respect to assessment of all liquidated damages provided for in this Contract, not just those for failure to timely achieve substantial completion, unless specifically detailed in a Specification where any individual liquidated damages are specified.

(B) FEDERAL EXCISE TAXES

Pursuant to Section 37 of the "Information for Bidders", the Contractor may be exempted from the payment of Federal Excise Taxes in accord with the following:

1. An Excise Tax Exemption Certificate will be provided by DEP where requested by the Contractor, for items that fall within the scope of the Contract and may be exempt from the Federal Excise Tax.

(C) LABOR

Where labor is used under the Contract for intermediate skills and for which no prevailing rate of wages is herein certified, and where there is in existence at the time the Contract is entered into a labor agreement between the Contractor and a duly recognized labor union recognizing the existence of such skills, the Contractor shall pay not less than the rate so agreed upon between the Contractor and such labor organization for such skills.

(D) PARTIAL PAYMENTS FOR MATERIALS IN ADVANCE OF THEIR INCORPORATION IN THE WORK PURSUANT TO ARTICLE 42 OF THE CITY OF NEW YORK STANDARD CONSTRUCTION CONTRACT

In order to better ensure the availability of materials, fixtures and equipment when needed for the Work, the Commissioner may authorize partial payment for certain materials, fixtures and equipment, prior to their incorporation in the Work, but only in

strict accordance with and subject to all the terms and conditions set forth in the following subdivisions numbered 1 to 15, unless another method of payment is elsewhere provided in the Specifications for specified materials, fixtures or equipment. For purposes of this Article 2(D), when the term “materials” is used, it shall also apply to fixtures and/or equipment.

1. The Contractor shall submit to the Commissioner a written request for payment for materials purchased or to be purchased for which the Contractor desires to be paid prior to their actual incorporation in the Work. The request shall be accompanied by a schedule of the types and quantities of materials, and shall state whether such materials are to be stored on or off the Site.

2. Where the materials are to be stored off the Site, they shall be stored at a place other than the Contractor's premises (except with the written consent of the Commissioner) and under the conditions prescribed or approved by the Commissioner. The Contractor shall set apart and separately store at the place or places of storage all materials and shall clearly mark same "Property of the City of New York", and shall not at any time move any of said materials to another off-site place of storage without the prior written consent of the Commissioner. Materials may be removed from their place of storage off the Site for incorporation in the Work upon approval of the Resident Engineer.

3. Where materials are to be stored at the Site, they shall be stored at such locations as shall be designated by the Resident Engineer and only in such quantities as, in the opinion of the Resident Engineer, will not interfere with the proper performance of the Work by the Contractor or by other contractors then engaged in performing Work on the Site. Such materials shall not be removed from their place of storage on the Site except for incorporation in the Work, without the approval of the Resident Engineer.

4. All costs, charges and expenses arising out of the storage of such materials shall be borne by the Contractor and the City hereby reserves the right to retain out of any partial or final payment made under the Contract an amount sufficient to cover such costs, charges and expenses. There shall be no increase in the Contract price for such costs, charges and expenses and the Contractor shall not make any claim or demand for compensation for provision of such storage.

5. The Contractor shall pay any and all costs of handling and delivery of materials to the place of storage, to any approved other place of storage, and from the place of storage to the Site of the Work and the City shall have the right to retain from any partial or final payment an amount sufficient to cover the cost of such handling and delivery.

6. In the event that the whole or any part of these materials are lost, damaged or destroyed in advance of their satisfactory incorporation in the Work, the Contractor, at its sole cost and expense, shall promptly replace such lost, damaged or destroyed materials with materials of the same character and quality.

7. Should any of the materials paid for by the City hereunder be subsequently rejected or incorporated in the Work in a manner not in accordance with the Contract, the Contractor shall remove and replace such rejected or improperly incorporated material with materials complying with the Contract. Until such materials are replaced, the City will deduct from the value of the materials or from

any other money due to the Contractor, the amount paid by the City for such rejected or improperly incorporated materials.

8. Payment for the cost of materials made hereunder shall not be deemed to be an acceptance of such materials in accordance with the Contract, and the Contractor always retains and must comply with its duty to deliver to the Site and properly incorporate into the Work only materials which comply with the Contract.

9. The Contractor shall retain any and all risks in connection with the damage, destruction or loss of the materials paid for hereunder to the time of delivery of the same to the Site of the Work and their proper incorporation in the Work in accordance with the Contract.

10. The Contractor shall comply with all applicable laws, rules and regulations of any governmental body or agency pertaining to the purchase, allocation and use of materials.

11. When requesting payment for such materials, the Contractor shall submit with the partial payment request, duly authenticated documents of title, such as bills of sale, invoices or warehouse receipts, all in quadruplicate. The Contractor shall provide along with its partial payment request for such materials, appropriate documentation transferring title to such materials from the Contractor to the City. In the event that the invoices state that the material has been purchased by a subcontractor, the Contractor shall also provide appropriate documentation demonstrating transfer of title to such materials from the subcontractor to the Contractor.

12. Where the Contractor, with the approval of the Commissioner, has purchased unusually large quantities of materials in order to assure their availability for the Work, the Commissioner, at his or her option, may waive the requirements of subdivision 11, provided the Contractor furnishes evidence in the form of an affidavit of the Contractor, and such other proof as the Commissioner may require, that it is the sole owner of such materials and has purchased them free and clear of all liens and other encumbrances. In such event, the Contractor shall pay for such materials and submit proof thereof, in the same manner as provided in subdivision 11 hereof, within seven (7) days after receipt of payment therefor. Failure on the part of the Contractor to submit satisfactory evidence that it has paid in full for all such materials shall preclude it from any payments under the Contract.

13. The Contractor shall include in any succeeding partial payment requisition a summary of materials stored which shall set forth the quantity and value of materials in storage, on or off the Site, at the end of each preceding payment period; the amount removed for incorporation in the Work; the quantity and value of materials delivered during the current period and the total value of materials on hand for which payment thereof will be included in the current payment requisition.

14. Upon proof to the satisfaction of the Commissioner of the actual cost of such materials and upon submission of proper proof of title as required under subdivisions 11 and/or 12 hereof, DEP will pay the Contractor Eighty Five Percent (85%) of the value of such materials, however, in no event shall the Eighty Five Percent (85%) payment exceed the estimated cost of such materials included in the approved detailed estimate breakdown submitted in accordance with Article 41 of the City of New York Standard Construction Contract; if the value exceeds such

estimated cost, the City will pay only Eighty Five Percent (85%) of such approved estimated cost.

15. Upon the incorporation in the Work of any such materials which have been paid for in advance of such incorporation in accordance with the foregoing provisions, payment will be made for such materials incorporated in the Work pursuant to Article 42 or Article 45 of the City of New York Standard Construction Contract, less any sums paid pursuant to subdivision 14 herein.

(E) CONFLICTS OF INTEREST

The City Charter in relation to conflicts of interest (Chapter 68, Section 2604) provides, among a number of safeguards, that:

(1) No employee or person whose salary is payable in whole or in part from the City treasury shall accept any valuable gift, whether in the form of service, loan, thing or promise, or any other form from any person, firm or corporation which to his or her knowledge is interested, directly or indirectly, in any manner whatsoever in business dealings with the City; and

(2) Any violation of any of the provisions of this section shall, at the option of the Comptroller, render forfeit and void the Contract, work, business, sale or transaction affected.

Other sections of the City Charter, the New York City Administrative Code and the New York State Penal Law are applicable in implementing the basic conflicts of interest section and under certain circumstances penalties may be invoked against the donor as well as the recipient of any form of valuable gift.

Notice is hereby given that sections of the City Charter, the New York City Administrative Code and the New York State Penal Law alluded to herein shall apply under the terms of this Contract to circumstances relevant to conflicts of interest and shall be extended in application to subcontractors authorized to perform Work, labor and services pursuant to this Contract and further it shall be the duty and responsibility of the Contractor to so inform its subcontractors.

ARTICLE 3 – CONTRACT DRAWINGS AND SPECIFICATIONS

Related contracts. The Contractor shall study the requirements of any related contracts insofar as they affect the Work or as the Work may affect that of the related contracts and the Contractor will be required to coordinate its Work with that of all other related contractors performing work on such related contracts. The Contractor shall coordinate deliveries in order to avoid delaying or impeding the progress of the Work of any related contractor.

Contract Drawings and Specifications furnished to Contractor. After the Contract has been executed, the Contractor will be furnished with four sets of paper prints of the Contract Drawings and four set of Specifications of the Contract. The Contractor will also be furnished with one set of paper prints and Specifications of any related contracts.

Additional copies. Additional sets of Contract Drawings and Specifications may be issued provided such documents are available in sufficient quantity.

Supplementary drawings. When the Engineer decides to show more fully the Work to be done, or to show required changes, or to rectify errors which may have been discovered, drawings to be known as supplementary drawings and revision sheets with Specifications pertaining thereto will be provided to the Contractor. Changes of a minor nature may be made on the Contract Drawings, in which case the revised Contract Drawings will be issued to the Contractor. The supplementary drawings and revised Contract Drawings shall be as fully binding as the original Contract Drawings, and if such supplementary or revised Contract Drawings require either less or more than the estimated quantities of work, credit to the City or compensation therefor to the Contractor shall be subject to the terms of the City of New York Standard Construction Contract.

Information to subcontractors, manufacturers and others. The Contractor shall furnish each of its subcontractors and materialmen copies of such portions of the Contract, together with all necessary drawings and copies of Specifications, as may be required for the portion of the Work that the respective subcontractors or materialmen shall be responsible for.

Contractor to check drawings and other data. The Contractor shall verify all dimensions, quantities and details shown on Contract Drawings, plans, sketches, schedules, or on any other data received from the Engineer and shall notify the Engineer of all errors, omissions, conflicts and discrepancies found therein.

Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at its sole cost and expense. Figures shall be used in preference to scaled dimensions and large scale drawings in preference to small scale drawings.

"Directed", etc. Whenever reference is made in the Contract to the Work or its performance, the terms "directed", "required", "permitted", "ordered", "designated", "prescribed", "determined", and words of similar import shall imply the direction, requirement, permission, order, designation, or prescription of the Commissioner.

"Approved", etc. "Approved", "acceptable", "satisfactory", and words of similar import shall mean approved, acceptable or satisfactory to the Commissioner.

ARTICLE 4 - TEMPORARY STRUCTURES

Contractor's Field Office. The Contractor shall, during the period of construction, erect or provide for its own use a temporary field office in which readily accessible copies of all Contract Documents and approved Shop and Working Drawings shall be kept. The field office shall be located at the Site, where directed by the Engineer, and shall be provided with the equipment necessary for a functional field office, as approved by the Engineer.

Material Sheds. Material sheds used by the Contractor for the storage of tools, materials and equipment shall be kept at all locations so as not to interfere at any time with the progress of the Work, the location of which shall be subject to the absolute discretion of the Engineer.

Construction of Temporary Structures. All of the Contractor's temporary structures shall be fully constructed and have a neat appearance and shall be painted a uniform gray, unless another color is ordered by the Engineer.

Contractor's Sign. The Contractor shall post and keep posted at the Site, outside of the field office, exterior fence or wall, a legible sign with the full name and address of the Contractor, and the telephone numbers of responsible representatives of the Contractor who can be reached in the event of an emergency.

Private property. When the Contractor temporarily occupies property adjacent to the Work, it shall provide the Engineer with certified copies of agreements which permit the use of such land, unless such permission has been obtained by DEP prior to bidding.

Land for Contractor's use. The Engineer shall in all cases determine the portion of the Site to be used by the Contractor for storage, plant or other purposes.

Obstructions, access. The Contractor shall not obstruct any highway or access thereto from private property except as otherwise specified in the Specifications. The necessary facilities and safeguards to comply with this requirement shall be provided and maintained at the sole cost and expense of the Contractor. If it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the Work or interfering with the work to be done by any other contractor, the Contractor shall remove and restack such materials at no additional cost to the City.

Trespassing prohibited. All employees and subcontractors of the Contractor are prohibited from trespassing on private or public property except where the law permits such entrance for a purpose such as underpinning or otherwise protecting adjoining structures. If it becomes necessary for employees of the Contractor or its subcontractor(s) to enter onto private property for the above stated reasons, the Contractor shall advise DEP of such need. Employees of the Contractor or subcontractor may not enter onto the property until the requisite permission has been obtained and proper notice furnished to the property owner.

ARTICLE 5 - CONTRACTOR'S SUPERINTENDENT

The Contractor shall employ and retain at the Site of the Work, from the commencement until the completion of the Work, a superintendent competent and capable of maintaining proper supervision and care of the Work and acceptable to the Engineer, and who, in the

absence of the Contractor and irrespective of any superintendent or foreman employed by any subcontractor, shall carry out the directions of the Engineer.

ARTICLE 6 - SURVEYS

Lines and grades. All Work shall be constructed according to the lines and grades shown on the Contract Drawings and approved by the Engineer. The Engineer will establish a baseline and benchmark. The Contractor shall establish all other lines, elevations and grades required for the Work and be solely responsible for the accuracy thereof. The Engineer shall be notified prior to the establishment of any line, elevation or grade.

Safeguarding marks. The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the Work, 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 points, stakes, marks and monuments.

Survey before completion of structure. The Contractor for general construction work 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 duly 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 the City. 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. One copy of the application and the survey shall be furnished to the Resident Engineer.

ARTICLE 7 - CONTRACTOR'S DAILY REPORTS

As soon as the Contractor has started Work on the Project, it shall submit to the Engineer written daily reports of the Work performed the previous day by any of its employees, including the employees of its subcontractors.

The reports shall be prepared by the Contractor's Superintendent and shall bear his or her signature. Each report shall contain the following information:

1. The type of materials and/or major equipment being installed by the Contractor and the total number of employees working in each category on that particular day.

2. The names of the subcontractors working and the type of materials and/or major equipment being installed by each together with the total number of employees working for each subcontractor on that particular day.

3. The major construction equipment being used by the Contractor and/or any subcontractor.

ARTICLE 8 – CONTRACTOR’S PLANT

The Contractor shall ensure that it obtains, provides and maintains a sufficient construction plant in close proximity to the Work all times during the progress of the Work in order to meet the demands of the Work, with ample margin for emergencies or

overload. The plant shall be of such capacity conducive to ensure the completion of the Work within the time stipulated in the Contract.

The Contractor may occupy any unused location within the area controlled by DEP with its construction plant, subject to the approval of the Engineer. If the Contractor desires to use additional area outside of that controlled by DEP, the Contractor shall arrange for the use of such area at its sole cost and expense. The location of the Contractor's stationary and mobile equipment shall be subject to the Engineer's approval.

The Engineer shall have the right to reject or condemn any construction plant, staging area, which, in his/her opinion, is unsafe, improper or inadequate. Whether or not the Engineer exercises this right, the Contractor shall not be relieved from its sole responsibility for the safe, proper and lawful construction, maintenance and use of such construction plant, staging area, or for the adequacy of such plant.

The Contractor shall, at its sole cost and expense, stack and restack as needed, all Project materials at locations that are easily accessible and convenient to the Project Site and that do not impede the progress of the Work, or as directed by the Engineer. The Contractor shall also take appropriate measures required to secure and protect all such materials from loss. Should the Contractor wish to stack any project materials on publicly mapped streets, it shall comply with all applicable local, state and federal laws, rules and regulations.

ARTICLE 9 - SECURITY GUARDS AND FIRE GUARDS ON THE SITE

The requirements of the Contract for security guard services and the responsibilities of the Contractor for safeguarding and protecting the Work and Site shall be in accordance with, but not limited to, the respective Division 01 Specifications.

The Contractor will be responsible for safeguarding and protecting its own Work, materials, tools, and equipment. When the provision of security guards is required, each Security Guard shall be required to possess a "Certificate of Fitness" issued by the Fire Department to qualify and serve as a Fire Guard whenever the structure under construction, alteration, or demolition exceeds the prescribed area and height requirements specified in Rule 2.4.1 of the "Rules for Erection, Alteration, Repair, Excavation for and Demolition of Buildings" adopted by the New York City Board of Standards and Appeals under Calendar Number 784-41SR. Each Security Guard shall, during his or her tour of duty, perform the duties of Fire Guards in addition to his or her security obligations.

The use of watchdogs requires the express written approval of DEP and at DEP’s sole discretion.

ARTICLE 10 - CERTIFICATES OF OCCUPANCY AND/OR COMPLETION

If the project structure is a building that is subject to the jurisdiction of the New York City Department of Buildings or similar local AHJ, before substantial completion of the project structure, the Commissioner will file an application for a Certificate of Occupancy or Certificate of Completion with the New York City Department of Buildings or New York City Department of Small Business Services or the local AHJ for project locations outside New York City, as applicable.

In connection with the application for Certificate of Occupancy or Certificate of Completion and before final payment is issued, the Contractor shall arrange for all final inspections by the inspection staffs of the New York City Department of Buildings, New York City Department of Small Business Services and other local AHJs for project locations outside New York City, as applicable, and shall do such remedial work and construction as is required and obtain all reports by such inspection staffs in order that the Certificate of Occupancy and/or Certificate of Completion or other similar certificate if occurring outside the City of New York be procured without delay.

ARTICLE 11 - COORDINATION AMONG CONTRACTORS

The Contractor is alerted to the importance of coordination and cooperation if other contractors are operating at or near the project Site. It is essential to the expeditious completion of this Project that the Contractor meet with any such other contractors at an early stage in the Work, to determine respective space requirements in areas where their operations or installations are in close proximity or are likely to be in conflict or interfere with each other, and to set up regular meetings as Shop Drawings are developed.

The Engineer will provide written notice of the time, place, and agenda of each such scheduled meeting.

The Contractor may also request a meeting by submitting a request for meeting to the Engineer.

Attendance at Coordination Meetings. To allow an orderly sequence of operations agreeable to all contractors, regular meetings shall be scheduled for the purpose of modifying work schedules and to address potential conflicts in work arrangements so that work stoppages and delays may be avoided. Coordination Meetings shall also be opportunities to prepare and circulate coordination drawings for the use and guidance of each contractor.

The Coordination Meetings will be arranged through the Engineer and shall be separate from and in addition to the regular job progress meetings. If it is desired that the architectural or engineering consultants be present at such meeting, this request should be directed to the Engineer.

The Contractor shall only send representatives to the meeting who have the competence and authority to make necessary decisions. Their statements shall commit the Contractor to the procedures, sequence of operations, and time schedules agreed upon.

The requirement to attend and effectively participate in all Progress and Coordination Meetings is subject to strict enforcement by the Commissioner. Failure to be represented at any of these meetings, when scheduled or approved by the Engineer, shall subject the Contractor to liability for any and all damages, delays, costs of alterations, etc., arising from the fact that it or its representatives were not present to coordinate its Work with the work that was scheduled, arrangements on or procedures developed at the meeting or meetings in question.

If, for compelling reasons, Contractor finds that its representative cannot attend a scheduled meeting, it shall give timely notice to the Engineer so that the meeting may be rescheduled.

Where procedures have been agreed upon and coordination drawings accepted by all contractors concerned, Contractor shall adhere to such drawings and procedures, both as to time and performance. No claim of delay or damages by a contractor, if it fails to comply, will be entertained by the Commissioner.

Contractor shall maintain at the Site sufficient competent personnel for the purpose of preparing layout and coordination drawings. Where such drawings are to be prepared by subcontractors, the subcontractor shall have the required personnel on Site in order to measure and asses proper, practical solutions found for problems arising from interferences, etc. and so that proper coordination among trades can be achieved.

ARTICLE 12 - PUBLIC DISSEMINATION OF INFORMATION

The Contractor agrees to hold confidential, both during and after the completion or termination of this Contract, all of the reports, information, or data, furnished to, or prepared, assembled or used by, the Contractor under this Contract. The Contractor agrees to maintain the confidentiality of such reports, information, or data by using a reasonable degree of care, and using at least the same degree of care that the Contractor uses to preserve the confidentiality of its own confidential information. The Contractor agrees that such reports, information, or data shall not be made available to any person or entity without the prior written approval of DEP. The obligation under this Article to hold reports, information or data confidential shall not apply where the Contractor is legally required to disclose such reports, information or data by virtue of a subpoena, court order or otherwise ("disclosure demand"), provided that the Contractor complies with the following: (1) the Contractor shall provide advance notice to the Commissioner, in writing or by e-mail, that it received a disclosure demand for such reports, information or data and (2) if requested by DEP, the Contractor shall not disclose such reports, information or data until the City has exhausted its legal rights, if any, to prevent disclosure of all or a portion of such reports, information, or data. The previous sentence shall not apply if the Contractor is prohibited by law from disclosing to DEP the disclosure demand for such reports, information or data.

The Contractor shall restrict access to confidential information to persons who have a legitimate work-related purpose to access such information. The Contractor agrees that it will instruct its officers, employees, and agents to maintain the confidentiality of any and all information required to be kept confidential by this Contract.

The Contractor, and its officers, employees, and agents shall notify DEP, at any time either during or after completion or termination of this Contract, of any intended statement to the press or any intended issuing of any material for publication in any media of communication (print, news, television, radio, Internet, etc.) regarding the services provided or the data collected pursuant to this Contract at least twenty-four (24) hours prior to any statement to the press or at least five (5) business days prior to the submission of the material for publication, or such shorter periods as are reasonable under the circumstances. The Contractor may not issue any statement or submit any material for publication that includes confidential information as prohibited by this Article.

SCHEDULE A

GENERAL CONDITIONS TO CONSTRUCTION CONTRACT
(INCLUDING GENERAL CONDITIONS RELATING TO ARTICLE 22 -- INSURANCE)

CONTRACT – TI-181

PART I. REQUIRED INFORMATION

INFORMATION FOR BIDDERS **BID BOND** The **Contractor** shall obtain a bid bond in the amount indicated to the right.	5% of Bid
INFORMATION FOR BIDDERS **PERFORMANCE AND PAYMENT BONDS** The **Contractor** shall obtain performance and payment bonds in the amount indicated to the right.	100% of Bid
CONTRACT ARTICLE 14. **DATE FOR SUBSTANTIAL COMPLETION** The **Contractor** shall substantially complete the **Work** in the number of calendar days indicated to the right.	752 consecutive calendar days
CONTRACT ARTICLE 15. **LIQUIDATED DAMAGES** If the **Contractor** fails to substantially complete the **Work** within the time fixed for substantial completion plus authorized time extensions or if the **Contractor**, in the sole determination of the **Commissioner**, has abandoned the **Work**, the **Contractor** shall pay to the **City** the amount indicated to the right.	$ 1000 for each consecutive calendar day over substantial completion time
Section 01 32 10 –Progress Schedule Liquidated Damages	$500 per day for delay of submittals
Section 01 33 00 –Submittal Procedures Liquidated Damages	$1,500 per each additional submission of a shop Drawing after the third rejected submission.
Executive Order No. 39 Rider: City Fleet and Truck Safety Requirements for City Contractors	See Section 3.01 of Rider

CONTRACT ARTICLE 17. **SUB-CONTRACTOR** The **Contractor** shall not make subcontracts totaling an amount more than the percentage of the total **Contract** price indicated to the right.	Not to exceed 40 % of the Contract price
CONTRACT ARTICLE 21. **RETAINAGE** The **Commissioner** shall deduct and retain until the substantial completion of the **Work** the percent value of the **Work** indicated to the right.	5 % of the value of the **Work**
CONTRACT ARTICLE 22. **(Per Directions Below)**	
CONTRACT ARTICLE 24. **DEPOSIT GUARANTEE** As security for the faithful performance of its obligations, the **Contractor**, upon filing its requisition for payment on **Substantial Completion**, shall deposit with the **Commissioner** a sum equal to the percentage of the **Contract** price indicated to the right.	1% of **Contract** price
CONTRACT ARTICLE 24. **PERIOD OF GUARANTEE** Periods of maintenance and guarantee other than the period set forth in Article 24.1 are indicated to the right.	None.
CONTRACT ARTICLE 74. **STATEMENT OF WORK** The **Contractor** shall furnish all labor and materials and perform all **Work** in strict accordance with the **Contract Drawings**, **Specifications,** and all **Addenda** thereto**.**	

CONTRACT ARTICLE 75. **COMPENSATION TO BE PAID TO CONTRACTOR** The **City** shall pay and the **Contractor** shall accept in full consideration for the performance of the **Contract**, subject to additions and deductions as provided herein, the total sum **shown in the column to the right,** this said sum being the amount at which the **Contract** was awarded to the **Contractor** at a public letting thereof, based upon the **Contractor's** bid for the **Contract.**	Amount for which the **Contract** was awarded: $ _____ [Agency: If the Bid Price, or any portion thereof, is based on unit prices, insert the words "Not to Exceed" before the amount.]

(GENERAL CONDITIONS RELATING TO ARTICLE 22 -- INSURANCE)

PART II. TYPES OF INSURANCE, MINIMUM LIMITS AND SPECIAL CONDITIONS

Note: All certificate(s) of insurance submitted pursuant to Contract Article 22.3. 3 must be accompanied by a Certification by Broker consistent with Part III below and include the following information:

- **For each insurance policy, the name and NAIC number of issuing company, number of policy, and effective dates;**
- **Policy limits consistent with the requirements listed below;**
- **Additional insureds or loss payees consistent with the requirements listed below; and**
- **The number assigned to the Contract by the City (in the "Description of Operations" field).**

Insurance indicated by a blackened box (■) or by X in a ☐ to left will be required under this contract

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
■ Commercial General Liability Art. 22.1.1	The minimum limits shall be $2,000,000 per occurrence and $4,000,000 per project aggregate applicable to this Contract unless the Work requires a permit from the Department of Buildings and greater limits of Commercial General Liability Insurance are required pursuant to 1 RCNY section 101-08. Additional Insureds: 1. City of New York, including its officials and employees, with coverage at least as broad as ISO Forms CG 20 10 and CG 20 37, and 2. All person(s) or organization(s), if any, that Article 22.1.1(b) of the **Contract** requires to be named as Additional Insured(s), with coverage at least as broad as ISO Form CG 20 26. The Additional Insured endorsement shall either specify the entity's name, if known, or the entity's title (e.g., Project Manager). 3. *[Agency: If appropriate, insert names of other entities to be covered as Additional Insureds.]*

■ Workers' Compensation Art. 22.1.2 ■ Disability Benefits Insurance Art. 22.1.2 ■ Employers' Liability Art. 22.1.2 ☐ Jones Act Art. 22.1.3 ☐ U.S. Longshoremen's and Harbor Workers Compensation Act Art. 22.1.3	Workers' Compensation, Employers' Liability, and Disability Benefits Insurance: Statutory per New York State law without regard to jurisdiction. **Note**: The following forms are acceptable: (1) New York State Workers' Compensation Board Form No. C-105.2, (2) State Insurance Fund Form No. U-26.3, (3) New York State Workers' Compensation Board Form No. DB-120.1 and (3) Request for WC/DB Exemption Form No. CE-200. The City will not accept an ACORD form as proof of Workers' Compensation or Disability Insurance. Jones Act and U.S. Longshoremen's and Harbor Workers' Compensation Act: Statutory per U.S. law.
■ Builders Risk Art. 22.1.4	100 % of total value of **Work** **Contractor** the Named Insured; the **City** both an Additional Insured and one of the loss payees as its interests may appear. If the **Work** does not involve construction of a new building or gut renovation work, the **Contractor** may provide an installation floater in lieu of Builders Risk insurance. Note: Builders Risk Insurance may terminate upon **Substantial Completion** of the **Work** in its entirety.
■ Commercial Auto Liability Art. 22.1.5	$ 2,000,000 per accident combined single limit If vehicles are used for transporting hazardous materials, the **Contractor** shall provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90

■ Contractors Pollution Liability Art. 22.1.6	$1,000,000 per occurrence $2,000,000 aggregate Additional Insureds: 1. _____ 2. _____ 3. _____
☐ Marine Protection and Indemnity Art. 22.1.7(a)	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
☐ Hull and Machinery Insurance Art. 22.1.7(b)	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
☐ Marine Pollution Liability Art. 22.1.7(c)	$_____ each occurrence Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____

[OTHER] Art. 22.1.8 □ _____	*[If other type(s) of insurance need to be required under the **Contract**, the Contracting Agency should (a) check the box and fill in the type of insurance in left-hand column, and (b) in this right-hand column, specify appropriate limit(s) and appropriate Named Insured and Additional Insured(s). Note that if Railroad Protective Liability Insurance is required, the appropriate Named Insured is the owner of the railroad and there are no additional insureds.]*
[OTHER] Art. 22.1.8 □ _____	*[See directly above.]*

SCHEDULE A

GENERAL CONDITIONS TO CONSTRUCTION CONTRACT

PART III. BROKER'S CERTIFICATION

CERTIFICATES OF INSURANCE

Instructions to New York City Agencies, Departments, and Offices

All certificates of insurance (except certificates of insurance solely evidencing Workers' Compensation Insurance, Employer's Liability Insurance, and/or Disability Benefits Insurance) must be accompanied by one of the following:

(1) the Certification by Insurance Broker or Agent on the following page setting forth the required information and signatures;

-- OR --

(2) copies of all policies as certified by an authorized representative of the issuing insurance carrier that are referenced in such certificate of insurance. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

SCHEDULE A

CITY OF NEW YORK
CERTIFICATION BY INSURANCE BROKER OR AGENT

The undersigned insurance broker or agent represents to the City of New York that the attached Certificate of Insurance is accurate in all material respects.

_____
[Name of broker or agent (typewritten)]

_____
[Address of broker or agent (typewritten)]

_____
[Email address of broker or agent (typewritten)]

_____
[Phone number/Fax number of broker (typewritten)]

_____
[Signature of authorized official or broker]

_____
[Name and title of authorized official (typewritten)]

State of …….)
) ss.:
County of …….)

Sworn to before me this _____ day of _____ 20___

_____
NOTARY PUBLIC FOR THE STATE OF _____

SCHEDULE A
(GENERAL CONDITIONS TO CONSTRUCTION CONTRACT)

PART IV. ADDRESS OF COMMISSIONER

Wherever reference is made in Article 7 or Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents shall be sent to the address set forth below or, in the absence of such address, to the **Commissioner's** address as provided elsewhere in this **Contract**.

NYC Department of Environmental Protection
Office of the Agency Chief Contracting Officer
59-17 Junction Blvd., 17th Floor Bid Room
Flushing NY, 11373
Via Email: insurance@dep.nyc.gov

NEW YORK CITY
PREVAILING WAGE RATES
Labor Law §220 – Schedule of Prevailing Wages

Notes:

1. The prime Contractor and its Subcontractors shall pay the applicable and lawful prevailing wages and supplements to workers at the time work is performed.
2. The latest Labor Law Prevailing Wage Schedules are available at the NYC Office of the Comptroller's web site link below.

   https://comptroller.nyc.gov/services/for-the-public/nyc-wage-standards/wage-schedules/

3. Changes in wage rates or supplements resulting from changes to the prevailing wages shall not be the basis for a change in the Contract price.

NO TEXT ON THIS PAGE

Note: The following is a listing of those trades expected to be utilized on this project. If a Contractor proposes to use an alternative trade, he must notify the DEP Contract Compliance Office at 718-595-3211.

Contract(s):TI-181

Description: Tallman Island Multi-Rake Screen and Degritting System Installation at Tallman Island WRRF

SCHEDULE OF WORKERS, MECHANICS AND LABORERS
(Listed by Individual Contract)

CONTRACT(S)	TRADE
TI-181	ASBESTOS HANDLER
TI-181	CARPENTER - SIDEWALK SHED, SCAFFOLD AND HOIST
TI-181	CEMENT & CONCRETE WORKER
TI-181	CEMENT MASON
TI-181	CORE DRILLER
TI-181	ELECTRICIAN
TI-181	ELECTRICIAN - ALARM TECHNICIAN
TI-181	ENGINEER
TI-181	ENGINEER - FIELD (HEAVY CONSTRUCTION)
TI-181	ENGINEER - OPERATING
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NO TEXT ON THIS PAGE

THE CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
BUREAU OF LABOR LAW
1 CENTRE STREET
NEW YORK, NY 10007

BRAD LANDER
COMPTROLLER

COMPTROLLER'S PREVAILING WAGE MEMORANDUM REGARDING FLAG PERSONS

June 1, 2024

This memorandum supersedes and replaces the Comptroller's Prevailing Wage Memoranda dated May 21, 1998 and related clarification dated March 13, 2001 concerning Flag Persons. This memorandum sets forth the superseding determination of the New York City Comptroller concerning the applicability of Article 8, Section 220 of the New York Labor Law (the "Labor Law") to individuals who perform traffic control duty or "flagger" tasks in connection with public works construction projects within the jurisdiction of the City of New York. The guidance set forth herein is effective July 1, 2024 and applies only to public works contracts and subcontracts solicited on or after such date.

For purposes of this memorandum, "traffic control duty" means tasks necessary or appropriate to alleviate congestion by directing the flow of pedestrian and/or vehicular traffic away from the vicinity of the construction site using a sign or flag. Workers performing traffic control duty in connection with a public works construction project, whether or not such workers are on, adjacent to, or in close proximity to the construction site, are performing the work of a construction "laborer," as directing traffic away from the job site serves to protect the public and safeguard the work crew. Such workers are thus subject to the prevailing wage requirements of Article 8, Section 220 of the Labor Law as "laborers, workmen, or mechanics." Accordingly, the Prevailing Rate of Wages and Supplements applies to such individuals.

Additionally, workers who perform "flagger" tasks relating to the protection of the public and/or work crew, including but not limited to erecting traffic cones, setting up construction site barriers, and directing the movement of trucks or construction equipment in, on, and off the site, also are subject to the requirements of Article 8, Section 220 of the Labor Law and the Prevailing Rate of Wages and Supplements.

This position is consistent with the New York State Department of Labor's position under Article 8 of the New York Labor Law and the U.S. Department of Labor's position under the Davis-Bacon Act and will promote and streamline compliance with prevailing wage requirements on the various public works construction projects within New York City.

If the trade performing the underlying work performs its own flagging or traffic control, e.g., bridge painters, the flagger or traffic control worker shall receive the same wages as the underlying trade. In the absence of an underlying trade, the flagger or traffic control worker shall receive the wages as set forth in the "Flagger" section of the New York City Comptroller's Construction Worker Prevailing Wage Schedule.

Contractors, agencies, and members of the public are encouraged to contact the Bureau of Labor Law to seek clarification regarding specific instances to ensure compliance with prevailing wage regulations and this memorandum.

LABOR LAW ARTICLE 8 - NYC PUBLIC WORKS

Workers, Laborers and Mechanics employed on a public work project must receive not less than the prevailing rate of wage and benefits for the classification of work performed by each upon such public work. Pursuant to New York Labor Law Article 8 the Comptroller of the City of New York has promulgated this schedule solely for Workers, Laborers and Mechanics engaged by private contractors on New York City public work projects. Prevailing rates are required to be annexed to and form part of the public work contract pursuant to Labor Law section 220 (3).

This schedule is a compilation of separate determinations of the prevailing rate of wage and supplements made by the Comptroller for each trade classification listed herein pursuant to Labor Law section 220 (5). The source of the wage and supplement rates, whether a collective bargaining agreement, survey data or other, is listed at the end of each classification.

Agency Chief Contracting Officers should contact the Bureau of Labor Law's Classification Unit with any questions concerning trade classifications, prevailing rates or prevailing practices with respect to procurement on New York City public work contracts. Contractors are advised to review the Comptroller's Prevailing Wage Schedule before bidding on public work contracts. Contractors with questions concerning trade classifications, prevailing rates or prevailing practices with respect to public work contracts in the procurement stage must contact the contracting agency responsible for the procurement.

Any error as to compensation under the prevailing wage law or other information as to trade classification, made by the contracting agency in the contract documents or in any other communication, will not preclude a finding against the contractor of prevailing wage violation.

Any questions concerning trade classifications, prevailing rates or prevailing practices on New York City public work contracts that have already been awarded may be directed to the Bureau of Labor Law's Classification Unit by calling (212) 669-4443. All callers must have the agency name and contract registration number available when calling with questions on public work contracts. Please direct all other compliance issues to: laborlaw@comptroller.nyc.gov or Bureau of Labor Law, Attn: Paul Brumlik, Office of the Comptroller, 1 Centre Street, Room 651, New York, N.Y. 10007.

Pursuant to Labor Law § 220 (3-a) (a), the appropriate schedule of prevailing wages and benefits must be posted in a prominent and accessible place at all public work sites along with the Construction Poster provided on our web site at comptroller.nyc.gov/wages. In addition, covered employees must be given the appropriate schedule of prevailing wages and benefits along with the Worker Notice provided on our web site at the time the public work project begins, and with the first paycheck to each such employee after July first of each year.

This schedule is applicable to work performed during the effective period, unless otherwise noted. Changes to this schedule are published on our web site comptroller.nyc.gov/wages. Contractors must pay the wages and supplements in effect when the worker, laborer, mechanic performs the work. Preliminary schedules for future one-year periods appear in the City Record on or about June 1 each succeeding year. Final schedules appear on or about July 1 in the City Record and on our web site comptroller.nyc.gov/wages.

Prevailing rates and ratios for apprentices are published in the Construction Apprentice Prevailing Wage Schedule. Pursuant to Labor Law § 220 (3-e), only apprentices who are individually registered in a bona fide program to which the employer contractor is a participant, registered with the

New York State Department of Labor, may be paid at the apprentice rates. Apprentices who are not so registered must be paid as journey persons.

New York City public work projects awarded pursuant to a Project Labor Agreement ("PLA") in accordance with Labor Law section 222 may have different labor standards for shift, premium and overtime work. Please refer to the PLA's pre-negotiated labor agreements for wage and benefit rates applicable to work performed outside of the regular workday. More information is available at the Mayor's Office of Contract Services (MOCS) web page at:

https://www1.nyc.gov/site/mocs/legal-forms/project-labor-agreements.page

All the provisions of Labor Law Article 8 remain applicable to PLA work including, but not limited to, the enforcement of prevailing wage requirements by the Comptroller in accordance with the trade classifications in this schedule; however, we will enforce shift, premium, overtime and other non-standard rates as they appear in a project's pre-negotiated labor agreement.

In order to meet their obligation to provide prevailing supplemental benefits to each covered employee, employers must either:

1) **Provide bona fide fringe benefits which cost the employer no less than the prevailing supplemental benefits rate; or**
2) **Supplement the employee's hourly wage by an amount no less than the prevailing supplemental benefits rate; or**
3) **Provide a combination of bona fide fringe benefits and wage supplements which cost the employer no less than the prevailing supplemental benefits rate in total.**

Although prevailing wage laws do not require employers to provide bona fide fringe benefits (as opposed to wage supplements) to their employees, other laws may. For example, the Employee Retirement Income Security Act, 29 U.S.C. § 1001 et seq., the Patient Protection and Affordable Care Act, 42 U.S.C. § 18001 et seq., and the New York City Paid Sick Leave Law, N.Y.C. Admin. Code § 20-911 et seq., require certain employers to provide certain benefits to their employees. Labor agreements to which employers are a party may also require certain benefits. The Comptroller's Office does not enforce these laws or agreements.

Employers must provide prevailing supplemental benefits at the straight time rate for each hour worked unless otherwise noted in the classification.

Paid Holidays, Vacation and Sick Leave when listed must be paid or provided in addition to the prevailing hourly supplemental benefit rate.

For more information, please refer to the Comptroller's Prevailing Wage Law Regulations in Title 44 of the Rules of the City of New York, Chapter 2, available at comptroller.nyc.gov/wages.

Paul Brumlik
Director of Classifications
Bureau of Labor Law

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ASBESTOS HANDLER
SEE HAZARDOUS MATERIAL HANDLER

BLASTER

Blaster

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $59.81
Supplemental Benefit Rate per Hour: $57.77

Blaster - Hydraulic Trac Drill

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $53.95
Supplemental Benefit Rate per Hour: $57.77

Blaster - Wagon: Air Trac: Quarry Bar: Drillrunners

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $53.12
Supplemental Benefit Rate per Hour: $57.77

Blaster - Journeyperson

(Laborer, Chipper/Jackhammer including Walk Behind Self Propelled Hydraulic Asphalt and Concrete Breakers and Hydro (Water) Demolition, Powder Carrier, Hydraulic Chuck Tender, Chuck Tender and Nipper)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.60
Supplemental Benefit Rate per Hour: $57.77

Blaster - Magazine Keepers: (Watch Person)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $23.30
Supplemental Benefit Rate per Hour: $57.77

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Columbus Day
Christmas Day

Triple time the regular rate for work on the following holiday(s).
Labor Day
Thanksgiving Day

Paid Holidays
Labor Day
Thanksgiving Day

Shift Rates
When two shifts are employed, single time rate shall be paid for each shift. When three shifts are found necessary, each shift shall work seven and one half hours (7 ½), but shall be paid for eight (8) hours of labor, and be permitted one half hour for lunch.

(Local #731)

BOILERMAKER

Boilermaker

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $70.38
Supplemental Benefit Rate per Hour: $50.33
Supplemental Note: For time and one half overtime - $74.92 For double overtime - $99.51

Overtime Description
For Repair and Maintenance work:
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
For New Construction work:
Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day

President's Day
Memorial Day
Independence Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day
Juneteenth

Quadruple time the regular rate for work on the following holiday(s).
Labor Day

Paid Holidays
Good Friday
Day after Thanksgiving
Day before Christmas
Day before New Year's Day

Shift Rates
On jobs requiring two (2) or three (3) shifts, the first shift shall work eight (8) hours at the regular straight-time hourly rate. The second shift shall work eight (8) hours and receive eight hours at the regular straight time hourly rate plus two dollars ($2.00) per hour. The third shift shall work eight (8) hours and receive eight hours at the regular straight time hourly rate plus two dollars and twenty-five cents ($2.25) per hour.

(Local #5)

BRICKLAYER

Bricklayer

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $61.29
Supplemental Benefit Rate per Hour: $46.60

Overtime Description
Time and one half the regular rate after a 7 hour day. If working on a job that is predominately Pointer, Cleaner, Caulker work, then Time and one half the regular rate after an 8 hour day.

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

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

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

Paid Holidays
None

Shift Rates
The second shift wage rate shall be a 15% wage premium with no premium for supplemental benefits. There must be a first shift in order to work a second shift.

(Bricklayer District Council)

CARPENTER - BUILDING COMMERCIAL

Building Commercial

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $60.05
Supplemental Benefit Rate per Hour: $50.83

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Day after Thanksgiving
Day before Christmas
Christmas Day
Day before New Year's Day

Paid Holidays
None

Shift Rates
The second shift will receive one hour at the double time rate of pay for the last hour of the shift; eight hours pay for seven hours of work, nine hours pay for eight hours of work. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

CARPENTER - HEAVY CONSTRUCTION WORK
(Construction of Engineered Structures and Building Foundations including all form work)

Heavy Construction Work

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $62.59
Supplemental Benefit Rate per Hour: $57.84

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate and the supplemental benefits shall be paid at the straight time rate. When two (2) or more shifts of Carpenters are employed, single time will be paid for each shift.

(Carpenters District Council)

CARPENTER - HIGH RISE CONCRETE FORMS
(Excludes Engineered Structures and Building Foundations)

Carpenter High Rise A

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $51.48
Supplemental Benefit Rate per Hour: $44.74

Carpenter High Rise B

Carpenter High Rise B worker is excluded from high risk operations such as erection decking, perimeter debris netting, leading edge work, self-climbing form systems, and the installation of cocoon systems unless directly supervised by a Carpenter High Rise A worker.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $40.89
Supplemental Benefit Rate per Hour: $18.05

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

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
The second shift wage rate shall be 113% of the straight time hourly wage rate. However, any shift beginning after 5:00 P.M. shall be paid at time and one half the regular hourly rate. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

CARPENTER - SIDEWALK SHED, SCAFFOLD AND HOIST

Carpenter - Hod Hoist

(Assisted by Mason Tender)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $57.20
Supplemental Benefit Rate per Hour: $51.20

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates

The second shift will receive 112% of the straight time hourly rate. Benefit fund contributions shall be paid at the straight time rate. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

CARPENTER - WOOD WATER STORAGE TANK

Tank Mechanic

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $39.58
Supplemental Benefit Rate per Hour: $27.26

Tank Helper

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $31.04
Supplemental Benefit Rate per Hour: $27.18

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays

New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Day after Thanksgiving
1/2 day on Christmas Eve if work is performed in the A.M.
Christmas Day
1/2 day on New Year's Eve if work is performed in the A.M.

Vacation

Employed for one (1) year.....one (1) week vacation (40 hours)
Employed for three (3) years.....two (2) weeks vacation (80 hours)
Employed for more than twenty (20) years.....three (3) weeks vacation (120 hours)

SICK LEAVE:

Two (2) sick days after being employed for twenty (20) years.

(Carpenters District Council)

CEMENT & CONCRETE WORKER
Building Work

Cement & Concrete Worker

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $47.28
Supplemental Benefit Rate per Hour: $34.20
Supplemental Note: $39.20 on Saturdays; $44.20 on Sundays & Holidays

Cement & Concrete Worker - (Hired after 2/6/2016)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $36.80
Supplemental Benefit Rate per Hour: $26.20
Supplemental Note: $29.20 on Saturdays; $32.20 on Sundays & Holidays

Overtime Description
Time and one half the regular rate after 7 hour day (time and one half the regular rate after an 8 hour day when working with Dockbuilders on pile cap forms and for work below street level to the top of the foundation wall, not to exceed 2 feet or 3 feet above the sidewalk-brick shelf, when working on the foundation and structure.)

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
1/2 day before Christmas Day
1/2 day before New Year's Day

Shift Rates
All night shifts are paid at straight time plus 10% differential.

(Cement & Concrete Workers District Council 16)

CEMENT MASON

Cement Mason

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $59.87
Supplemental Benefit Rate per Hour: $34.76
Supplemental Note: Supplemental benefit time and one half rate: $63.22; Double time rate: double the base supplemental benefit rate.

Overtime Description
Time and one-half the regular rate after an 8 hour day, double time the regular rate after 10 hours. Time and one-half the regular rate on Saturday, double time the regular rate after 10 hours. Double time the regular rate on Sunday. Four Days a week at Ten (10) hours straight time is allowed.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
Any worker who reports to work on Christmas Eve or New Year's Eve pursuant to his employer's instruction shall be entitled to three (3) hours afternoon pay without working.

Shift Rates
For off shift work, (at times other than the regular 7:00 A.M. to 3:30 P.M. work day) a cement mason shall be paid at the regular hourly rate plus a 25% per hour differential.

(Local #780) (BCA)

CORE DRILLER
Test Boring

Core Driller

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.78
Supplemental Benefit Rate per Hour: $36.07

Core Driller Helper

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $38.15
Supplemental Benefit Rate per Hour: $36.07

Core Driller Helper(Third year in the industry)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.37
Supplemental Benefit Rate per Hour: $36.07
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Core Driller Helper (Second year in the industry)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.61
Supplemental Benefit Rate per Hour: $36.07

Core Driller Helper (First year in the industry)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $26.83
Supplemental Benefit Rate per Hour: $36.07

Overtime Description
Time and one half the regular rate for work on a holiday plus Holiday pay when worked.

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

Paid Holidays
New Year's Day
Memorial Day

Independence Day
Labor Day
Veteran's Day
Thanksgiving Day
Christmas Day

Shift Rates

When two (2) or more shifts are employed, single time shall be paid for each shift, but those employees employed on a shift other than from 8:00 A.M. to 5:00 P.M. shall, in addition, receive two dollars ($2.00) per hour differential for each hour worked. When three (3) shifts are needed, each shift shall work seven and one-half (7 ½) hours paid for eight (8) hours of labor and be permitted one-half (½) hour for mealtime.

(Carpenters District Council)

DERRICKPERSON AND RIGGER

Derrick Person & Rigger

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $61.82
Supplemental Benefit Rate per Hour: $63.63

Overtime Description

The first two hours of overtime on weekdays and the first seven hours of work on Saturdays are paid at time and one half for wages and supplemental benefits. All additional overtimes is paid at double time for wages and supplemental benefits.

Overtime

Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

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

Derrick Person & Rigger- Handset

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $59.67
Supplemental Benefit Rate per Hour: $62.64

Overtime Description
The first two hours of overtime on weekdays and the first seven hours of work on Saturdays are paid at time and one half for wages and supplemental benefits. All additional overtimes is paid at double time for wages and supplemental benefits.

Overtime
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

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

(Local #197)

DIVER

Diver (Marine)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $77.46
Supplemental Benefit Rate per Hour: $57.84

Diver Tender (Marine)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $57.00
Supplemental Benefit Rate per Hour: $57.84

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When three shifts are utilized each shift shall work seven and one half-hours (7 1/2 hours) and paid for 8 hours, allowing for one half hour for lunch.

(Carpenters District Council)

DOCKBUILDER - PILE DRIVER

Dockbuilder - Pile Driver

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $62.59
Supplemental Benefit Rate per Hour: $57.84

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day

President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate and the supplemental benefits shall be paid at the straight time rate. When two (2) or more shifts of Dockbuilders are employed, single time will be paid for each shift.

(Carpenters District Council)

DRIVER: TRUCK (TEAMSTER)

Including work involving the delivery to and hauling from such worksites of aggregate supply construction materials and any time spent loading/unloading

Driver - Dump Truck

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $47.07
Supplemental Benefit Rate per Hour: $61.15
Supplemental Note: Over 40 hours worked: at time and one half rate - $25.50; at double time rate - $34.00

Driver - Tractor Trailer

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $50.76
Supplemental Benefit Rate per Hour: $60.15
Supplemental Note: Over 40 hours worked: at time and one half rate - $32.83; at double time rate - $41.60

Driver - Euclid & Turnapull Operator

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $50.07

Supplemental Benefit Rate per Hour: $60.15
Supplemental Note: Over 40 hours worked: at time and one half rate - $32.83; at double time rate - $41.60

Driver – Boom Truck

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $52.51
Supplemental Benefit Rate per Hour: $60.15
Supplemental Note: Over 40 hours worked: at time and one half rate - $32.83; at double time rate - $41.60

Driver – Goldhofer & Self Propelled Modular Trailer (SPMT)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $53.51
Supplemental Benefit Rate per Hour: $60.15
Supplemental Note: Over 40 hours worked: at time and one half rate - $32.83; at double time rate - $41.60

Overtime Description
For Paid Holidays: Holiday pay for all holidays shall be prorated based two hours per day for each day worked in the holiday week, not to exceed 8 hours of holiday pay.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

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

Shift Rates
Off shift work commencing between 6:00 P.M. and 5:00 A.M. shall work eight and one half (8 1/2) hours allowing for one half hour for lunch

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Driver Redi-Mix (Sand & Gravel)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $44.50
Supplemental Benefit Rate per Hour: $54.88
Supplemental Note: Over 40 hours worked: time and one half rate $22.59; double time rate $30.12

Overtime Description
For Paid Holidays: Employees who do not work on a contractual holiday shall be compensated two (2) hours extra pay in straight time wages and benefits for every day on which the Employee does not pass up a day's work during the calendar week (Sunday through Saturday) of the holiday, up to a maximum of ten (10) hours in wages and eight (8) hours in benefit contributions for the holiday

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
Martin Luther King Jr. Day
President's Day
Columbus Day
Veteran's Day

Triple time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Christmas Day

(Local #282)

ELECTRICIAN

(Including installation of low voltage cabling carrying data, video and/or voice on building construction/alteration/renovation projects.)

Electrician "A" (Regular Day / Day Shift)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $64.00
Supplemental Benefit Rate per Hour: $70.28
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $64.00
Supplemental Benefit Rate per Hour: $72.74
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Regular Day Overtime after 7 hrs / Day Shift Overtime after 8 hrs)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $96.00
Supplemental Benefit Rate per Hour: $72.34
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $96.00
Supplemental Benefit Rate per Hour: $74.80
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Swing Shift)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $75.10
Supplemental Benefit Rate per Hour: $78.93
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $75.10
Supplemental Benefit Rate per Hour: $81.66
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

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

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $112.65
Supplemental Benefit Rate per Hour: $81.35
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $112.65
Supplemental Benefit Rate per Hour: $84.07
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Graveyard Shift)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $84.12
Supplemental Benefit Rate per Hour: $86.28
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $84.12
Supplemental Benefit Rate per Hour: $89.25
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

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

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $126.18
Supplemental Benefit Rate per Hour: $88.98
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $126.18
Supplemental Benefit Rate per Hour: $91.96
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

*** Supplemental Benefit Rate per Hour Note**
In addition to the Supplemental Benefit Rates per Hour listed above, the employer must provide an additional 6.2% of taxable gross pay earned on covered work only. This additional Supplemental Benefit Rate will terminate when the employee has contributed the maximum annual Social Security tax required by law, on all work performed.

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on a holiday.
New Year's Day
Martin Luther King Jr. Day
President's Day

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

Paid Holidays

None

Shift Rates

For multiple shifts of temporary light and/or power, the temporary light and/or power employee shall be paid for 8 hours at the straight time rate. For three or less workers performing 8 hours temporary light and/or power the supplemental benefit rate is $27.91, effective 04/15/2027 the supplemental benefit rate is $29.91 - See * Supplemental Benefit Rate per Hour Note above.

Electrician "M" 1st Year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $26.79

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $27.42

Electrician "M" 1st Year (Overtime)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $41.25
Supplemental Benefit Rate per Hour: $28.52

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $41.25
Supplemental Benefit Rate per Hour: $29.16

Electrician "M" 2nd Year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $28.50
Supplemental Benefit Rate per Hour: $27.32

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $28.50
Supplemental Benefit Rate per Hour: $27.97

Electrician "M" 2nd Year (Overtime)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $42.75
Supplemental Benefit Rate per Hour: $29.12

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $42.75
Supplemental Benefit Rate per Hour: $29.77

Electrician "M" 3rd Year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $30.50
Supplemental Benefit Rate per Hour: $28.40

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $30.50
Supplemental Benefit Rate per Hour: $29.05

Electrician "M" 3rd Year (Overtime)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $45.75
Supplemental Benefit Rate per Hour: $30.33

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $45.75
Supplemental Benefit Rate per Hour: $30.98

Electrician "M" 4th Year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $33.50
Supplemental Benefit Rate per Hour: $30.01

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $33.50
Supplemental Benefit Rate per Hour: $30.68

Electrician "M" 4th Year (Overtime)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $50.25
Supplemental Benefit Rate per Hour: $32.13

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $50.25

Supplemental Benefit Rate per Hour: $32.80

Electrician "M" 5th Year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $36.50
Supplemental Benefit Rate per Hour: $31.62

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $36.50
Supplemental Benefit Rate per Hour: $32.31

Electrician "M" 5th Year (Overtime)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $54.75
Supplemental Benefit Rate per Hour: $33.93

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $54.75
Supplemental Benefit Rate per Hour: $34.61

Electrician "M" 6th Year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $43.50
Supplemental Benefit Rate per Hour: $35.39

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $43.50
Supplemental Benefit Rate per Hour: $36.11

Electrician "M" 6th Year (Overtime)

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $65.25
Supplemental Benefit Rate per Hour: $38.14

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $65.25
Supplemental Benefit Rate per Hour: $38.85

Overtime

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

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).

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

Paid Holidays
None

(Local #3)

ELECTRICIAN - ALARM TECHNICIAN
(Scope of Work - Inspect, test, repair, and replace defective, malfunctioning, or broken devices, components and controls of Fire, Burglar and Security Systems)

Alarm Technician

Effective Period: 7/1/2026 - 3/11/2027
Wage Rate per Hour: $39.45
Supplemental Benefit Rate per Hour: $23.33
Supplemental Note: $21.20 only after 8 hours worked in a day

Effective Period: 3/12/2027 - 6/30/2027
Wage Rate per Hour: $40.45
Supplemental Benefit Rate per Hour: $23.86
Supplemental Note: $21.74 only after 8 hours worked in a day

Overtime Description
Time and one half the regular rate for work on the following holidays: Columbus Day, Veterans Day, Day after Thanksgiving.
Double time the regular rate for work on the following holidays: New Year's day, Martin Luther King Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Paid Holidays

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

Shift Rates

Night Differential is based upon a ten percent (10%) differential between the hours of 4:00 P.M. and 12:30 A.M. and a fifteen percent (15%) differential for the hours 12:00 A.M. to 8:30 A.M.

Vacation

At least 1 year of employment.....ten (10) days
5 years or more of employment.....fifteen (15) days
10 years of employment.....twenty (20) days
Plus one Personal Day per year

Sick Days:
One day per Year. Up to 4 vacation days may be used as sick days.

(Local #3)

ELECTRICIAN-STREET LIGHTING WORKER

Electrician - Electro Pole Electrician

Effective Period: 7/1/2026 - 4/21/2027
Wage Rate per Hour: $64.00
Supplemental Benefit Rate per Hour: $72.46
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/22/2027 - 6/30/2027
Wage Rate per Hour: $64.00
Supplemental Benefit Rate per Hour: $74.92
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician - Electro Pole Foundation Installer

Effective Period: 7/1/2026 - 4/21/2027
Wage Rate per Hour: $49.66
Supplemental Benefit Rate per Hour: $53.91
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/22/2027 - 6/30/2027
Wage Rate per Hour: $49.66
Supplemental Benefit Rate per Hour: $55.91
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician - Electro Pole Maintainer

Effective Period: 7/1/2026 - 4/21/2027
Wage Rate per Hour: $43.61
Supplemental Benefit Rate per Hour: $48.96
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/22/2027 - 6/30/2027
Wage Rate per Hour: $43.61
Supplemental Benefit Rate per Hour: $50.89
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

*** Supplemental Benefit Rate per Hour Note**
In addition to the Supplemental Benefit Rates per Hour listed above, the employer must provide an additional 6.2% of taxable gross pay earned on covered work only. This additional Supplemental Benefit Rate will terminate when the employee has contributed the maximum annual Social Security tax required by law, on all work performed.

Overtime Description
Electrician - Electro Pole Electrician: Time and one half the regular rate after a 7 hour day and after 5 consecutive days worked per week.
Electrician - Electro Pole Foundation Installer: Time and one half the regular rate after 8 hours within a 24 hour period and Saturday and Sunday.
Electrician - Electro Pole Maintainer: Time and one half the regular rate after a 7 hour day and after 5 consecutive days worked per week. Saturdays and Sundays may be used as a make-up day at straight time when a day is lost during the week to inclement weather.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Local #3)

ELEVATOR CONSTRUCTOR

Elevator Constructor

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $86.43
Supplemental Benefit Rate per Hour: $43.43

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $89.76
Supplemental Benefit Rate per Hour: $44.53

Overtime Description
For New Construction: work performed after an 8 hour day, Saturday, Sunday or between 5:30pm and 6:00am shall be paid at double time rate.

Existing buildings: work performed after an 8 hour day, Saturday, Sunday or between 6:00pm and 5:00 am shall be paid time and one half.

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

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

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

(Local #1)

ELEVATOR REPAIR & MAINTENANCE

Elevator Service/Modernization Mechanic

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $68.06
Supplemental Benefit Rate per Hour: $43.38

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $70.72
Supplemental Benefit Rate per Hour: $44.48

Overtime Description
For Scheduled Service Work: Double time - work scheduled in advance by two or more workers performed on Sundays, Holidays, and between midnight and 5:00am.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

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

Shift Rates
Afternoon shift - regularly hourly rate plus a (15%) fifteen percent differential. Graveyard shift - time and one half the regular rate.

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

(Local #1)

ENGINEER

Engineer - Heavy Construction Operating Engineer I

Cherrypickers 20 tons and over and Loaders (rubber tired and/or tractor type with a manufacturer's minimum rated capacity of six cubic yards and over).

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $79.50
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $127.20

Engineer - Heavy Construction Operating Engineer II

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $76.95
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $123.12

Engineer - Heavy Construction Operating Engineer III

Minor Equipment such as Tractors, Post Hole Diggers, Ditch Witch (Walk Behind), Road Finishing Machines, Rollers five tons and under, Tugger Hoists, Dual Purpose Trucks, Fork Lifts, and Dempsey Dumpers, Fireperson.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $72.72
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $116.35

Engineer - Heavy Construction Maintenance Engineer I

Installing, Repairing, Maintaining, Dismantling of all equipment including Steel Cutting, Bending and Heat Sealing Machines, Mechanical Heaters, Grout Pumps, Bentonite Pumps & Plants, Screening Machines, Fusion Coupling Machines, Tunnel Boring Machines Moles and Machines of a similar nature, Power Packs, Mechanical Hydraulic Jacks; all drill rigs including but not limited to Churn, Rotary Caisson, Raised Bore & Drills of a similar

nature; Personnel, Inspection & Safety Boats or any boats used to perform functions of same, Mine Hoists, Whirlies, all Climbing Cranes, all Tower Cranes, including but not limited to Truck Mounted and Crawler Type and machines of similar nature; Maintaining Hydraulic Drills and machines of a similar nature; Well Point System-Installation and dismantling; Burning, Welding, all Pumps regardless of size and/or motor power, except River Cofferdam Pumps and Wells Point Pumps; Motorized Buggies (three or more); equipment used in the cleaning and televising of sewers, but not limited to jet-rodder/vacuum truck, vacall/vactor, closed circuit television inspection equipment; high powered water pumps, jet pumps; screed machines and concrete finishing machines of a similar nature; vermeers.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $76.55
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $122.48

Engineer - Heavy Construction Maintenance Engineer II

On Base Mounted Tower Cranes

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $102.42
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $163.87

Engineer - Heavy Construction Maintenance Engineer III

On Generators, Light Towers

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.50
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $77.60

Engineer - Heavy Construction Maintenance Engineer IV

On Pumps and Mixers including mud sucking

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.90
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $79.84

Engineer - Heavy Construction Service Engineer

Gradalls: Concrete Pumps: Power Houses: Driving Truck Cranes: Driving and Operating Fuel and Grease Trucks.

Effective Period: 7/1/2026 - 6/30/2027

Wage Rate per Hour: $68.42
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $109.47

Engineer - Heavy Construction Service Mechanic

Shovels: Cranes: Draglines: Backhoes: Keystones: Pavers: Trenching Machines: Gunite Machines: Compressors (three (3) or more in Battery): Crawler Cranes- having a straight lattice boom with no attachment or luffing boom, no jib and no auxiliary attachment.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $45.50
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $72.80

Engineer - Steel Erection Maintenance Engineers

Derrick, Travelers, Tower, Crawler Tower and Climbing Cranes

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $73.88
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $118.21

Engineer - Steel Erection Oiler I

On a Truck Crane

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $68.81
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $110.10

Engineer - Steel Erection Oiler II

On a Crawler Crane

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.83
Supplemental Benefit Rate per Hour: $51.76
Supplemental Note: $95.97 on overtime
Shift Wage Rate: $74.93

Overtime Description

On jobs of more than one shift, if the next shift employee fails to report for work through any cause over which the employer has no control, the employee on duty who works the next shift continues to work at the single time rate.

Overtime

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

Paid Holidays

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

Engineer - Building Work Maintenance Engineers I

Installing, repairing, maintaining, dismantling (of all equipment including: Steel Cutting and Bending Machines, Mechanical Heaters, Mine Hoists, Climbing Cranes, Tower Cranes, Linden Peine, Lorain, Liebherr, Mannes, or machines of a similar nature, Well Point Systems, Deep Well Pumps, Concrete Mixers with loading Device, Concrete Plants, Motor Generators when used for temporary power and lights), skid steer machines of a similar nature including bobcat.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $63.77
Supplemental Benefit Rate per Hour: $50.85
Supplemental Note: $94.15 on overtime

Engineer - Building Work Maintenance Engineers II

On Pumps, Generators, Mixers and Heaters

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.27
Supplemental Benefit Rate per Hour: $50.85
Supplemental Note: $94.15 on overtime

Engineer - Building Work Oilers I

All gasoline, electric, diesel or air operated Gradealls: Concrete Pumps, Overhead Cranes in Power Houses: Their duties shall be to assist the Engineer in oiling, greasing and repairing of all machines; Driving Truck

Cranes: Driving and Operating Fuel and Grease Trucks, Cherrypickers (hydraulic cranes) over 70,000 GVW, and machines of a similar nature.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $60.35
Supplemental Benefit Rate per Hour: $50.85
Supplemental Note: $94.15 on overtime

Engineer - Building Work Oilers II

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $43.39
Supplemental Benefit Rate per Hour: $50.85
Supplemental Note: $94.15 on overtime

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

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

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

Shift Rates
When two (2) or more shifts are employed, single time will be paid for each shift.

(Local #15)

ENGINEER - CITY SURVEYOR AND CONSULTANT

Party Chief

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.27
Supplemental Benefit Rate per Hour: $29.92
Supplemental Note: Overtime Benefit Rate - $35.66 per hour (time & one half) $41.39 per hour (double time).

Instrument Person

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $39.26
Supplemental Benefit Rate per Hour: $29.92
Supplemental Note: Overtime Benefit Rate -$35.66 per hour (time & one half) $41.39 per hour (double time).

Rodperson

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $33.55
Supplemental Benefit Rate per Hour: $29.92
Supplemental Note: Overtime Benefit Rate - $35.66 per hour (time & one half) $41.39 per hour (double time).

Rodperson 1st Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $29.92
Supplemental Note: Overtime Benefit Rate - $35.66 per hour (time & one half) $41.39 per hour (double time).

Overtime Description

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

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (BUILDING CONSTRUCTION)
(Construction of Building Projects, Concrete Superstructures, etc.)

Field Engineer - BC Party Chief

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $71.62
Supplemental Benefit Rate per Hour: $46.38
Supplemental Note: Overtime Benefit Rate - $65.85 per hour (time & one half) $85.31 per hour (double time).

Field Engineer - BC Instrument Person

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $50.50
Supplemental Benefit Rate per Hour: $46.38
Supplemental Note: Overtime Benefit Rate - $65.85 per hour (time & one half) $85.31 per hour (double time).

Field Engineer - BC Rodperson

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.86
Supplemental Benefit Rate per Hour: $46.38
Supplemental Note: Overtime Benefit Rate - $65.85 per hour (time & one half) $85.31 per hour (double time).

Overtime Description
Time and one half the regular rate after a 7 hour work and time and one half the regular rate for Saturday for the first seven hours worked, Double time the regular time rate for Saturday for work performed in excess of seven hours, Double time the regular rate for Sunday and Double time the regular rate for work on a holiday.

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (HEAVY CONSTRUCTION)
(Construction of Roads, Tunnels, Bridges, Sewers, Building Foundations, Engineering Structures etc.)

Field Engineer - HC Party Chief

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $80.18
Supplemental Benefit Rate per Hour: $51.37
Supplemental Note: Overtime benefit rate - $73.21 per hour (time & one half), $95.05 per hour (double time).

Field Engineer - HC Instrument Person

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $56.72
Supplemental Benefit Rate per Hour: $51.37
Supplemental Note: Overtime benefit rate - $73.21 per hour (time & one half), $95.05 per hour (double time).

Field Engineer - HC Rodperson

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.30
Supplemental Benefit Rate per Hour: $51.37
Supplemental Note: Overtime benefit rate - $73.21 per hour (time & one half), $95.05 per hour (double time).

Field Engineer - HC Rodperson 1st Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $51.37
Supplemental Note: Overtime benefit rate - $73.21 per hour (time & one half), $95.05 per hour (double time).

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

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day

Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (STEEL ERECTION)

Field Engineer - Steel Erection Party Chief

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $76.11
Supplemental Benefit Rate per Hour: $49.70
Supplemental Note: Overtime benefit rate - $70.71 per hour (time & one half), $91.71 per hour (double time).

Field Engineer - Steel Erection Instrument Person

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $53.33
Supplemental Benefit Rate per Hour: $49.70
Supplemental Note: Overtime benefit rate - $70.71 per hour (time & one half), $91.71 per hour (double time).

Field Engineer - Steel Erection Rodperson

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $33.45
Supplemental Benefit Rate per Hour: $49.70
Supplemental Note: Overtime benefit rate - $70.71 per hour (time & one half), $91.71 per hour (double time).

Field Engineer - Steel Erection Rodperson 1st Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $49.70
Supplemental Note: Overtime benefit rate - $67.22 per hour (time & one half), $87.07 per hour (double time).

Overtime Description
Time and one half the regular rate for Saturday for the first eight hours worked.
Double time the regular rate for Saturday for work performed in excess of eight hours.

Overtime
Time and one half the regular rate after an 8 hour day.
Double time the regular rate for Sunday.

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

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one (1) day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - OPERATING

Operating Engineer - Road & Heavy Construction I

Back Filling Machines, Cranes, Mucking Machines and Dual Drum Paver.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $95.27
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $152.43

Operating Engineer - Road & Heavy Construction II

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $98.67
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $157.87

Operating Engineer - Road & Heavy Construction III

Mine Hoists (Cranes, etc. when used as Mine Hoists)

Effective Period: 7/1/2026 - 6/30/2027

Wage Rate per Hour: $101.86
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $162.98

Operating Engineer - Road & Heavy Construction IV

Gradealls, Keystones, Cranes on land or water (with digging buckets), Bridge Cranes, Vermeer Cutter and machines of a similar nature, Trenching Machines.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $99.37
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $158.99

Operating Engineer - Road & Heavy Construction V

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $97.41
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $155.86

Operating Engineer - Road & Heavy Construction VI

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $92.51
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $148.02

Operating Engineer - Road & Heavy Construction VII

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $74.63
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $119.41

Operating Engineer - Road & Heavy Construction VIII

Utility Compressors

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $57.84
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $73.02

Operating Engineer - Road & Heavy Construction IX

Horizontal Boring Rig

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $87.98
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $140.77

Operating Engineer - Road & Heavy Construction X

Elevators (manually operated as personnel hoist).

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $80.83
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $129.33

Operating Engineer - Road & Heavy Construction XI

Compressors (Portable 3 or more in battery), Driving of Truck Mounted Compressors, Well-point Pumps, Tugger Machines Well Point Pumps, Churn Drill.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $62.68
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $100.29

Operating Engineer - Road & Heavy Construction XII

All Drills and Machines of a similar nature.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $93.50
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $149.60

Operating Engineer - Road & Heavy Construction XIII

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $90.57
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $144.91

Operating Engineer - Road & Heavy Construction XIV

Concrete Mixer

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $86.55
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $138.48

Operating Engineer - Road & Heavy Construction XV

Compressors (Portable Single or two in Battery, not over 100 feet apart), Pumps (River Cofferdam) and Welding Machines, Push Button Machines, All Engines Irrespective of Power (Power-Pac) used to drive auxiliary equipment, Air, Hydraulic, etc.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $58.23
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $93.17

Operating Engineer - Road & Heavy Construction XVI

Concrete Breaking Machines, Hoists (Single Drum), Load Masters, Locomotives (over ten tons) and Dinkies over ten tons, Hydraulic Crane-Second Engineer.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $82.63
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $132.21

Operating Engineer - Road & Heavy Construction XVII

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $83.23
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours

Shift Wage Rate: $133.17

Operating Engineer - Road & Heavy Construction XVIII

Tower Crane

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $119.67
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $191.47

Operating Engineer - Paving I

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $92.51
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $148.02

Operating Engineer - Paving II

Asphalt Roller

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $90.14
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $144.22

Operating Engineer - Paving III

Asphalt Plants

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $76.11
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $121.78

Operating Engineer - Concrete I

Cranes

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $98.93
Supplemental Benefit Rate per Hour: $40.40

Supplemental Note: $74.50 overtime hours

Operating Engineer - Concrete II

Compressors

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $58.68
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours

Operating Engineer - Concrete III

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $78.97
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours

Operating Engineer - Steel Erection I

Three Drum Derricks

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $103.35
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $165.36

Operating Engineer - Steel Erection II

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $99.29
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $158.86

Operating Engineer - Steel Erection III

Compressors, Welding Machines.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $54.73
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $87.57

Operating Engineer - Steel Erection IV

Compressors - Not Combined with Welding Machine. (Public Works Only)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $52.08
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
Shift Wage Rate: $83.33

Operating Engineer - Building Work I

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

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $74.34
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours

Operating Engineer - Building Work II

Compressors, Welding Machines (Cutting Concrete-Tank Work), Paint Spraying, Sandblasting, Pumps (with the exclusion of Concrete Pumps), All Engines irrespective of Power (Power-Pac) used to drive Auxiliary Equipment, Air, Hydraulic, Jacking System, etc.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $55.45
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours

Operating Engineer - Building Work III

Double Drum

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $94.79
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours

Operating Engineer - Building Work IV

Stone Derrick, Cranes, Hydraulic Cranes Boom Trucks.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $100.43
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours

Operating Engineer - Building Work V

Dismantling and Erection of Cranes, Relief Engineer.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $82.68
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours

Operating Engineer - Building Work VI

4 Pole Hoist, Single Drum Hoists.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $81.79
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours

Operating Engineer - Building Work VII

Rack & Pinion and House Cars

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $64.87
Supplemental Benefit Rate per Hour: $40.40
Supplemental Note: $74.50 overtime hours
For New House Car projects Wage Rate per Hour $51.61
For New House Car projects: Supplemental Benefit overtime hours: $74.50

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

For House Cars and Rack & Pinion only: Overtime paid at time and one-half for all hours in excess of eight hours in a day, Saturday, Sunday and Holidays worked.

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

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

Christmas Day

Shift Rates

When two (2) or more shifts are employed, single time will be paid for each shift.
For Steel Erection Only: Shifts may be worked at the single time rate at other than the regular working hours (8:00 A.M. to 4:30 P.M.) on the following work ONLY: Heavy construction jobs on work below the street level, over railroad tracks and on building jobs.

(Operating Engineer Local #14)

FLAGGER

Flagger to be paid at the rate of the journeyperson or apprentice in the trade performing the underlying work.

In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, this title includes traffic control duty only for City public works contracts and subcontracts solicited on or after July 1, 2024.

On City public works contracts and subcontracts solicited on or after July 1, 2024, traffic control worker to be paid at the rate of the journeyperson or apprentice in the trade performing the underlying work.

If the trade performing the underlying work does not regularly employ a flagger or traffic control worker, then one of the following titles must be used on such projects:
Laborer - Heavy & Highway
Laborer - Paver & Roadbuilder
Laborer - Paver & Roadbuilder Line Striping (Roadway)

FLOOR COVERER

(Interior vinyl composition tile, sheath vinyl linoleum and wood parquet tile including site preparation and synthetic turf not including site preparation)

Floor Coverer

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $60.05
Supplemental Benefit Rate per Hour: $50.83

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Day after Thanksgiving
Day before Christmas
Christmas Day
Day before New Year's Day

Shift Rates
Two shifts may be utilized with the first shift working 8 a.m. to the end of the shift at straight time rate of pay. The wage rate for the second shift consisting of 7 hours shall be paid at 114.29% of straight time wage rate. The wage rate for the second shift consisting of 8 hours shall be paid 112.5% of the straight time wage rate. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

GLAZIER
(New Construction, Remodeling, and Alteration)

Glazier

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.72
Supplemental Benefit Rate per Hour: $60.05

Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

DC9 (Local #1087)

GLAZIER - REPAIR & MAINTENANCE
(For the Installation of Glass - All repair and maintenance work on a particular building.)

Craft Jurisdiction for repair, maintenance and fabrication

Plate glass replacement, Storm windows and storm doors, Herculite door repairs, Door closer repairs, Glass tinting.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $28.32
Supplemental Benefit Rate per Hour: $28.68

Overtime
Time and one half the regular rate after an 8 hour day.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Paid Holidays
New Year's Day
President's Day
Memorial Day

Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

DC9 (Local #1087)

HAZARDOUS MATERIAL HANDLER
(Removal, abatement, encapsulation or decontamination of asbestos, lead, mold, or other toxic or hazardous waste/materials)

Handler

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $40.00
Supplemental Benefit Rate per Hour: $26.27

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Sunday.
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Veteran's Day
Thanksgiving Day
Christmas Day
Easter

Paid Holidays
None

(Local #78 and Local #12A)

HEAT AND FROST INSULATOR

Heat & Frost Insulator

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $73.21
Supplemental Benefit Rate per Hour: $37.81

Overtime Description
Supplemental Benefit contributions are to be made at the applicable overtime rates.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Triple time the regular rate for work on the following holiday(s).
Labor Day

Paid Holidays
None

Shift Rates
The first shift shall work seven hours at the regular straight time rate. The second and third shift shall work seven hours the regular straight time hourly rate plus a fourteen percent wage and benefit premium. There must be a first shift to work the second shift, and a second shift to work the third shift. Off-hour jobs in occupied buildings may be worked on weekdays with an increment of one-dollar ($1.00) per hour and eight (8) hours pay for seven (7) hours worked.

(Local #12) (BCA)

HOUSE WRECKER
(TOTAL DEMOLITION)

House Wrecker - Tier A

On all work sites the first, second, eleventh and every third House Wrecker thereafter will be Tier A House Wreckers (i.e. 1st, 2nd, 11th, 14th etc). Other House Wreckers may be Tier B House Wreckers.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $40.60
Supplemental Benefit Rate per Hour: $32.80

House Wrecker - Tier B

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $29.83
Supplemental Benefit Rate per Hour: $25.21

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

(Mason Tenders District Council)

IRON WORKER - ORNAMENTAL

Iron Worker - Ornamental

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.65
Supplemental Benefit Rate per Hour: $69.29
Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Overtime Description
Monday through Friday- the first eight hours are paid at straight time, the 9th and 10th hours are paid at time and one-half the regular rate, all additional weekday overtime is paid at double the regular rate. Saturdays- the first eight hours are paid at time and one-half the regular rate, double time thereafter. Sunday-all shifts are paid at double time. Four Days a week at Ten (10) hours straight time is allowed.

Overtime
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When two or three shifts are employed on a job, Monday through Friday, each shift will be paid eight (8) hours at the straight time rate for eight (8) hours of work; at time and one-half the regular straight time rate for the first two (2) hours of overtime worked beyond eight (8) hours; and at double time for all work thereafter. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, eight (8) hours will be paid at straight time rate for seven (7) hours of work, and all overtime shall be paid at time and one-half the regular straight time rates. On Saturday, Sundays and Holidays, time and one-half the regular straight time rate shall be paid for all work up to seven (7) hours and double time shall be paid for all work thereafter.

(Local #580)

IRON WORKER - STRUCTURAL

Iron Worker - Structural

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $59.45
Supplemental Benefit Rate per Hour: $94.63
Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Overtime Description

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

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

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

Shift Rates

Monday through Friday - First Shift: First eight hours are paid at straight time, the 9th & 10th hours are paid at time and a half, double time paid thereafter. Second and third Shifts: First eight hours are paid at time and one-half, double time thereafter. Saturdays: All shifts, first eight hours paid at time and one-half, double time thereafter: Sunday all shifts are paid at double time.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday.

(Local #40 & #361)

LABORER – HEAVY & HIGHWAY
(Foundation, Concrete, Excavating, Street Pipe Layer and Common)

Laborer - Heavy & Highway

Excavation and foundation work for buildings, heavy construction, street pipe laying, engineering work, and hazardous waste removal in connection with the above work. Landscaping tasks in connection with heavy construction work, engineering work and building projects. Projects include, but are not limited to pollution plants, sewers, parks, subways, bridges, highways, etc. In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, for City public work contracts and subcontracts solicited on or after July 1, 2024 only, includes traffic control duty associated with such projects.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.60
Supplemental Benefit Rate per Hour: $57.77

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Columbus Day
Christmas Day

Triple time the regular rate for work on the following holiday(s).
Labor Day
Thanksgiving Day

Paid Holidays
Labor Day
Thanksgiving Day

Shift Rates
When two shifts are employed, single time rate shall be paid for each shift. When three shifts are found necessary, each shift shall work seven and one half hours (7 ½), but shall be paid for eight (8) hours of labor, and be permitted one half hour for lunch.

(Local #731)

LABORER - PAVER & ROADBUILDER

Laborer - Paver & Roadbuilder

Paving and road construction work, regardless of material used, including but not limited to preparation of job sites, removal of old surfaces, asphalt and/or concrete, by whatever method, including but not limited to milling; laying of concrete; laying of asphalt for temporary, patchwork, and utility paving (but not production paving); site preparation and incidental work for installation of rubberized materials and similar surfaces; installation and repair of temporary construction fencing; slurry/seal coating, paving stones, maintenance of safety surfaces; play equipment installation, and other related work. In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, for City public work contracts and subcontracts solicited on or after July 1, 2024 only, includes traffic control duty associated with such projects.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.98

Supplemental Benefit Rate per Hour: $56.65
Supplemental Note: For time and one half overtime - $61.53 For double overtime - $66.40

Paver & Roadbuilder - Formsetter

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $50.85
Supplemental Benefit Rate per Hour: $56.65
Supplemental Note: For time and one half overtime - $61.53 For double overtime - $66.40

Production Paver & Roadbuilder - Shoveler

General laborer (except removal of surfaces - see Paver and Roadbuilder-Laborer) including but not limited to tamper, AC paint and liquid tar work.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.98
Supplemental Benefit Rate per Hour: $56.65
Supplemental Note: For time and one half overtime - $61.53 For double overtime - $66.40

Production Paver & Roadbuilder - Raker

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $50.85
Supplemental Benefit Rate per Hour: $56.65
Supplemental Note: For time and one half overtime - $61.53 For double overtime - $66.40

Production Paver & Roadbuilder - Screed Person

(Production paving is asphalt paving when using a paving machine or on a project where a paving machine is traditionally used)

Adjustment of paving machinery on production paving jobs.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $51.45
Supplemental Benefit Rate per Hour: $56.65
Supplemental Note: For time and one half overtime - $61.53 For double overtime - $66.40

Overtime Description

If an employee works New Year's Day or Christmas Day, they receive the single time rate plus 25%.

For Paid Holidays: Holiday pay for all holidays shall be prorated based two hours per day for each day worked in the holiday week, not to exceed 8 hours of holiday pay.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day

Paid Holidays

Memorial Day
Independence Day
Labor Day
Thanksgiving Day

Shift Rates

When two shifts are employed, the work period for each shift shall be a continuous eight (8) hours. When three shifts are employed, each shift will work seven and one half (7 ½) hours but will be paid for eight (8) hours at the straight time rate since only one half (1/2) hour is allowed for meal time.
When two or more shifts are employed, single time will be paid for each shift.

(Local #1010)

LABORER - PAVER & ROADBUILDER LINE STRIPING (ROADWAY)

(Road markings, applications of striping and surface coatings on Roadways, Bus lanes, Bike lanes & Pedestrian Plazas)

Striping - Machine Operator (Thermoplastic & Epoxy)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $43.00
Supplemental Benefit Rate per Hour: $25.77
Supplemental Note: For time and one half overtime - $28.02 For double overtime - $30.27

Lineperson - Crew Chief

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $47.00
Supplemental Benefit Rate per Hour: $25.77
Supplemental Note: For time and one half overtime - $28.02 For double overtime - $30.27

Laborer: Striping Assistant - Green Infrastructure - Traffic Control

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $41.00

Supplemental Benefit Rate per Hour: $25.77
Supplemental Note: For time and one half overtime - $28.02 For double overtime - $30.27

Overtime Description
For Paid Holidays: Employees will only receive Holiday Pay for holidays not worked if said employee worked both the regularly scheduled workday before and after the holiday.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Shift Rates
Vacation
As of January 1, 2026, Vacation removed and its value was incorporated in the Supplemental Benefit rate above.

Vacation
Vacation Employees with one to two years service shall accrue vacation based on hours worked: 250 hours worked - 1 day vacation; 500 hours worked - 2 days vacation; 750 hours worked - 3 days vacation; 900 hours worked - 4 days vacation; 1,000 hours worked - 5 days vacation. Employees with two to five years service receive two weeks vacation. Employees with five to twenty years service receive three weeks vacation. Employees with twenty to twenty-five years service receive four weeks vacation. Employees with 25 or more years service receive five weeks vacation.

(Local #1010)

LANDSCAPING

Landscaper (Year 6 and above)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $40.66
Supplemental Benefit Rate per Hour: $18.55

Landscaper (Year 3 - 5)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $39.39
Supplemental Benefit Rate per Hour: $18.55

Landscaper (up to 3 years)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $36.19
Supplemental Benefit Rate per Hour: $18.55

Groundsperson

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $36.19
Supplemental Benefit Rate per Hour: $18.55

Tree Remover / Pruner

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $47.08
Supplemental Benefit Rate per Hour: $18.55

Landscaper Sprayer (Pesticide Applicator)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.28
Supplemental Benefit Rate per Hour: $18.55

Watering - Plant Maintainer

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $27.85
Supplemental Benefit Rate per Hour: $18.55

Overtime Description

For all overtime work performed, supplemental benefits shall include an additional seventy-five ($0.75) cents per hour.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays

New Year's Day
Memorial Day
Independence Day

Labor Day
Thanksgiving Day
Christmas Day

Shift Rates

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

(Local #175)

MARBLE MECHANIC

Marble Setter

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $60.21
Supplemental Benefit Rate per Hour: $44.96

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $60.61
Supplemental Benefit Rate per Hour: $45.31

Marble Finisher

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $46.17
Supplemental Benefit Rate per Hour: $41.91

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $46.49
Supplemental Benefit Rate per Hour: $42.11

Marble Polisher

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $45.11
Supplemental Benefit Rate per Hour: $35.01

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $45.47
Supplemental Benefit Rate per Hour: $35.21

Marble Maintenance Finisher

Effective Period: 7/1/2026 - 7/1/2026

Wage Rate per Hour: **$28.30**
Supplemental Benefit Rate per Hour: **$15.94**

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: **$28.56**
Supplemental Benefit Rate per Hour: **$16.09**

Overtime Description
Supplemental Benefit contributions are to be made at the applicable overtime rates.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Local #7)

MASON TENDER
Building Laborer

Mason Tender

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$42.55**
Supplemental Benefit Rate per Hour: **$34.64**

Overtime

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

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates

The employer may work two (2) shifts with the first shift at the straight time wage rate and the second shift receiving 114.3% of straight time on wage rate and fringe benefit rate. When it is not possible to conduct alteration work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Local #79)

MASON TENDER (INTERIOR DEMOLITION WORKER)

Mason Tender Tier A

Tier A Interior Demolition Worker performs all burning, chopping, and other technically skilled tasks related to interior demolition work.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $38.40
Supplemental Benefit Rate per Hour: $26.89

Mason Tender Tier B

Tier B Interior Demolition Worker performs manual work and work incidental to demolition work, such as loading and carting of debris from the work site to an area where it can be loaded in to bins/trucks for removal.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $27.59
Supplemental Benefit Rate per Hour: $21.21

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

(Local #79)

METALLIC LATHER

Metallic Lather

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $47.85
Supplemental Benefit Rate per Hour: $57.11
Supplemental Note: For time and one half overtime - $69.11 For double overtime - $90.51

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Christmas Day

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

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

Shift Rates
Off-shift work outside of normal working hours shall receive straight time rate plus $12 per hour for the first eight (8) hours.

(Local #46)

MILLWRIGHT

Millwright

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $62.03
Supplemental Benefit Rate per Hour: $59.98

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Veteran's Day
Thanksgiving Day
Christmas Day

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

Shift Rates
Second and third shifts receives the straight time rate of pay plus fifteen (15%) percent allowing for one half hour for a meal. There must be a first shift to work a second and third shift. All additional hours worked shall be paid at the time and one-half rate of pay plus fifteen (15%) percent for weekday hours.

(Local #740)

MOSAIC MECHANIC

Mosaic Mechanic - Mosaic & Terrazzo Mechanic

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $55.82
Supplemental Benefit Rate per Hour: $49.47

Mosaic Mechanic- Mosaic & Terrazzo Mechanic / Machine Operator Grinder

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $54.22
Supplemental Benefit Rate per Hour: $49.47

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Local #7)

PAINTER

Painter - Brush & Roller

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $45.50
Supplemental Benefit Rate per Hour: $45.72
Supplemental Note: Supplemental benefits for time and one half overtime - $54.78, For double overtime - $63.83

Spray & Scaffold / Decorative / Sandblast

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.50
Supplemental Benefit Rate per Hour: $45.72
Supplemental Note: Supplemental benefits for time and one half overtime - $54.78, For double overtime - $63.83

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(District Council of Painters #9)

PAINTER - BRIDGE & STRUCTURAL STEEL

Painters on Structural Steel

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $57.00
Supplemental Benefit Rate per Hour: $57.21

Painter - Power Tool

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $64.00

Supplemental Benefit Rate per Hour: $57.21
Overtime Wage Rate: $7.00 above the "Painters on Structural Steel" overtime rate.

Overtime Description
Supplemental Benefits shall be paid for each hour worked, up to forty (40) hours per week for the period of May 1st to November 15th or up to fifty (50) hours per week for the period of November 16th to April 30th.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
Second shift is paid at regular hourly wage rates plus a ten percent (10%) differential. There must be a first shift to work a second shift.

(Local #806)

PAINTER - METAL POLISHER

METAL POLISHER

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $35.00
Supplemental Benefit Rate per Hour: $12.84

METAL POLISHER - NEW CONSTRUCTION

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $35.95
Supplemental Benefit Rate per Hour: $12.84

METAL POLISHER - SCAFFOLD OVER 34 FEET

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $38.50
Supplemental Benefit Rate per Hour: $12.84

ASSISTANT METAL POLISHER

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $27.19
Supplemental Benefit Rate per Hour: $12.47

ASSISTANT METAL POLISHER - NEW CONSTRUCTION

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $27.94
Supplemental Benefit Rate per Hour: $12.47

ASSISTANT METAL POLISHER - SCAFFOLD OVER 34 FEET

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $29.69
Supplemental Benefit Rate per Hour: $12.47

Overtime Description
All work performed on Saturdays shall be paid at time-in-a half. The exception being; for suspended scaffold work and work deemed as a construction project; an eight (8) hour shift lost during the week due to circumstances beyond the control of the employer, up to a maximum of eight (8) hours per week, may be worked on Saturday at the straight time rate.

Holiday Pay
Double time the regular rate for work on the following Holiday plus the day's pay. Only employees who have completed one year of service, including any trial period shall be eligible for holiday pay.

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

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

Day after Thanksgiving
Christmas Day

Shift Rates
Four Days a week at Ten (10) hours straight a day.

Local 8A-28A

PAINTER - SIGN

Sign Painter

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.39
Supplemental Benefit Rate per Hour: $29.75

Assistant Sign Painter

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $41.98
Supplemental Benefit Rate per Hour: $29.04

Overtime Description
If any employee is required to work on any of the paid holidays then the employee shall receive double time rate of wages as well as the holiday pay for that day.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Paid Holidays
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Personal Day

Vacation
At least 1 year of employment.....1 week

2 years or more of employment.....2 weeks
8 years or more of employment.....3 weeks

(Local #8A-28A)

PAPERHANGER

Paperhanger

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.02
Supplemental Benefit Rate per Hour: $46.90
Supplemental Note: Supplemental benefits for time and one half overtime - $55.87, For double overtime - $64.84

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
None

(District Council of Painters #9)

PLASTERER

Plasterer

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.51
Supplemental Benefit Rate per Hour: $32.78

Plasterer II

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $32.11
Supplemental Benefit Rate per Hour: $16.70

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When it is not possible to conduct work during regular working hours (between 6:00am and 4:30pm), a shift differential shall be paid at the regular hourly rate plus a twelve percent (12%) per hour differential. Workers on shift work shall be allowed a paid one-half hour meal break.

(Local #262)

PLASTERER - TENDER

Plasterer - Tender

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $42.55
Supplemental Benefit Rate per Hour: $34.64

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

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When work commences outside regular work hours, workers receive an hour additional (differential) wage and supplement payment. Eight hours pay for seven hours work or nine hours pay for eight hours work.

(Mason Tenders District Council)

PLUMBER

Plumber

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $78.05
Supplemental Benefit Rate per Hour: $46.40
Supplemental Note: Double time shall be paid for supplemental benefits during overtime work.

Plumber - Temporary Services

Temporary Services - When there are no Plumbers on the job site, there may be three shifts designed to cover the entire twenty-four hour period, including weekends if necessary, at the following rate straight time.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $62.52
Supplemental Benefit Rate per Hour: $37.04
Supplemental Note: Double time shall be paid for supplemental benefits during overtime work.

Overtime Description
Where the plumbing contract price is one and one half million dollars ($1,500,000.00) or less, double time the regular rate after an 8 hour day.

Overtime
Double time the regular rate after a 7 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates
Shift work, when directly specified in public agency or authority contract documents, and continues for a period of not less than ten (10) consecutive work days. A shift shall consist of seven (7) hours with one-half (1/2) hour for lunch after the first four (4) hours of each shift. A premium of thirty percent (30%) for wages and supplemental benefits on shift work performed Monday through Friday on the 4 P.M. and midnight shifts. For shift work performed on weekends the shift premium shall be fifty percent (50%) of wages and supplemental benefits. For shift work performed on holidays designated below, double time wages and supplemental benefits shall be paid. Also noted that the normal workday Monday through Friday 8:00 A.M. to 3:30 P.M. is not considered shift work, and therefore not subject to shift premium.

(Plumbers Local #1)

PLUMBER (MECHNICAL EQUIPMENT AND SERVICE)
Mechanical Equipment and Service work is any repair and/or replacement of the present plumbing system that does not change existing roughing or water supply lines. Projects regardless of work type which have approved plans and specifications wherein the plumbing exceeds $725,000 are excluded.

Plumber

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.90
Supplemental Benefit Rate per Hour: $22.86

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

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Plumbers Local # 1)

PLUMBER (RESIDENTIAL RATES FOR 1, 2 AND 3 FAMILY HOME CONSTRUCTION)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $54.25
Supplemental Benefit Rate per Hour: $33.21

Overtime
Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates

Shift work, when directly specified in public agency or authority contract documents, and continues for a period of not less than ten (10) consecutive work days. A shift shall consist of seven (7) hours with one-half (1/2) hour for lunch after the first four (4) hours of each shift. A premium of thirty percent (30%) for wages and supplemental benefits on shift work performed Monday through Friday on the 4 P.M. and midnight shifts. For shift work performed on weekends the shift premium shall be fifty percent (50%) of wages and supplemental benefits. For shift work performed on holidays designated below, double time wages and supplemental benefits shall be paid. Also noted that the normal workday Monday through Friday 8:00 A.M. to 3:30 P.M. is not considered shift work, and therefore not subject to shift premium.

(Plumbers Local #1)

PLUMBER: PUMP & TANK

Oil Trades (Installation and Maintenance)

Plumber - Pump & Tank

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $75.00
Supplemental Benefit Rate per Hour: $35.81

Overtime

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

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

Shift Rates

All work outside the regular workday (8:00 A.M. to 4:30 P.M.) is to be paid at time and one half the regular hourly rate

(Plumbers Local #1)

POINTER, WATERPROOFER, CAULKER, SANDBLASTER, STEAMBLASTER
(Exterior Building Renovation)

Journeyperson

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $66.58
Supplemental Benefit Rate per Hour: $33.85

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

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
All work outside the regular work day (an eight hour workday between the hours of 6:00 A.M. and 4:00 P.M.) is to be paid at time and one half the regular rate. However, the employer may establish one (1) or two (2) shifts starting at or after 4:00 P.M. to be paid at the regular hourly rate plus a 10% differential. For projects bid and performed after July 1, 2023, the first shift shall be paid at the regular hourly rate plus a 5% differential.

(Bricklayer District Council)

ROOFER

Roofer

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $52.50
Supplemental Benefit Rate per Hour: $40.03

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
Second shift - Regular hourly rate plus a 10% differential. Third shift - Regular hourly rate plus a 15% differential. There must be a first shift to work the second shift, and a second shift to work the third shift. All other work outside the regular work day (an eight hour workday between the hours of 5:00 A.M. and 4:00 P.M.) is to be paid at time and one half the regular rate.

(Local #8)

SHEET METAL WORKER

Sheet Metal Worker

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $57.08
Supplemental Benefit Rate per Hour: $60.70
Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Sheet Metal Worker - Fan Maintenance

(The temporary operation of fans or blowers in new or existing buildings for heating and/or ventilation, and/or air conditioning prior to the completion of the project.)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $45.66
Supplemental Benefit Rate per Hour: $60.70

Sheet Metal Worker - Duct Cleaner

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $21.00
Supplemental Benefit Rate per Hour: $13.06

Overtime Description
Double time the regular rate after 10 hours on Saturday.

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

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Juneteenth

Paid Holidays
None

Shift Rates
Work that can only be performed outside regular working hours (eight hours of work between 7:30 A.M. and 3:30 P.M.) - First shift (work between 3:30 P.M. and 11:30 P.M.) - 10% differential above the established hourly rate. Second shift (work between 11:30 P.M. and 7:30 A.M.) - 15% differential above the established hourly rate.

For Fan Maintenance: On all full shifts of fan maintenance work the straight time hourly rate of pay will be paid for each shift, including nights, Saturdays, Sundays, and holidays.

(Local #28)

SHEET METAL WORKER - SPECIALTY
(Decking & Siding)

Sheet Metal Specialty Worker

The first worker to perform this work must be paid at the rate of the Sheet Metal Worker. The second and third workers shall be paid the Specialty Worker Rate. The ratio of One Sheet Metal Worker, then Two Specialty Workers shall be utilized thereafter.

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $52.54
Supplemental Benefit Rate per Hour: $31.61
Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Overtime Description
Double time the regular rate after 10 hours on Saturday.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day
Juneteenth

Paid Holidays
None

(Local #28)

SHIPYARD WORKER

Shipyard Mechanic - First Class

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $33.06
Supplemental Benefit Rate per Hour: $3.04

Shipyard Mechanic - Second Class

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $22.89
Supplemental Benefit Rate per Hour: $2.26

Shipyard Laborer - First Class

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $27.74
Supplemental Benefit Rate per Hour: $3.28

Shipyard Laborer - Second Class

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $19.92
Supplemental Benefit Rate per Hour: $2.41

Shipyard Dockhand - First Class

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $28.65
Supplemental Benefit Rate per Hour: $3.27

Shipyard Dockhand - Second Class

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $20.78
Supplemental Benefit Rate per Hour: $3.20

Overtime Description

Work performed on holiday is paid double time the regular hourly wage rate plus holiday pay.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Paid Holidays

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

Based on Survey Data

SIGN ERECTOR
(Sheet Metal, Plastic, Electric, and Neon)

Sign Erector

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $58.00
Supplemental Benefit Rate per Hour: $63.44

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

Time and one half the regular hourly rate is to be paid for all hours worked outside the regular workday either (7:00 A.M. through 2:30 P.M.) or (8:00 A.M. through 3:30 P.M.)

(Local #137)

STEAMFITTER

Steamfitter

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $61.80
Supplemental Benefit Rate per Hour: $64.89
Supplemental Note: Overtime supplemental benefit rate for double time: $129.04. For time & half: $96.97

Steamfitter -Temporary Services

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.97
Supplemental Benefit Rate per Hour: $52.50

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

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

The single time rate plus 15%.
Martin Luther King Jr. Day
President's Day
Columbus Day
Veteran's Day

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

Shift Rates
When shift work is performed the wage rate for regular time worked is a 15% percent premium on wage.

Local 638

STEAMFITTER - REFRIGERATION AND AIR CONDITIONER
(Maintenance and Installation Service Person)

Refrigeration and Air Conditioner Mechanic

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.35
Supplemental Benefit Rate per Hour: $23.46

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Independence Day
Labor Day
Veteran's Day
Thanksgiving Day
Christmas Day

Double time and one half the regular rate for work on the following holiday(s).
Martin Luther King Jr. Day
President's Day
Memorial Day
Columbus Day

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

Christmas Day

(Local #638-B)

STONE MASON - SETTER

Stone Mason - Setter

(Assisted by Derrickperson and Rigger)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $62.52
Supplemental Benefit Rate per Hour: $56.92

Overtime Description
Monday through Friday: Time and one quarter after seven hours worked. Time and one half after eight hours worked. Double time after 9 hours worked.
Saturday: Time and one half for the first nine hours worked. Double time after 9 hours worked.
Sunday and Holiday: double time for all hours worked.
Site Work: (paving and base course) paid at straight time for the first eight hours.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

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

Shift Rates
For all hours worked outside 8:00 am to 3:30 pm shall be paid double time unless flex band hours and/or site work are in use.

(Bricklayers District Council)

TAPER

Drywall Taper

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.01
Supplemental Benefit Rate per Hour: $37.67
Supplemental Note: Supplemental benefits for time and one half overtime - $42.80, For double overtime - $75.34

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Columbus Day
Thanksgiving Day
Day before Christmas
Christmas Day
Day before New Year's Day

(Local #1974)

TELECOMMUNICATION WORKER
(Install/maintain/repair telecommunications cables carrying data, video, and/or voice except for installation on building construction/alteration/renovation projects.)

Telecommunication Worker

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $47.03
Supplemental Benefit Rate per Hour: $23.15
Supplemental Note: The above rate applies for Manhattan, Bronx, Brooklyn, Queens. $22.84 for Staten Island only.

Overtime

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

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Lincoln's Birthday
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day

Paid Holidays

New Year's Day
Lincoln's Birthday
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day
Employees have the option of observing either Martin Luther King's Birthday or the day after Thanksgiving instead of Lincoln's Birthday

Shift Rates

For any workday that starts before 8A.M. or ends after 6P.M. there is a 10% differential for the applicable worker's hourly rate.

Vacation

After 6 months.....one week.
After 12 months but less than 7 years.....two weeks.
After 7 or more but less than 15 years.....three weeks.
After 15 years or more but less than 25 years.....four weeks.

(C.W.A.)

TILE FINISHER

Tile Finisher

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $50.93
Supplemental Benefit Rate per Hour: $34.66

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
Off shift work day (work performed outside the regular 8:00 A.M. to 3:30 P.M. workday): shift differential of one and one quarter (1¼) times the regular straight time rate of pay for the seven hours of actual off-shift work.

(Local #7)

TILE LAYER - SETTER

Tile Layer - Setter

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $66.35
Supplemental Benefit Rate per Hour: $38.06

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

Off shift work day (work performed outside the regular 8:00 A.M. to 3:30 P.M. workday): shift differential of one and one quarter (1¼) times the regular straight time rate of pay for the seven hours of actual off-shift work.

(Local #7)

TIMBERPERSON

Timberperson

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $57.59
Supplemental Benefit Rate per Hour: $57.41

Overtime

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

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

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

(Local #1556)

TUNNEL WORKER

Blasters, Mucking Machine Operators (Compressed Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $75.14
Supplemental Benefit Rate per Hour: $66.51

Tunnel Workers (Compressed Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $72.46
Supplemental Benefit Rate per Hour: $64.41

Top Nipper (Compressed Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $71.24
Supplemental Benefit Rate per Hour: $63.14

Outside Lock Tender, Outside Gauge Tender,Muck Lock Tender (Compressed Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $69.83
Supplemental Benefit Rate per Hour: $62.11

Bottom Bell & Top Bell Signal Person: Shaft Person (Compressed Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $69.83
Supplemental Benefit Rate per Hour: $62.11

Changehouse Attendant: Powder Watchperson (Compressed Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $61.57
Supplemental Benefit Rate per Hour: $58.18

Blasters (Free Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $71.69
Supplemental Benefit Rate per Hour: $63.84

Tunnel Workers (Free Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $68.58
Supplemental Benefit Rate per Hour: $61.18

All Others (Free Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $63.40
Supplemental Benefit Rate per Hour: $56.62

Microtunneling (Free Air Rates)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $54.86
Supplemental Benefit Rate per Hour: $48.95

Overtime Description

For work performed during excavation and primary concrete tunnel lining phases - Double time the regular rate after an 8 hour day and Saturday, Sunday and on the following holiday(s) listed below.
For Repair-Maintenance Work on Existing Equipment and Facilities - Time and one half the regular rate after a 8 hour day, Saturday, Sunday and double time the regular rate for work on the following holiday(s) listed below.
For Small-Bore Micro Tunneling Machines - Time and one-half the regular rate shall be paid for all overtime.
For work not listed above - Time and one half the regular rate after an 8 hour day and Saturday and double time the regular rate on Sunday and on the following holiday(s) listed below.

Paid Holidays

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

Christmas Day

(Local #147)

UTILITY LOCATOR
(Locate & mark underground utilities including gas for street excavation and utility line repairs)

Utility Locator (Months Over 60)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $38.03
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 55-60)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $35.83
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 49-54)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.07
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 43-48)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $32.30
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 37-42)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.54
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 31-36)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $28.78

Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 25-30)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $27.02
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 19-24)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.26
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 13-18)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $23.50
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 7-12)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $21.74
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Months 0-6)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $19.98
Supplemental Benefit Rate per Hour: $1.43
Supplemental Note: No Benefits for the first 90 days of employment.

Overtime

Time and one half the regular rate for work on the following holiday(s).
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Paid Holidays

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

Shift Rates

10% shift differential to employees working any shift starting between noon and 5 AM.

Vacation

For up to 1 year 0 hours

For year 1 - 2 48 hours per year
For year 3 - 9 96 hours per year
For year 10 or more 144 hours per year

Sick Days:
For up to 1 year employee receives 40 hours paid sick leave.
For year 1 employee earns 2 hours of paid sick leave for every 100 overtime hours worked.
For year 2 - 9 years employee earns 4 hours of paid sick leave for every 100 overtime hours worked.
For year 10 or more employee earns 6 hours of paid sick leave for every 100 overtime hours worked.

(C.W.A.)

WELDER

WELDER AND FIREWATCH TO BE PAID AT THE RATE OF THE JOURNEYPERSON OR REGISTERED APPRENTICE IN THE TRADE PERFORMING THE WORK.

OFFICE OF THE COMPTROLLER

CITY OF NEW YORK

CONSTRUCTION APPRENTICE PREVAILING WAGE SCHEDULE

Pursuant to Labor Law § 220 (3-e), only apprentices who are individually registered in a bona fide program to which the employer contractor is a participant and registered with the New York State Department of Labor, may be paid at the apprentice rates in this schedule. Apprentices who are not so registered must be paid as journey persons in accordance with the trade classification of the work they actually performed.

Apprentice ratios are established to ensure the proper safety, training and supervision of apprentices. A ratio establishes the number of journey workers required for each apprentice in a program and on a job site. Ratios are interpreted as follows: in the case of a 1:1, 1:4 ratio, there must be one journey worker for the first apprentice, and four additional journey workers for each subsequent apprentice.

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BOILERMAKER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Boilermaker (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $45.75
Supplemental Benefit Rate per Hour: $35.60

Boilermaker (Second Year: 1st Six Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.27
Supplemental Benefit Rate per Hour: $37.70

Boilermaker (Second Year: 2nd Six Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $52.79
Supplemental Benefit Rate per Hour: $39.81

Boilermaker (Third Year: 1st Six Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $56.30
Supplemental Benefit Rate per Hour: $41.89

Boilermaker (Third Year: 2nd Six Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $59.82
Supplemental Benefit Rate per Hour: $44.02

Boilermaker (Fourth Year: 1st Six Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $63.34
Supplemental Benefit Rate per Hour: $46.13

Boilermaker (Fourth Year: 2nd Six Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $66.86
Supplemental Benefit Rate per Hour: $48.24

(Local #5)

BRICKLAYER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Bricklayer (First 650 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $24.52
Supplemental Benefit Rate per Hour: $29.85

Bricklayer (Second 650 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.65
Supplemental Benefit Rate per Hour: $29.85

Bricklayer (Third 650 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $36.77
Supplemental Benefit Rate per Hour: $29.85

Bricklayer (Fourth 650 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $42.90
Supplemental Benefit Rate per Hour: $29.85

Bricklayer (Fifth 650 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.03
Supplemental Benefit Rate per Hour: $29.85

Bricklayer (Last 750 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $55.16
Supplemental Benefit Rate per Hour: $29.85

(Bricklayer District Council)

CARPENTER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Carpenter (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour For Building Apprentice: $25.20
Supplemental Benefit Rate Per Hour For Building Apprentice: $20.20

Wage Rate Per Hour For Heavy Apprentice: $28.98
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $39.89

Carpenter (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour For Building Apprentice: $28.20
Supplemental Benefit Rate Per Hour For Building Apprentice: $21.70

Wage Rate Per Hour For Heavy Apprentice: $34.58
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $39.89

Carpenter (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour For Building Apprentice: $32.45
Supplemental Benefit Rate Per Hour For Building Apprentice: $25.30

Wage Rate Per Hour For Heavy Apprentice: $42.96
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $39.89

Carpenter (Fourth Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour For Building Apprentice: $40.33
Supplemental Benefit Rate Per Hour For Building Apprentice: $27.30

Wage Rate Per Hour For Heavy Apprentice: $51.35
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $39.89

(Carpenters District Council)

CARPENTER - HIGH RISE CONCRETE FORMS
(Ratio of Apprentice to Journeyperson: 1 to 1, 2 to 5)

Carpenter - High Rise (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $18.27
Supplemental Benefit Rate per Hour: $17.55

Carpenter - High Rise (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $24.70
Supplemental Benefit Rate per Hour: $17.68

Carpenter - High Rise (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $31.28
Supplemental Benefit Rate per Hour: $17.81

Carpenter - High Rise (Fourth Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $38.90
Supplemental Benefit Rate per Hour: $17.96

(Carpenters District Council)

CEMENT AND CONCRETE WORKER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Cement & Concrete Worker (First 1333 hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $19.27
Supplemental Benefit Rate per Hour: $17.97

Cement & Concrete Worker (Second 1333 hours)

Effective Period: 7/1/2026 - 6/30/2027

Wage Rate per Hour: **$25.24**
Supplemental Benefit Rate per Hour: **$23.41**

Cement & Concrete Worker (Last 1334 hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$31.21**
Supplemental Benefit Rate per Hour: **$24.85**

(Cement Concrete Workers District Council)

CEMENT MASON
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Cement Mason (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$23.77**
Supplemental Benefit Rate per Hour: **$14.86**

Cement Mason (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$28.74**
Supplemental Benefit Rate per Hour: **$15.16**

Cement Mason (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$34.27**
Supplemental Benefit Rate per Hour: **$15.27**

(Local #780)

DERRICKPERSON & RIGGER (STONE)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Derrickperson & Rigger (stone) - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.91
Supplemental Benefit Rate per Hour: $31.63

Derrickperson & Rigger (stone) - Second Year: 1st Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $43.27
Supplemental Benefit Rate per Hour: $47.63

Derrickperson & Rigger (stone) - Second Year: 2nd Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.46
Supplemental Benefit Rate per Hour: $47.63

Derrickperson & Rigger (stone) - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $55.64
Supplemental Benefit Rate per Hour: $47.63

(Local #197)

DOCKBUILDER/PILE DRIVER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Dockbuilder/Pile Driver (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour: $28.98
Supplemental Benefit Rate Per Hour: $39.89

Dockbuilder/Pile Driver (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour: $34.58
Supplemental Benefit Rate Per Hour: $39.89

Dockbuilder/Pile Driver (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour: $42.96
Supplemental Benefit Rate Per Hour: $39.89

Dockbuilder/Pile Driver (Fourth Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour: $51.35
Supplemental Benefit Rate Per Hour: $39.89

(Carpenters District Council)

ELECTRICIAN
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Electrician 1st year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $19.25
Supplemental Benefit Rate per Hour: $19.84
Overtime Supplemental Rate Per Hour: $21.11

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $19.25
Supplemental Benefit Rate per Hour: $20.93
Overtime Supplemental Rate Per Hour: $22.21

Electrician 2nd Year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $21.25
Supplemental Benefit Rate per Hour: $20.88
Overtime Supplemental Rate Per Hour: $22.29

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $21.25
Supplemental Benefit Rate per Hour: $21.99
Overtime Supplemental Rate Per Hour: $23.40

Electrician 3rd Year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $23.25
Supplemental Benefit Rate per Hour: $21.93

Overtime Supplemental Rate Per Hour: $23.48

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $23.25
Supplemental Benefit Rate per Hour: $23.05
Overtime Supplemental Rate Per Hour: $24.59

Electrician 4th Year

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $26.25
Supplemental Benefit Rate per Hour: $23.50
Overtime Supplemental Rate Per Hour: $25.25

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $26.25
Supplemental Benefit Rate per Hour: $24.64
Overtime Supplemental Rate Per Hour: $26.38

Electrician 5th Term (0-12 Months)

MIJ 1

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $26.79
Overtime Supplemental Rate Per Hour: $28.52

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $27.42
Overtime Supplemental Rate Per Hour: $29.16

Electrician 5th Term (13-18 Months)

MIJ 2

Effective Period: 7/1/2026 - 4/14/2027
Wage Rate per Hour: $33.50
Supplemental Benefit Rate per Hour: $30.01
Overtime Supplemental Rate Per Hour: $32.13

Effective Period: 4/15/2027 - 6/30/2027
Wage Rate per Hour: $33.50
Supplemental Benefit Rate per Hour: $30.68
Overtime Supplemental Rate Per Hour: $32.80

Overtime Description

Overtime Wage paid at time and one half the regular rate

(Local #3)

ELEVATOR CONSTRUCTOR
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Elevator (Constructor) - First Year

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $37.09
Supplemental Benefit Rate per Hour: $36.18

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $38.53
Supplemental Benefit Rate per Hour: $36.88

Elevator (Constructor) - Second Year

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $47.54
Supplemental Benefit Rate per Hour: $36.90

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $49.37
Supplemental Benefit Rate per Hour: $37.64

Elevator (Constructor) - Third Year

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $56.18
Supplemental Benefit Rate per Hour: $38.35

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $58.34
Supplemental Benefit Rate per Hour: $39.17

Elevator (Constructor) - Fourth Year

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $64.82

Supplemental Benefit Rate per Hour: $39.81

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $67.32
Supplemental Benefit Rate per Hour: $40.71

(Local #1)

ELEVATOR REPAIR & MAINTENANCE
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Elevator Service/Modernization Mechanic (First Year)

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $37.09
Supplemental Benefit Rate per Hour: $36.15

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $38.53
Supplemental Benefit Rate per Hour: $36.85

Elevator Service/Modernization Mechanic (Second Year)

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $37.43
Supplemental Benefit Rate per Hour: $36.87

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $38.90
Supplemental Benefit Rate per Hour: $37.61

Elevator Service/Modernization Mechanic (Third Year)

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $44.24
Supplemental Benefit Rate per Hour: $38.32

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $45.97
Supplemental Benefit Rate per Hour: $39.14

Elevator Service/Modernization Mechanic (Fourth Year)

Effective Period: 7/1/2026 - 3/16/2027
Wage Rate per Hour: $51.05
Supplemental Benefit Rate per Hour: $39.76

Effective Period: 3/17/2027 - 6/30/2027
Wage Rate per Hour: $53.04
Supplemental Benefit Rate per Hour: $40.66

(Local #1)

ENGINEER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Engineer - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $29.09
Supplemental Benefit Rate per Hour: $36.76

Engineer - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $36.36
Supplemental Benefit Rate per Hour: $36.76

Engineer - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $40.00
Supplemental Benefit Rate per Hour: $36.76

Engineer - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $43.63
Supplemental Benefit Rate per Hour: $36.76

(Local #15)

ENGINEER - OPERATING
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Operating Engineer - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $38.96
Supplemental Benefit Rate per Hour: $29.90

Operating Engineer - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.70
Supplemental Benefit Rate per Hour: $29.90

Operating Engineer - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $58.44
Supplemental Benefit Rate per Hour: $29.90

(Local #14)

FLOOR COVERER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Floor Coverer (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $26.54
Supplemental Benefit Rate per Hour: $19.11

Floor Coverer (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $29.60
Supplemental Benefit Rate per Hour: $20.87

Floor Coverer (Third Year)

Effective Period: 7/1/2026 - 6/30/2027

Wage Rate per Hour: **$34.05**
Supplemental Benefit Rate per Hour: **$24.87**

Floor Coverer (Fourth Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$42.40**
Supplemental Benefit Rate per Hour: **$27.12**

(Carpenters District Council)

GLAZIER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Glazier (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$22.52**
Supplemental Benefit Rate per Hour: **$20.08**

Glazier (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$24.41**
Supplemental Benefit Rate per Hour: **$35.41**

Glazier (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$31.96**
Supplemental Benefit Rate per Hour: **$44.44**

Glazier (Fourth Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$39.42**
Supplemental Benefit Rate per Hour: **$49.97**

DC9 (Local #1087)

HAZARDOUS MATERIAL HANDLER
(Ratio of Apprentice Journeyperson: 1 to 1, 1 to 3)

Handler (First 1000 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $20.80
Supplemental Benefit Rate per Hour: $19.00

Handler (Second 1000 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $21.85
Supplemental Benefit Rate per Hour: $19.00

Handler (Third 1000 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $24.92
Supplemental Benefit Rate per Hour: $19.00

Handler (Fourth 1000 Hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $27.08
Supplemental Benefit Rate per Hour: $19.00

(Local #78)

HEAT & FROST INSULATOR
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Heat & Frost Insulator (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $32.95
Supplemental Benefit Rate per Hour: $17.02

Heat & Frost Insulator (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $40.27
Supplemental Benefit Rate per Hour: $20.80

Heat & Frost Insulator (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $47.59
Supplemental Benefit Rate per Hour: $24.58

Heat & Frost Insulator (Fourth Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $54.91
Supplemental Benefit Rate per Hour: $28.37

(Local #12)

HOUSE WRECKER
(TOTAL DEMOLITION)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

House Wrecker - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $22.27
Supplemental Benefit Rate per Hour: $12.22

House Wrecker - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $24.02
Supplemental Benefit Rate per Hour: $12.22

House Wrecker - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.52
Supplemental Benefit Rate per Hour: $12.22

House Wrecker - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $28.02
Supplemental Benefit Rate per Hour: $12.22

(Mason Tenders District Council)

IRON WORKER - ORNAMENTAL
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Iron Worker (Ornamental) - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.98
Supplemental Benefit Rate per Hour: $15.99

Iron Worker (Ornamental) - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $28.45
Supplemental Benefit Rate per Hour: $17.99

Iron Worker (Ornamental) - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.80
Supplemental Benefit Rate per Hour: $18.99

Iron Worker (Ornamental) - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.39
Supplemental Benefit Rate per Hour: $20.99

(Local #580)

IRON WORKER - STRUCTURAL
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Iron Worker (Structural) - 1st Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.87
Supplemental Benefit Rate per Hour: $65.75

Iron Worker (Structural) - 7- 18 Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $31.47
Supplemental Benefit Rate per Hour: $65.75

Iron Worker (Structural) - 19 - 36 months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $32.08
Supplemental Benefit Rate per Hour: $65.75

(Local #40 and #361)

LABORER - HEAVY & HIGHWAY
(Ratio Apprentice to Journeyperson: 1 to 1, 1 to 3)

Laborer - Heavy & Highway - First 1000 hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $23.30
Supplemental Benefit Rate per Hour: $57.77

Laborer - Heavy & Highway - Second 1000 hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $27.96
Supplemental Benefit Rate per Hour: $57.77

Laborer - Heavy & Highway - Third 1000 hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.95
Supplemental Benefit Rate per Hour: $57.77

Laborer - Heavy & Highway - Fourth 1000 hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $41.94
Supplemental Benefit Rate per Hour: $57.77

(Local #731)

LABORER - PAVER & ROADBUILDER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Paver and Roadbuilder - First Year (Minimum 1000 hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $32.86
Supplemental Benefit Rate per Hour: $28.87

Paver and Roadbuilder - Second Year (Minimum 1000 hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.50
Supplemental Benefit Rate per Hour: $28.87

(Local#1010)

LABORER - PAVER AND ROADBUILDER - LINE STRIPING (ROADWAY)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Paver and Roadbuilder - Line Striping (Roadway) - First Year (Minimum 1000 hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $32.86
Supplemental Benefit Rate per Hour: $25.77

Paver and Roadbuilder - Line Striping (Roadway) - Second Year (Minimum 1000 hours)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.50
Supplemental Benefit Rate per Hour: $25.77

(Local #1010)

MARBLE MECHANICS
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Cutters & Setters - 0-3000 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $25.39
Supplemental Benefit Rate per Hour: $30.18
NO BENEFITS PAID DURING THE FIRST TWO MONTHS (PROBATIONARY PERIOD)

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $26.35
Supplemental Benefit Rate per Hour: $29.52
NO BENEFITS PAID DURING THE FIRST TWO MONTHS (PROBATIONARY PERIOD)

Cutters & Setters - 3001-3750 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $38.07
Supplemental Benefit Rate per Hour: $34.03

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $39.51
Supplemental Benefit Rate per Hour: $33.04

Cutters & Setters - 3751-4500 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $41.24
Supplemental Benefit Rate per Hour: $34.99

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $42.80
Supplemental Benefit Rate per Hour: $33.92

Cutters & Setters - 4501-5250 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $44.41
Supplemental Benefit Rate per Hour: $35.96

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $46.09
Supplemental Benefit Rate per Hour: $34.80

Cutters & Setters - 5251-6000 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $47.58
Supplemental Benefit Rate per Hour: $36.92

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $49.39
Supplemental Benefit Rate per Hour: $35.68

Cutters & Setters - 6001-7500 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $49.48
Supplemental Benefit Rate per Hour: $44.08

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $51.51
Supplemental Benefit Rate per Hour: $42.68

Finisher- 0-750 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $23.56
Supplemental Benefit Rate per Hour: $12.18

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $23.78
Supplemental Benefit Rate per Hour: $12.29

Finisher- 751-1500 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $24.20
Supplemental Benefit Rate per Hour: $12.68

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $24.43

Supplemental Benefit Rate per Hour: $12.79

Finisher- 1501-2250 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $24.83
Supplemental Benefit Rate per Hour: $13.18

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $25.07
Supplemental Benefit Rate per Hour: $13.30

Finisher- 2251-3000 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $25.46
Supplemental Benefit Rate per Hour: $13.68

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $25.70
Supplemental Benefit Rate per Hour: $13.81

Finisher- 3001-3750 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $26.41
Supplemental Benefit Rate per Hour: $14.43

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $26.65
Supplemental Benefit Rate per Hour: $14.57

Finisher- 3751-4500 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $27.68
Supplemental Benefit Rate per Hour: $15.43

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $27.93
Supplemental Benefit Rate per Hour: $15.58

Polisher- 0-900 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $33.84
Supplemental Benefit Rate per Hour: $30.90

Effective Period: 7/2/2026 - 6/30/2027

Wage Rate per Hour: $31.82
Supplemental Benefit Rate per Hour: $30.71

Polisher- 901-1800 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $38.68
Supplemental Benefit Rate per Hour: $31.32

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $36.37
Supplemental Benefit Rate per Hour: $31.12

Polisher- 1801-2700 Hours

Effective Period: 7/1/2026 - 7/1/2026
Wage Rate per Hour: $43.51
Supplemental Benefit Rate per Hour: $31.79

Effective Period: 7/2/2026 - 6/30/2027
Wage Rate per Hour: $40.91
Supplemental Benefit Rate per Hour: $31.55

(Local #7)

MASON TENDER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Mason Tender - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $22.27
Supplemental Benefit Rate per Hour: $11.72

Mason Tender - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $24.02
Supplemental Benefit Rate per Hour: $11.72

Mason Tender - Third Year

Effective Period: 7/1/2026 - 6/30/2027

Wage Rate per Hour: **$25.52**
Supplemental Benefit Rate per Hour: **$11.72**

Mason Tender - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$28.02**
Supplemental Benefit Rate per Hour: **$11.72**

(Local #79)

MASON TENDER (INTERIOR DEMOLITION WORKER)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Mason Tender (Interior Demolition) - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$21.75**
Supplemental Benefit Rate per Hour: **$11.27**

Mason Tender (Interior Demolition) - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$23.50**
Supplemental Benefit Rate per Hour: **$11.27**

Mason Tender (Interior Demolition) - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$25.00**
Supplemental Benefit Rate per Hour: **$11.27**

Mason Tender (Interior Demolition) - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$27.50**
Supplemental Benefit Rate per Hour: **$11.27**

(Local #79)

METALLIC LATHER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Metallic Lather (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $22.55
Supplemental Benefit Rate per Hour: $17.87

Metallic Lather (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $17.92

Metallic Lather (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $28.00
Supplemental Benefit Rate per Hour: $16.92

Metallic Lather (Fourth Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.00
Supplemental Benefit Rate per Hour: $16.92

(Local #46)

MILLWRIGHT
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Millwright (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $33.04
Supplemental Benefit Rate per Hour: $39.09

Millwright (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $38.89
Supplemental Benefit Rate per Hour: $42.79

Millwright (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $44.74
Supplemental Benefit Rate per Hour: $47.14

Millwright (Fourth Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $56.44
Supplemental Benefit Rate per Hour: $53.90

(Local #740)

MOSAIC MECHANIC
Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4

Mosaic & Terrazzo Mechanic 0-1500

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $23.45
Supplemental Benefit Rate per Hour: $10.96

Mosaic & Terrazzo Mechanic 1501-3000

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.80
Supplemental Benefit Rate per Hour: $14.08

Mosaic & Terrazzo Mechanic 3001-3750

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $38.35
Supplemental Benefit Rate per Hour: $22.33

Mosaic & Terrazzo Mechanic 3751-4500

Effective Period: 7/1/2026 - 6/30/2027

Wage Rate per Hour: **$39.00**
Supplemental Benefit Rate per Hour: **$31.70**

Mosaic & Terrazzo Mechanic 4501-5250

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$45.56**
Supplemental Benefit Rate per Hour: **$33.67**

Mosaic & Terrazzo Mechanic 5251-6000

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$51.05**
Supplemental Benefit Rate per Hour: **$37.71**

(Local 7)

PAINTER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Painter - Brush & Roller - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$18.20**
Supplemental Benefit Rate per Hour: **$20.34**

Painter - Brush & Roller - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$22.76**
Supplemental Benefit Rate per Hour: **$25.91**

Painter - Brush & Roller - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$27.30**
Supplemental Benefit Rate per Hour: **$30.60**

Painter - Brush & Roller - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: **$36.40**

Supplemental Benefit Rate per Hour: $39.74

(District Council of Painters)

PAINTER - BRIDGE & STRUCTURAL STEEL
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Painter - Bridge & Structural Steel (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $22.80
Supplemental Benefit Rate per Hour: $18.53

Painter - Bridge & Structural Steel (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.20
Supplemental Benefit Rate per Hour: $34.29

Painter - Bridge & Structural Steel (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $45.60
Supplemental Benefit Rate per Hour: $45.76

(Local #806)

PAINTER - METAL POLISHER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Metal Polisher (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $20.17
Supplemental Benefit Rate per Hour: $8.91
New Construction - Wage Rate Per Hour: $20.56
Scaffold Over 34 Feet - Wage Rate Per Hour: $22.67

Metal Polisher (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $22.18
Supplemental Benefit Rate per Hour: $8.91
New Construction - Wage Rate Per Hour: $22.62
Scaffold Over 34 Feet - Wage Rate Per Hour: $24.68

Metal Polisher (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $24.20
Supplemental Benefit Rate per Hour: $8.91
New Construction - Wage Rate Per Hour: $24.74
Scaffold Over 34 Feet - Wage Rate Per Hour: $26.70

(Local 8A-28)

PLASTERER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)
(Each Term is 800 Hours.)
(Rates are based of the Plasterer II)

Plasterer - First Term

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $19.15
Supplemental Benefit Rate per Hour: $12.98

Plasterer - Second Term

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $22.54
Supplemental Benefit Rate per Hour: $13.47

Plasterer - Third Term

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.95
Supplemental Benefit Rate per Hour: $14.12

(Local #262)

PLASTERER - TENDER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Plasterer Tender - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $22.27
Supplemental Benefit Rate per Hour: $11.72

Plasterer Tender - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $24.02
Supplemental Benefit Rate per Hour: $11.72

Plasterer Tender - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.52
Supplemental Benefit Rate per Hour: $11.72

Plasterer Tender - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $28.02
Supplemental Benefit Rate per Hour: $11.72

(Local #79)

PLUMBER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Plumber - First Year: 1st Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $19.00

Supplemental Benefit Rate per Hour: $5.43

Plumber - First Year: 2nd Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $21.00
Supplemental Benefit Rate per Hour: $6.43

Plumber - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $31.78
Supplemental Benefit Rate per Hour: $24.44

Plumber - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $33.88
Supplemental Benefit Rate per Hour: $24.44

Plumber - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $36.73
Supplemental Benefit Rate per Hour: $24.44

Plumber - Fifth Year: 1st Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $38.13
Supplemental Benefit Rate per Hour: $24.44

Plumber - Fifth Year: 2nd Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $50.20
Supplemental Benefit Rate per Hour: $24.44

(Plumbers Local #1)

POINTER, WATERPROOFER, CAULKER, SANDBLASTER, STEAMBLASTER
(Exterior Building Renovation)

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.96
Supplemental Benefit Rate per Hour: $15.65

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $39.69
Supplemental Benefit Rate per Hour: $21.00

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.12
Supplemental Benefit Rate per Hour: $24.75

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $55.30
Supplemental Benefit Rate per Hour: $25.75

(Bricklayer District Council)

ROOFER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Roofer - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $19.95
Supplemental Benefit Rate per Hour: $8.06

Roofer - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $23.63

Supplemental Benefit Rate per Hour: $18.39

Roofer - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $26.25
Supplemental Benefit Rate per Hour: $20.35

Roofer - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $31.50
Supplemental Benefit Rate per Hour: $24.28

Roofer - Fifth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $39.38
Supplemental Benefit Rate per Hour: $30.20

(Local #8)

SHEET METAL WORKER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Sheet Metal Worker (0-6 Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $19.57
Supplemental Benefit Rate per Hour: $8.26

Sheet Metal Worker (7-18 Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $19.84
Supplemental Benefit Rate per Hour: $22.30

Sheet Metal Worker (19-30 Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $25.57
Supplemental Benefit Rate per Hour: $30.13

Sheet Metal Worker (31-36 Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $31.31
Supplemental Benefit Rate per Hour: $35.67

Sheet Metal Worker (37-42 Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $31.31
Supplemental Benefit Rate per Hour: $35.67

Sheet Metal Worker (43-48 Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $39.93
Supplemental Benefit Rate per Hour: $44.01

Sheet Metal Worker (49-54 Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $39.93
Supplemental Benefit Rate per Hour: $44.01

Sheet Metal Worker (55-60 Months)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $45.64
Supplemental Benefit Rate per Hour: $49.58

(Local #28)

SIGN ERECTOR
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Sign Erector - First Year: 1st Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $20.30
Supplemental Benefit Rate per Hour: $18.25

Sign Erector - First Year: 2nd Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $23.20
Supplemental Benefit Rate per Hour: $20.68

Sign Erector - Second Year: 1st Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $26.10
Supplemental Benefit Rate per Hour: $23.14

Sign Erector - Second Year: 2nd Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $29.00
Supplemental Benefit Rate per Hour: $25.61

Sign Erector - Third Year: 1st Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $31.90
Supplemental Benefit Rate per Hour: $34.50

Sign Erector - Third Year: 2nd Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.80
Supplemental Benefit Rate per Hour: $37.54

Sign Erector - Fourth Year: 1st Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $37.70
Supplemental Benefit Rate per Hour: $41.43

Sign Erector - Fourth Year: 2nd Six Months

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $40.60
Supplemental Benefit Rate per Hour: $44.55

Sign Erector - Fifth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $43.50
Supplemental Benefit Rate per Hour: $47.68

Sign Erector - Sixth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.40
Supplemental Benefit Rate per Hour: $50.78

(Local #137)

STEAMFITTER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Steamfitter - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $24.72
Supplemental Benefit Rate per Hour: $26.40

Steamfitter - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $30.90
Supplemental Benefit Rate per Hour: $32.82

Steamfitter - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $37.08
Supplemental Benefit Rate per Hour: $39.23

Steamfitter - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $43.26
Supplemental Benefit Rate per Hour: $45.65

Steamfitter - Fifth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $49.44
Supplemental Benefit Rate per Hour: $52.06

(Local #638)

STEAMFITTER - REFRIGERATION & AIR CONDITIONER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Refrigeration & Air Conditioner (First Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $23.39
Supplemental Benefit Rate per Hour: $15.35

Refrigeration & Air Conditioner (Second Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $28.25
Supplemental Benefit Rate per Hour: $16.91

Refrigeration & Air Conditioner (Third Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $32.91
Supplemental Benefit Rate per Hour: $18.53

Refrigeration & Air Conditioner (Fourth Year)

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $39.75
Supplemental Benefit Rate per Hour: $20.73

(Local #638-B)

STONE MASON - SETTER
(Ratio Apprentice of Journeyperson: 1 to 1, 1 to 2)

Stone Mason - Setters - First 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $23.41
Supplemental Benefit Rate per Hour: $23.93

Stone Mason - Setters - Second 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $29.26
Supplemental Benefit Rate per Hour: $32.93

Stone Mason - Setters - Third 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $34.85
Supplemental Benefit Rate per Hour: $32.93

Stone Mason - Setters - Fourth 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $40.44
Supplemental Benefit Rate per Hour: $32.93

Stone Mason - Setters - Fifth 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $46.04
Supplemental Benefit Rate per Hour: $32.93

Stone Mason - Setters - Sixth 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $51.63
Supplemental Benefit Rate per Hour: $32.93

(Bricklayers District Council)

TAPER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Drywall Taper - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $22.96
Supplemental Benefit Rate per Hour: $15.55

Drywall Taper - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $24.51
Supplemental Benefit Rate per Hour: $26.61

Drywall Taper - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $29.41
Supplemental Benefit Rate per Hour: $28.82

Drywall Taper - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $39.21
Supplemental Benefit Rate per Hour: $33.24

(Local #1974)

TILE LAYER - SETTER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Tile Layer - Setter - First 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $23.09
Supplemental Benefit Rate per Hour: $13.45

Tile Layer - Setter - Second 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $28.32
Supplemental Benefit Rate per Hour: $13.45

Tile Layer - Setter - Third 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $35.65
Supplemental Benefit Rate per Hour: $16.56

Tile Layer - Setter - Fourth 750 Hours

Effective Period: 7/1/2026 - 6/30/2027

Wage Rate per Hour: $40.86
Supplemental Benefit Rate per Hour: $16.56

Tile Layer - Setter - Fifth 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $44.67
Supplemental Benefit Rate per Hour: $17.98

Tile Layer - Setter - Sixth 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $48.38
Supplemental Benefit Rate per Hour: $19.48

Tile Layer - Setter - Seventh 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $52.23
Supplemental Benefit Rate per Hour: $20.86

Tile Layer - Setter - Eighth 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $57.45
Supplemental Benefit Rate per Hour: $20.86

Tile Layer - Setter - Ninth 750 Hours

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate per Hour: $59.83
Supplemental Benefit Rate per Hour: $23.71

(Local #7)

TIMBERPERSON
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Timberperson - First Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour: $26.96
Supplemental Rate Per Hour: $39.69

Timberperson - Second Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour: $32.07
Supplemental Rate Per Hour: $39.69

Timberperson - Third Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour: $39.72
Supplemental Rate Per Hour: $39.69

Timberperson - Fourth Year

Effective Period: 7/1/2026 - 6/30/2027
Wage Rate Per Hour: $47.38
Supplemental Rate Per Hour: $39.69

(Local #1536)

NOTICE TO BIDDERS

This contract is subject to a new 2025 Project Labor Agreement

This contract is subject to the attached Project Labor Agreement ("PLA") entered into between the City and the Building and Construction Trades Council of Greater New York ("BCTC") affiliated Local Unions. By submitting a bid, the Contractor agrees that if awarded the Contract the PLA is binding on the Contractor and all subcontractors of all tiers.

The bidder to be awarded the contract will be required to execute a Letter of Assent prior to award. The Contractor shall include in any subcontract a requirement that the subcontractor, and sub-subcontractors of all tiers, become signatory to and bound to the PLA with respect to the subcontracted work. The Contractor will also be required to have all subcontractors of all tiers execute a Letter of Assent prior to such subcontractors performing any Program Work.

Bidders are advised that the City of New York and City agencies have entered into multiple PLAs. The terms of each PLA, while similar, are not identical. Please also note that there are revisions between the 2025 NYC Agency Citywide New Construction & Renovation PLA attached to this bid and the prior 2020 NYC Agency New Construction PLA, 2020 NYC Agency Renovation PLA, and 2021 DEP Renovation PLA.

All bidders are urged to review the entire 2025 NYC Agency Citywide New Construction & Renovation PLA prior to submitting a bid.

To the extent that the terms of the PLA conflict with any other terms of the invitation for bids, including the Standard Construction Contract, the terms of the PLA shall govern. For example, the PLA section that authorizes the scheduling of a four-day week, ten hours per day on straight time at the commencement of the job, PLA Article 12, Section 1(A), overrides the Standard Construction Contract's provision concerning a

five-day work week with a maximum of eight hours in a day, Standard Construction Contract Article 37.2.1. Where, however, the invitation for bids, including the Standard Construction Contract, requires the approval of the City/Department, the PLA does not supersede or eliminate that requirement.

This Contract is subject to the apprenticeship requirements of Labor Law § 222 and to apprenticeship requirements established by the Department pursuant to Labor Law § 816-b. Please be advised that the involved trades have apprenticeship programs that meet the statutory requirements of Labor Law § 222(e) and the requirements set by the Department pursuant to Labor Law § 816-b, and that Contractors and subcontractors who agree to perform the Work pursuant to the PLA are participating in such apprenticeship programs within the meaning of Labor Law § 222(e) and the Department's directives.

This Contract is subject to Community Hiring Construction Careers and its requirements pursuant to Chapter 79 of the New York City Charter and the Community Hiring Rules adopted as Title 74 of the Rules of the City of New York. The Contractor shall agree to make best efforts to meet the Community Hiring Goal for at least 30% of cumulative labor hours of Program Work to be worked by Residence-Based Community Hires. At least 30% of such Residence-Based Community Hires labor hours are to be worked by apprentices.

If this Contract is subject to the Minority-Owned and Women-Owned Business Enterprise ("M/WBE") program implemented pursuant to New York City Administrative Code § 6-129, the specific requirements of M/WBE participation for this Contract are set forth elsewhere in this bid package.

The local collective bargaining agreements (CBAs) that are incorporated into the PLA as PLA Schedule A Agreements are available from the Department's Agency Chief Contract Officer upon the request of any prospective bidder.

Please note that the “PLA Schedule A” is distinct from the Department’s Schedule A that is a part of this invitation for bids.

2025 Agency Citywide New Construction & Renovation PLA
Frequently Asked Questions

1. **Q.** Does a Contractor need to be signatory with the unions in the NYC Building and Construction Trades Council ("BCTC") in order to bid on projects under the PLA?

   A. No, any contractor may bid by signing and agreeing to the terms of the PLA. The contractor need not be signatory with these unions by any other labor agreement or for any other project.

2. **Q.** Does a Contractor agreeing to the PLA and signing the Letter of Assent create a labor agreement with these unions outside of the project covered by the PLA?

   A. No, the PLA applies only to those projects that the Contractor agrees to perform under the PLA and makes no labor agreement beyond those projects. Contractors do not need to sign any additional agreements (*e.g.*, a collective bargaining agreement) with a union aside from the Letter of Assent to work on a PLA project.

3. **Q.** Do the provisions of the PLA apply equally to subcontractors as well as contractors and how does the PLA affect the subcontractors that a bidder may utilize on the project?

   A. Yes, the PLA applies to subcontractors and all subcontractors performing Program Work must agree to become party to the PLA. Subject to the Agency's approval of subcontractors pursuant to Article 17 of the Standard Construction Contract, a Contractor may use any subcontractor, union or non-union, as long as the subcontractor signs the Letter of Assent. See PLA Article 2, Section 8.

4. **Q.** Are bidders required to submit Letters of Assent signed by proposed subcontractors with their bid in order to be found responsive?

   A. No, bidders do not have to submit signed Letters of Assent from their subcontractors with their bid. However, subcontractors performing Program Work will be required to sign the Letter of Assent prior to being approved by the Agency.

5. **Q.** Does the PLA contain special provisions for MWBE or DBE subcontractors?

   A. On contracts valued at $25,000,000 or more where participation goals are set forth in the contract, the PLA does not apply to up to 7% of the value of the construction work under the contract provided the construction work is performed by certified MWBE or DBE subcontractors and such MWBE or DBE subcontractor is not a signatory to any Schedule "A" agreement ("Exempt Work"). Such Exempt Work shall be no more than $500,000 or 20% (whichever is greater) of the value of the subcontracts for work in any particular union's jurisdiction under any prime contract. See PLA Article 3, Section 1.

6. **Q.** May a Contractor or subcontractor use any of its existing employees to perform this work?

   A. Generally, labor will be referred to the Contractor from the respective signatory local unions. However, Contractors and subcontractors may use up to 12% of their existing, qualifying labor force for this work. Certified M/WBEs for which participation goals are set pursuant to NYC Administrative Code § 6-129 that are not signatory to any Schedule A collective bargaining agreements ("CBAs") with subcontracts valued at or under two million dollars ($2,000,000) and where the first two or more workers are hired simultaneously, may request by name, and the Local Union will honor, referral of the first (1st), fourth (4th), sixth (6th), and eighth (8th) Core Employee. In any case where the first two or more employees are not hired simultaneously, the certified MWBEs or DBEs Core Employees may be the second (2nd), fourth (4th), sixth (6th), and eighth (8th) Core Employee. Any additional workers will be referred to the Contractor in accordance with the 12% referral requirements set forth in the PLA. See PLA Article 4, Section 2.

7. **Q.** Must the City set M/WBE participation goals for the particular project or contract in order for a certified M/WBE to utilize the provisions of PLA Article 4, Section 2(C)?

   A. No. PLA Article 4, Section 2(C) specifies what categories of M/WBEs are eligible to take advantage of this provision (i.e., those M/WBEs for which the City is authorized to set participation goals under § 6-129). For purposes of Article 4, Section 2(C), it is not necessary for the project to be subject to § 6-129 or for the City to have actually set participation goals for the particular contract or project. The result is the same where a project receives State funding and therefore is subject to the requirements of Article 15-A of the Executive Law.

8. **Q.** May a Contractor bring in union members from locals that are not signatory unions?

   A. Referrals will be from the respective signatory locals and/or locals listed in Schedule A of the PLA. Contractors may utilize 'traveler provisions' contained in the local CBAs where such provisions exist and/or in accordance with the provisions of PLA Article 4, Section 2.

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

   A. No, the non-union employee does not automatically become a union member by working on a project covered by the PLA and nothing in the PLA requires employees to join a union or pay dues or fees to a union as a condition of working on the covered project. This Agreement is not, however, intended to supersede independent requirements in applicable local union agreements as to contractors that are otherwise signatory to those agreements and as to employees of such employers performing covered work. Non-union employees will be enrolled in the appropriate benefit plans and earn credit toward various union benefit programs except in certain circumstances as set forth in the PLA. See PLA Article 4, Section 6 and Article 11.

10. **Q.** Are all Contractors and subcontractors working under the PLA, including non-union Contractors and Contractors signatory to CBAs with locals other than those that are signatories to the PLA, required to make contributions to designated employee benefit funds?

    A. Except in certain circumstances, as described in the following paragraph, Contractors and subcontractors working under the PLA will be required to contribute on behalf of all employees covered by the PLA to established jointly trusteed employee benefit funds designated in the Schedule A CBAs and required to be paid on public works under any applicable prevailing wage law. The Agency may withhold from amounts due the Contractor any amounts required to be paid, but not actually paid into any such fund by the Contractor or a subcontractor. See PLA Article 11, Section 2.

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

11. **Q.** When do Core Employees become eligible for union benefits?

    A. Union benefit plans have their own plan documents that determine eligibility, and workers will become eligible for certain benefits at different points in time. Contractors who will have Core Employees should speak with the respective union(s) as to benefit eligibility thresholds. Employees that may remain unaffiliated with any local union at the completion of their employment may apply for any distributions to which they may be entitled from the funds in accordance with the applicable rules and governing documents of the unions and the employee benefit funds.

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

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

    Upon notification by a union or fringe benefit fund that a Contractor is delinquent in its payment of benefits and a determination by the Agency that the union or fund has submitted appropriate documentation of such delinquency, the Agency will thereafter require the Contractor to submit cancelled checks or other equivalent proof of payment of

benefit contributions with certified payroll reports for work covered by this PLA on which the Contractor is engaged.

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

13. **Q.** Does signing on to the PLA satisfy the Apprenticeship Directive Requirements established for this bid?

A. Yes. By agreeing to perform the Work subject to the PLA, the bidder demonstrates compliance with the apprenticeship requirements imposed by this Invitation for Bids.

14. **Q.** Who decides on the number of workers needed?

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

15. **Q.** What happens if a union does not provide a worker within 48 hours from the request (Saturdays, Sundays, and holidays excepted)?

A. In the event that a Local Union does not fill any request for qualified employees within a 48-hour period after such requisition is made by a Contractor (Saturdays, Sundays and holidays excepted), a Contractor may employ qualified applicants from any other available source.

16. **Q.** May a Contractor discharge a union referral for lack of productivity?

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

17. **Q.** May a contractor assign a management person to site?

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

18. **Q.** What type of work can Stewards perform?

A. All Stewards must be working Stewards (*i.e.*, they must be performing Program Work). In addition, Stewards may perform other tasks such as receiving complaints or grievances from other employees of the Steward's trade. Stewards may not determine

when overtime is worked. Stewards are entitled to the same wages as other employees of that trade. See PLA Article 5, Sections 2 and 3.

19. **Q.** Can a Contractor utilize apprentices?

A. Contractors are permitted to utilize apprentices so long as the ratios between journeyperson and apprentice do not exceed the allowable ratios set by the New York State Department of Labor ("NYSDOL"). Should a Contractor request that apprentices be provided for Program Work, the referring Local Union shall comply with that request so long as it is consistent with the maximum ratios permitted by NYSDOL.

20. **Q.** What is Community Hiring Construction Careers?

A. As authorized under Section 3502 of the New York City Charter, Community Hiring Construction Careers is an initiative (superseding HireNYC Construction Careers) to advance career opportunities within the construction industry for those from economically disadvantaged communities. The initiative has a target goal of 30% of all hours worked on PLA projects to be performed by workers who reside in NYCHA housing or ZIP codes where 15% or more of the population lives below the poverty threshold, also know as "Residence-Based Community Hires." When a Contractor requests employees, the trades will take into account the target goals when they refer additional workers. To further encourage recruitment of new workers, Community Hiring Construction Careers has a goal that at least 30% of those hours are to be performed by apprentices who are Residence-Based Community Hires.

21. **Q.** Does the PLA provide a standard workday across all the signatory trades?

A. Yes, all signatory trades will work an eight (8) hour day, Monday through Friday with a day shift at straight time as the standard work week. For renovation and rehabilitation projects only, the PLA also permits a Contractor to schedule a four-day (within Monday through Friday) work week, ten (10) hours per day at straight time if announced at the commencement of the job. See PLA Article 12, Section 1. This is an example where the terms of the PLA override provisions of the Standard Construction Contract (compare with section 37.2 of the Standard Construction Contract). For renovation and rehabilitation projects only, the standard work week may be reduced to 35 or 37 ½ hours of work in those limited circumstances where the City states in the bid documents that the Contractor will not be given access to the site to accommodate an 8-hour day. The 8 hour, 7 ½ hour or 7-hour workday must be established at the commencement of the renovation and rehabilitation project by the Agency and may not be altered by the Contractor.

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

A. Yes, the PLA recognizes nine common holidays. See PLA Article 12, Section 4.

23. **Q.** Are workers entitled to holiday pay if they do not work on the holiday?

A. No. Workers are only entitled to pay if they work on the holiday. See PLA Article 12, Section 4.

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

A. Yes, for second and third shift work on work performed Monday – Friday on renovation and rehabilitation projects, there shall be a 5% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. For second shift work on work performed Monday – Friday on new construction projects, there shall be a 10% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. For third shift work on work performed Monday – Friday on new construction projects, there shall be a 15% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. No other premium or other payments for such work shall be required unless such work is in excess of the employee's regularly scheduled work week. See PLA Article 12, Section 3.

25. **Q.** May the Contractor schedule overtime work, including work on a weekend?

A. Yes, the PLA permits the Contractor to schedule overtime work, including work on weekends. See PLA Article 12, Sections 2, 3, and 5. To the extent that the Agency's approval is required before a Contractor may schedule or be paid for overtime, that approval is still required notwithstanding the PLA language.

26. **Q.** Are overtime payments affected by the PLA?

A. Yes, all overtime pay incurred Monday through Saturday will be at time and one half (1 ½). There will be no stacking or pyramiding of overtime pay under any circumstances. See PLA Article 12, Section 2. Sunday and holiday overtime will be paid according to each trade's CBA.

27. **Q.** Are there special provisions for Saturday work when a day is 'lost' during the week due to weather, power failure or other emergency?

A. Yes, when this occurs the Contractor may schedule Saturday work at weekday rates. See PLA Article 12, Section 5.

28. **Q.** Does the PLA contain special provisions for the staffing of temporary services?

A. Yes. Where temporary services are required by specific request of the Agency or construction manager, they shall be provided by the Contractor's existing employees during working hours in which a shift is scheduled for employees of the Contractor. The need for temporary services during non-working hours will be determined by the Agency or construction manager. There will be no stacking of trades on temporary services. See PLA Article 15.

29. **Q.** What do the workers get paid when work is terminated early in a day due to inclement weather or otherwise cut short of 8 hours?

A. The PLA provides that employees who report to work pursuant to regular schedule and not given work will be paid two hours of straight time. Work terminated early for severe weather or emergency conditions will be paid only for time actually worked. In other instances where work is terminated early, the worker will be paid for a full shift. See PLA Article 12, Sections 6 and 8. The usual reporting pay requirement of two hours for employees who report to their work location pursuant to their regular schedule does not apply when the National Weather Service issues a Weather Advisory and the Contractor speaks to the employee at least four hours before their shift starting time. See PLA Article 12, Section 6.

30. **Q.** Should a local collective bargaining agreement of a signatory union expire during the project will a work stoppage occur on a project subject to the PLA?

A. No. All the signatory unions are bound by the 'no strike' agreement as to the PLA work. Work will continue under the PLA and the otherwise expired local CBA(s) until the new local CBA(s) are negotiated and in effect. See PLA Articles 7 and 19.

31. **Q.** May a Contractor working under the PLA be subject to a strike or other boycott activity by a signatory union at another site while the Contractor is a signatory to the PLA?

A. Yes. The PLA applies ONLY to work under the PLA and does not regulate labor relations at other sites even if those sites are in close proximity to PLA work.

32. **Q.** If a Contractor has worked under other PLAs in the New York City area, are the provisions in this PLA generally the same as the others?

A. While PLAs often look similar to each other, and particular clauses are often used in multiple agreements, each PLA is a unique document and should be examined accordingly.

33. **Q.** What happens if a dispute occurs between the Contractor and an employee during the project?

A. The PLA contains a grievance and arbitration process to resolve disputes between the Contractor and the employees. See PLA Article 9.

34. **Q.** What happens if there is a dispute between locals as to which local gets to provide employees for a particular project or a particular aspect of a project?

A. The PLA provides for jurisdictional disputes to be resolved in accordance with the NY Plan. A copy of the NY Plan is available upon request from the Agency. The PLA provides that work is not to be disrupted or interrupted pending the resolution of any jurisdictional dispute. The work proceeds as assigned by the Contractor until the dispute is resolved. See PLA Article 10.

35. **Q.** How do the referral rules work for Operating Engineers Locals 14 and 15?

A. If there is Program Work within the jurisdiction of Operating Engineers Locals 14 or 15, the contractor shall request labor from the appropriate local union. If the locals provide labor consistent with the referral provisions outlined in Article 4, Section 2, the terms of the Local 14 CBA or Local 15 CBA will apply to that work. However, if the locals do not provide labor for that work, the terms of the PLA will apply to such work.

PROJECT LABOR AGREEMENT
COVERING SPECIFIED NEW CONSTRUCTION, RENOVATION & REHABILITATION OF NEW YORK CITY OWNED BUILDINGS AND STRUCTURES

2025 – 2028

Execution Copy 9.26.25

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PROJECT LABOR AGREEMENT COVERING SPECIFIED NEW CONSTRUCTION, RENOVATION & REHABILITATION OF NEW YORK CITY OWNED BUILDINGS & STRUCTURES

ARTICLE 1 - PREAMBLE

WHEREAS, the City of New York desires to provide for the cost efficient, safe, quality, and timely completion of certain new construction, rehabilitation and renovation work ("Program Work," as defined in Article 3) in a manner designed to afford the lowest costs to the Agencies covered by this Agreement, and the public it represents, and the advancement of permissible statutory objectives;

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

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

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

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

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

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

(6) permitting adjustments to work rules and staffing requirements from those which otherwise might obtain;

(7) providing comprehensive and standardized mechanisms for the settlement of work disputes, including those relating to jurisdiction;

(8) fostering increased participation by Minority and Women-owned Business Enterprises ("MWBEs") and/or Disadvantaged Business Enterprises ("DBEs");

(9) encouraging the development of pathways to construction careers through Community Hiring;

(10) ensuring a reliable source of skilled and experienced labor; and

(11) securing applicable New York State Labor Law exemptions.

WHEREAS, the Building and Construction Trades Council of Greater New York and Vicinity, its participating affiliated Local Unions and their members, desire to assist the City in meeting these operational needs and objectives as well as to provide for stability, security and work opportunities which are afforded by this Project Labor Agreement; and

WHEREAS, the Parties desire to maximize Program Work safety conditions for both workers and the community in the project area.

NOW, THEREFORE, the Parties enter into this Agreement:

SECTION 1. PARTIES TO THE AGREEMENT

This is a Project Labor Agreement ("Agreement") entered into by the City of New York ("City"), acting by and through the Agencies covered herein, including in their capacity as construction manager of covered projects and/or on behalf of any third party construction manager which may be utilized, and the Building and Construction Trades Council of Greater New York and Vicinity ("Council" or "BCTC") (on behalf of itself) and the signatory affiliated Local Unions ("Unions" or "Local Unions"). The Council and each signatory Local Union hereby warrant and represent that it has been duly authorized to enter into this Agreement.

ARTICLE 2 - GENERAL CONDITIONS

SECTION 1. DEFINITIONS

A. The term "Agency" means each of the following New York City agencies, individually or collectively as applicable: the Department for the Aging ("DFTA"), Administration

for Children's Services ("ACS"), Department of Citywide Administrative Services ("DCAS"), Department of Correction ("DOC"), Department of Design and Construction ("DDC"), Fire Department ("FDNY"), Department of Homeless Services ("DHS"), Human Resources Administration ("HRA"), Department of Health and Mental Hygiene ("DOHMH"), Department of Parks and Recreation ("DPR"), Police Department ("NYPD"), Department of Sanitation ("DSNY"); Department of Transportation ("DOT"), Department of Buildings ("DOB"), and Department of Environmental Protection ("DEP"); with respect to Program Work as defined in Article 3, the New York City agency that awards a particular contract subject to this Agreement may be referred to hereafter as the "Agency";

B. The term "Agreement" means this project labor agreement ("PLA"), the applicable Collective Bargaining Agreements (each a "CBA") identified in Schedule "A", and each Exhibit hereto;

C. The term "BCTC" refers to the Building and Construction Trades Council of Greater New York and Vicinity. The terms "BCTC" and "Council" are used interchangeably;

D. The term "City" refers to the City of New York;

E. The term "Community Hiring Construction Careers" refers to the PLA initiative to advance career opportunities for Residence-Based Community Hires;

F. The term "Contractor(s)" shall include any Construction Manager, General Contractor and all other contractors, and subcontractors of all tiers engaged in Program Work within the scope of this Agreement as defined in Article 3;

G. The term "Core Employee" means an employee that has been on a contractor's payroll consistent with Article 4, Section 2(B) and (C);

H. The term "DBEs" means Disadvantaged Business Enterprises as defined in 49 C.F.R. Part 26;

I. The term "Economically Disadvantaged Region" means an area, represented by its five-digit ZIP code, in which at least fifteen percent of residents have household incomes below the federal poverty threshold;

J. The term "Minor Repair" means routine repair, service, or maintenance that is recurrent, day to day, periodic scheduled or routine work required to preserve or restore a building, facility or system to working order. Such work shall qualify as "Minor Repair" if; i) a wage and benefit rate applicable to the work is listed on the New York City Comptroller's ("NYC Comptroller") prevailing wage schedule as repair work and is lower than the Schedule A rate; and ii) the work satisfies the definition and criteria established by the NYC Comptroller for application of that lower rate for the work being performed.

K. The term "MWBEs" means Minority and Women Owned Business Enterprises as the entities are defined in NYC Charter 1304;

L. The term "Program Work" is the work covered by this Agreement as defined in Article 3;

M. The term "Residence-Based Community Hire" means an individual who is: (1) a resident of an address within an Economically Disadvantaged Region; (2) a resident of a building that is: (i) owned or operated by the New York City Housing Authority; and (ii) subject to section nine of the United States Housing Act of nineteen hundred thirty-seven, as amended; or (3) a resident of a dwelling unit that is: (i) subject to a regulatory agreement with a federal, state or local government agency requiring that occupancy of such unit be restricted based on the income of the

occupants; and (ii) located in a building that was previously operated by the New York City Housing Authority, was previously subject to section nine of the United States Housing Act of nineteen hundred thirty-seven, as amended, and is subject to section eight of such act; and

N. The term "Union(s)" or "Local Union(s)" refers to the various participating unions affiliated with the BCTC, singularly and collectively.

SECTION 2. CONDITIONS FOR AGREEMENT TO BECOME EFFECTIVE

This Agreement shall not become effective unless each of the following conditions are met: the Agreement is executed by (1) the Council, on behalf of itself, (2) the participating affiliated Local Unions; and (3) the mayor of the City of New York or their designee.

SECTION 3. ENTITIES BOUND & ADMINISTRATION OF AGREEMENT

This Agreement shall be binding on all participating Unions and their affiliates, the Construction Manager (in its capacity as such) and all Contractors of all tiers performing Program Work, as defined in Article 3. The Contractors shall include in any subcontract that they let for performance during the term of this Agreement a requirement that their subcontractors, of all tiers, become signatory and bound by this Agreement with respect to that subcontracted work falling within the scope of Article 3 and all Contractors (including subcontractors) performing Program Work shall be required to sign a "Letter of Assent" in the form annexed hereto as Exhibit "A". This Agreement shall be administered by the applicable Agency or a Construction Manager or such other designee as may be named by the Agency or Construction Manager, on behalf of all Contractors. When the Agency manages Program Work without a Construction Manager, unless otherwise provided, it has the rights and obligations of a Construction Manager in addition to the rights and obligations of an Agency, if applicable. The City shall provide BCTC with the contact

information of the Agency Chief Contracting Officer for each Agency and BCTC shall provide the City with the contact information of a representative for each Local Union.

SECTION 4. SUPREMACY CLAUSE

This Agreement, together with the local Collective Bargaining Agreements (each a "CBA") appended hereto as Schedule "A", represents the complete understanding of all signatories and supersedes any national agreement, local agreement or other CBA of any type which would otherwise apply to this Program Work, in whole or in part, except: 1) to the extent applicable, work performed that may fall under the NTL Articles of Agreement, the National Stack/Chimney Agreement, the National Cooling Tower Agreement, all instrument calibration work and loop checking which shall be performed under the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, and the National Agreement of the International Union of Elevator Constructors, with the exception of Article 2, Section 7, and Articles 7, 9 and 10 of this Agreement, which shall apply to such work; and 2) Program Work which falls within the jurisdiction of the Operating Engineers Locals 14 and 15. If Program Work falling within the jurisdiction of Operating Engineers Locals 14 and 15 is accepted by and performed by said locals, only then will such work be performed under the terms and conditions set out in the Schedule "A" agreements of Operating Engineers Locals 14 and 15. The CBAs of the affiliated local unions that cover the particular type of construction work to be performed by the contractor, and as set forth in the Schedule "A" list of agreements, shall be deemed the Schedule "A" Collective Bargaining Agreements ("Schedule 'A' CBA") under this Agreement. Where association and independent CBAs for a particular type of construction work are both set forth in Schedule "A", association members shall treat the applicable association agreement as the Schedule "A" CBA and independent contractors shall treat the applicable independent agreement as the Schedule "A"

CBA. Subject to the foregoing, where a subject covered by the provisions of this project labor agreement is also covered by a Schedule "A" CBA, the provisions of this project labor agreement shall prevail. It is further understood that no Contractor shall be required to sign any other agreement as a condition of performing Program Work. No practice, understanding or agreement between a Contractor and a Local Union which is not set forth in this Agreement shall be binding with respect to Program Work unless endorsed in writing by the Construction Manager or such other designee as may be designated by the Agency. Nothing in this Agreement requires employees to join a union or pay dues or fees to a union as a condition of working on the Program Work. This Agreement is not, however, intended to supersede independent requirements in applicable local union agreements as to contractors that are otherwise signatory to those agreements and as to employees of such employers performing Program Work.

SECTION 5. LIABILITY

The liability of any Contractor and the liability of any Union under this Agreement shall be several and not joint. The Construction Manager and any Contractor shall not be liable for any violations of this Agreement by any other Contractor; and the Council and Local Unions shall not be liable for any violations of this Agreement by any other Union.

SECTION 6. THE AGENCY

The Agency (or Construction Manager where applicable) shall require in its bid specifications for all Program Work within the scope of Article 3 that all successful bidders, and their subcontractors of all tiers, become bound by, and signatory to, this Agreement. The Agency (or Construction Manager) shall not be liable for any violation of this Agreement by any Contractor. It is understood that nothing in this Agreement shall be construed as limiting the sole discretion of the Agency or Construction Manager in determining which Contractors shall be

awarded contracts for Program Work. It is further understood that the Agency or Construction Manager has sole discretion at any time to terminate, delay or suspend the Program Work, in whole or part, on any project.

SECTION 7. AVAILABILITY AND APPLICABILITY TO ALL SUCCESSFUL BIDDERS

The Unions agree that this Agreement will be made available to, and will fully apply to, any successful bidder for (or subcontractor of) Program Work who becomes signatory thereto, without regard to whether that successful bidder (or subcontractor) performs work at other sites on either a union or non-union basis and without regard to whether employees of such successful bidder (or subcontractor) are, or are not, members of any unions. This Agreement shall not apply to the work of any Contractor which is performed at any location other than the site of Program Work.

SECTION 8. SUBCONTRACTING

Contractors will subcontract Program Work only to a person, firm or corporation who is or agrees to become party to this Agreement.

ARTICLE 3 - SCOPE OF THE AGREEMENT

SECTION 1. WORK COVERED

A. Program Work shall be limited to designated new construction, rehabilitation and renovation construction contracts bid and let by an Agency (or its Construction Manager where applicable) after the effective date of this Agreement with respect to new construction, rehabilitation and renovation work performed for an Agency on City-owned property under contracts advertised for public solicitation prior to December 31, 2028. Subject to the foregoing, and the exclusions below, such Program Work shall mean:

1. For Renovation and Rehabilitation Projects: any and all contracts that predominantly involve the demolition, reconstruction, renovation, alteration, repair, rehabilitation or expansion of an existing City-owned building, pier, marina, or structure within the five boroughs of the City. Examples of Program Work include, but are not limited to, the renovation, repair, alteration and rehabilitation of an existing temporary or permanent structure, or an expansion of above ground structures located in the City on a City-owned building, Wastewater Resource Recovery Facility, a water filtration plant, or a pumping station. Program Work shall also include job order contracts ("JOCS"), demolition work, painting services. Low voltage work, site work, elevator work, mold, asbestos and lead abatement, carpentry services, and carpet removal and installation shall be included as Program Work only when incidental to such building renovation and/or rehabilitation of City-owned buildings or structures and included in a contract that predominantly involves such renovation and/or rehabilitation. Program Work shall also include the installing and removing of centrifuges on City-owned property, but not any other work under such contracts, in connection with contracts that involve the maintenance or repair of centrifuges, in accordance with Exhibit "D". Program Work shall also include contracts bid and let by the DEP for the rehabilitation and upgrade of wells and well stations located in Southeast Queens as part of the Queens Groundwater Project, including the renovation and rehabilitation of buildings and other above or below-ground structures, the installation of equipment, piping and drainage structures including subsurface installations, the installation of water treatment system elements, control systems, plumbing, electrical, HVAC and site and road work required for the construction, operation or maintenance of the wells and other related facilities.

2. For New Construction Projects: new construction, including a construction of an entirely new park exceeding $10,000,000 if the Project also involves construction of a new above-

ground building such as a restroom, field house, garage or maintenance facility, for which an addendum has been approved by an agency of the City of New York and by the BCTC on behalf of itself and its affiliated Local Unions. Each Project-specific addendum is to outline a description of the project being undertaken, the project's location, and the general findings of the feasibility analysis used as the basis of the determination to utilize a PLA on the project.

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

1. Contracts that are let under a different project labor agreement with an Agency, and/or other entities that have entered separate PLAs, such as NYCHA, H+H and SCA;

2. Contracts let and work performed in connection with projects carried over, recycled from, or performed under bids or rebids relating to work that were bid prior to the effective date of this Agreement or after December 31, 2028;

3. Contracts procured on an emergency basis;

4. Prime contracts that do not exceed $3,000,000;

5. Contracts for work on streets and bridges and for the closing or environmental remediation of landfills;

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

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

8. Contracts with electric utilities, gas utilities, telephone companies, and railroads, except that it is understood and agreed that these entities may only install their work to

a demarcation point, *e.g.*, a telephone closet or utility vault, the location of which is determined prior to construction and employees of such entities shall not be used to replace employees performing Program Work pursuant to this Agreement;

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

10. Task Orders or Work Orders issued under JOCS or Requirements Contracts that do not exceed $250,000, and JOCS or Requirements Contracts where the monetary value of such contracts predominantly involves such Task Orders or Work Orders;

11. Contracts that predominantly involve Minor Repair work, as defined in Article 2, Section 1(J) above. Such work is to be paid under the applicable prevailing wage law, if any, for service or maintenance work;

12. Up to 7% of work set aside to be performed by certified MWBE or DBE subcontractors ("Exempt Work") on prime contracts that are valued at $25,000,000 or more where participation goals are set forth in the contract to be performed by MWBEs or DBEs; and provided that: (i) the prime contractor shall first work in good faith with the relevant Local Unions, to identify one or more MWBE or DBE subcontractors who are a signatory to a Schedule "A" CBA or who will sign a Letter of Assent (Exhibit "A") as required under Article 2, Section 3 above to meet the 7% prior to such work being set aside; and (ii) if the prime contractor nevertheless fails to identify one or more MWBE or DBE subcontractors who are a signatory to a Schedule "A" CBA or who will sign a Letter of Assent (Exhibit "A") as required under Article 2, Section 3 above, then the amount of Exempt Work allowed to be set aside pursuant to this paragraph on a given project shall only be the difference between 7% of the prime contract value and the percentage of work awarded pursuant to this paragraph. Performance of a portion of the Exempt

Work performed by the certified MWBE or DBE subcontractors does not preclude the contractor from employing one or more MWBE or DBE subcontractor who is a signatory on another portion of the Exempt Work. Such Exempt Work shall be no more than $500,000 or 20% (whichever is greater) of the value of the subcontracts for work in any particular union's jurisdiction under any prime contract; and

13. On-site work performed on purchased equipment, which is required by the manufacturer to be performed by its staff or by its selected contractors as a condition of the continued effectiveness of the equipment warranty.

SECTION 2. TIME LIMITATIONS

In addition to falling within the scope of Article 3, Section 1, to be covered by this Agreement, Program Work must be (1) advertised and let for bid after the effective date of this Agreement, and (2) let for bid prior to December 31, 2028, the expiration date of this Agreement. It is understood that this Agreement, together with all of its provisions, shall remain in effect for all such Program Work until completion, even if not completed by the expiration date of the Agreement. If Program Work otherwise falling within the scope of Article 3, Section 1 is not let for bid by the expiration date of this Agreement, this Agreement may be extended to that work by mutual agreement of the parties.

SECTION 3. EXCLUDED EMPLOYEES

The following persons are not subject to the provisions of this Agreement, even though performing Program Work:

A. Superintendents, supervisors (except field surveyors on construction contracts, general and forepersons specifically covered by a craft's Schedule "A" CBA are included), engineers, professional engineers and/or licensed architects engaged in inspection and testing,

quality control/assurance personnel, timekeepers, mail carriers, clerks, office workers, messengers, guards, technicians, non-manual employees, and all professional, engineering, administrative and management persons;

B. Employees of the City, or any other municipal or State agency, authority or entity, or employees of any other public employer, even though working on the project site while covered Program Work is underway;

C. Employees and entities engaged in off-site manufacture, modifications, repair, maintenance, assembly, painting, handling or fabrication of project components, materials, equipment or machinery, or involved in deliveries to and from the Program site, except to the extent they are lawfully included in the bargaining unit of a Schedule "A" CBA;

D. Employees of the Construction Manager (except that in the event the Agency engages a Contractor to serve as Construction Manager, then those employees of the Construction Manager performing manual, on site construction labor will be covered by this Agreement);

E. Employees engaged in on-site equipment warranty work including installation, repair or maintenance unless employees are already working on the site and are certified to perform warranty work;

F. Employees engaged in geophysical testing other than boring for core samples;

G. Employees engaged in laboratory, specialty testing, or inspections, pursuant to a professional services agreement between the Agency, or any of the Agency's other professional consultants, and such laboratory, testing, inspection or surveying firms;

H. Employees engaged in on-site maintenance of installed equipment or systems which maintenance is awarded as part of a contract that includes Program Work, but which

maintenance occurs after installation of such equipment or system and is not directly related to construction services; and

I. Employees who perform work classified as Minor Repairs, provided that such workers are paid at the applicable prevailing wage, if any, for the work being performed.

SECTION 4. NON-APPLICATION TO CERTAIN ENTITIES

This Agreement shall not apply to those parents, affiliates, subsidiaries, or other joint or sole ventures of any Contractor which do not perform Program Work. It is agreed that this Agreement does not have the effect of creating any joint employment, single employer or alter ego status among the Agency or any Contractor. The Agreement shall further not apply to any New York City or other municipal or State agency, authority, or entity other than a listed Agency and nothing contained herein shall be construed to prohibit or restrict the Agency or its employees, or any State, New York City or other municipal or State authority, agency or entity and its employees, from performing on or off-site work related to Program Work.

As the contracts involving Program Work are completed and accepted, the Agreement shall not have further force or effect on such items or areas except where inspections, additions, repairs, modifications, check-out and/or warranty work are assigned in writing (copy to Local Union involved) by the Agency (or Construction Manager) for performance under the terms of this Agreement.

ARTICLE 4 - UNION RECOGNITION AND EMPLOYMENT

SECTION 1. PRE-HIRE RECOGNITION

The Contractors recognize the signatory Unions as the sole and exclusive bargaining representatives of all employees who are performing on-site Program Work, with respect to that work.

SECTION 2. UNION REFERRAL

A. The Contractors agree to request, employ and hire craft employees, including Residence-Based Community Hires as defined in Article 2, Section 1(M), for Program Work covered by this Agreement through the job referral systems and hiring halls established in the Local Unions' area CBAs set forth in Schedule "A". Notwithstanding this, Contractors shall have sole right to determine the competency of all referrals; to determine the number of employees required; to select employees for layoff (subject to Article 5, Section 3); and the sole right to reject any applicant referred by a Local Union, subject to the show-up payments. In the event that a Local Union does not fill any request for qualified employees within a 48-hour period after such requisition is made by a Contractor (Saturdays, Sundays and holidays excepted), a Contractor may employ qualified applicants from any other available source. In the event that the Local Union does not have a job referral system, the Contractor shall give the Local Union first preference to refer applicants, subject to the other provisions of this Article. The Contractor shall notify the Local Union of craft employees hired for Program Work within its jurisdiction from any source other than referral by the Union. Any employee hired by a Contractor because a Local Union does not fill a request for qualified employees within a 48 hour period (Saturdays, Sundays and holidays excepted) are not covered by this Agreement for purposes of Article 11, Section 2, unless they are or become a member of an affiliated Union.

B. A Contractor may request by name, and the Local Union will honor, referral of persons who have applied to the Local Union for Program Work ("Core Employees") and who meet the following qualifications:

1. possess any license required by New York State law for the Program Work to be performed;
2. have worked a total of at least 1000 hours in the Construction field during the prior 3 years; and

3. were on the Contractor's active payroll for at least 60 out of the 180 calendar days prior to the contract award.

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

C. Notwithstanding Section 2(B), above, certified MWBE contractors for which participation goals are set forth in New York City Administrative Code §6-129, or DBE contractors for which participation goals are established, that are not signatory to any Schedule "A" CBAs, with subcontracts valued at or under two-million dollars ($2,000,000), and where the first two or more workers are hired simultaneously, may request by name, and the Local Union will honor, referral of the first (1st), fourth (4th), sixth (6th), and eighth (8th) Core Employee. In any case where the first two or more employees are not hired simultaneously, the certified MWBE's or DBE's Core Employees may be the second (2nd), fourth (4th), sixth (6th), and eighth (8th) Core Employee. All such Core Employees must have applied to the Local Union for Program Work and meet the following qualifications:

1. possess any license required by New York State law for the Program Work to be performed;
2. have worked a total of at least 1000 hours in the Construction field during the prior 3 years; and
3. were on the Contractor's active payroll for at least 60 out of the 365 calendar days prior to the contract award.

D. Where a certified MWBE or DBE Contractor voluntarily enters into a CBA with a BCTC Union, the employees of such Contractor at the time the CBA is executed shall be allowed to join the Union for the applicable trade subject to satisfying the Union's basic standards of proficiency for admission.

SECTION 3. NON-DISCRIMINATION IN REFERRALS

The Council represents that each Local Union hiring hall and referral system will be operated in a non-discriminatory manner and in full compliance with all applicable federal, state and local laws and regulations which require equal employment opportunities. Referrals shall not be affected in any way by the rules, regulations, bylaws, constitutional provisions or any other aspects or obligations of union membership, policies or requirements and shall be subject to such other conditions as are established in this Article. No employment applicant shall be discriminated against by any referral system or hiring hall because of the applicant's union membership, or lack thereof.

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

In the event a Local Union either fails, or is unable to refer qualified Residence-Based Community Hires, minority or female applicants in percentages equaling the workforce participation goals adopted by the City and set forth in the Agency's (or, if applicable, Construction Manager's) bid specifications, within 48 hours of the request for same, the Contractor may employ qualified Residence-Based Community Hires, minority or female applicants from any other available source.

The Local Unions agree to prioritize the referral of Residence-Based Community Hires in accordance with Article 13 and to the extent consistent with the law, rules applicable to the union referral systems and joint apprentice programs. Those unions that do not currently provide for Residence-Based Community Hire preferences in their referral systems will undertake to implement such preferences consistent with this Agreement and their governing documents. Please see Exhibit "C" for a non-exhaustive list of the Economically Disadvantaged Regions. Residence-Based Community Hires who are already on a Contractor's workforce, including Core

Employees, and referral of apprentices, in accordance with Article 13, Section 1(A) below, shall count towards the referral goals of this Section.

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

SECTION 5. CROSS AND QUALIFIED REFERRALS

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

SECTION 6. CRAFT FOREPERSONS AND GENERAL FOREPERSONS

The selection of craft forepersons and/or general forepersons and the number of forepersons required shall be solely the responsibility of the Contractor except where otherwise provided by specific provisions of an applicable Schedule "A" CBA, and provided that all craft

forepersons shall be experienced and qualified journeypersons in their trade as determined by the appropriate Local Union. All forepersons shall take orders exclusively from the designated Contractor representatives. Craft forepersons shall be designated as working forepersons at the request of the Contractor, except when an existing local CBA prohibits a foreperson from working when the craft persons, they are leading exceed a specified number.

SECTION 7. ON CALL REPAIR REFERRALS

A. When an Agency awards a contract under this Agreement that requires the Contractor to have employees available on short notice to make time-sensitive repairs with such contract requiring the Contractor to respond within as little as two hours from the time the Contractor is contacted by the Agency ("On Call, Repair Contract"), the Contractor will, within ten (10) days of being awarded an On Call, Repair Contract subject to this Agreement, notify the appropriate affiliated Union that would perform the work for a contractor that the Contractor has been awarded such a contract and immediately enter into good faith negotiations with such relevant affiliated Union to establish a procedure to receive time sensitive referrals from such affiliated Union(s).

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

1. Upon notification by a Contractor that it has been awarded an On Call, Repair Contract pursuant to paragraph A above, each relevant affiliate Union shall provide the

Contractor with the name and twenty-four (24) hour contact information of an On Call, Repair Contract contact person for urgent on call repair referrals.

2. The relevant affiliated Unions shall prepare a list of individuals eligible and prepared for referral on an immediate basis to respond to the on call repair contractor, which may include the affiliated Unions' service, repair and maintenance division workers where appropriate for repairs that can be made within 24 to 48 hours and paid at the appropriate prevailing wage rates for service and repair or maintenance work. Such list shall be provided to and in the possession of the designated-on call repair contact person for the affiliated Union and available for immediate reference.

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

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

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

ARTICLE 5 - UNION REPRESENTATION

SECTION 1. LOCAL UNION REPRESENTATIVE

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

SECTION 2. STEWARDS

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

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

C. The Stewards shall not have the right to determine when overtime shall be worked, or who shall work overtime except pursuant to a Schedule "A" CBA provision providing procedures for the equitable distribution of overtime.

SECTION 3. LAYOFF OF A STEWARD

Contractors agree to notify the appropriate Union 24 hours prior to the layoff of a Steward, except in cases of discipline or discharge for just cause. If a Steward is protected against layoff by a Schedule "A" CBA provision, such provision shall be recognized to the extent the Steward possesses the necessary qualifications to perform the work required, except in cases of discipline or discharge for just cause. In any case in which a Steward is discharged or disciplined for just cause, the Local Union involved shall be notified immediately by the Contractor.

ARTICLE 6 - MANAGEMENT'S RIGHTS

SECTION 1. RESERVATION OF RIGHTS

Except as expressly limited by a specific provision of this Agreement, Contractors retain full and exclusive authority for the management of their operations including, but not limited to, the right to: direct the workforce, including determination as to the number of employees to be hired and the qualifications therefore; the promotion, transfer, layoff of its employees; require compliance with the directives of the Agency including standard restrictions related to security and access to the site that are equally applicable to Agency employees, guests, or vendors; or the discipline or discharge for just cause of its employees; assign and schedule work; promulgate reasonable Program Work rules that are not inconsistent with this Agreement or rules common in the industry and are reasonably related to the nature of work; and, the requirement, timing and number of employees to be utilized for overtime work. No rules, customs, or practices which limit or restrict productivity or efficiency of the individual, as determined by the Contractor, Agency and/or Construction Manager and/or joint working efforts with other employees shall be permitted or observed.

SECTION 2. MATERIALS, METHODS & EQUIPMENT

There shall be no limitation or restriction upon the Contractor's choice of materials, techniques, methods, technology or design, or, regardless of source or location, upon the use and installation of equipment, machinery, package units, pre-cast, pre-fabricated, pre-finished, or pre-assembled materials or products, tools, or other labor-saving devices. Contractors may, without restriction, install or use materials, supplies or equipment regardless of their source; provided, however, that where there is a Schedule "A" CBA that includes a lawful union standards and practices clauses, then such clause as set forth in Schedule "A" CBA will be complied with, unless there is a lawful Agency specification (or specification issued by a Construction Manager which would be lawful if issued by the Agency directly) that would specifically limit or restrict the Contractor's choice of materials, techniques, methods, technology or design, or, regardless of source or location, upon the use and installation of equipment, machinery, package units, pre-cast, pre-fabricated, pre-finished, or pre-assembled materials or products, tools, or other labor-saving devices, and which would prevent compliance with such Schedule "A" CBA clause. The on-site installation or application of such items shall be performed by the craft having jurisdiction over such work; provided, however, it is recognized that other personnel having special qualifications may participate, in a supervisory capacity, in the installation, check-off or testing of specialized or unusual equipment or facilities as designated by the Contractor. There shall be no restrictions as to work which is performed off-site for Program Work.

ARTICLE 7 - WORK STOPPAGES AND LOCKOUTS

SECTION 1. NO STRIKES-NO LOCK OUT

There shall be no strikes, sympathy strikes, picketing, work stoppages, slowdowns, hand billing, demonstrations or other similar disruptive activity at the Program Work site for any reason by any Union or employee against any Contractor or employer. There shall be no other Union or

concerted or employee activity which disrupts or interferes with the operation of the Program Work or the objectives of the Agency at any Program Work site. In addition, failure of any Union or employee to cross any picket line established by any Union, signatory or non-signatory to this Agreement, or the picket or demonstration line of any other organization, at or in proximity to a Program Work site where the failure to cross disrupts or interferes with the operation of Program Work is a violation of this Article. Should any employees breach this provision, the Unions will use their best efforts to try to immediately end that breach and return all employees to work. There shall be no lockout at a Program Work site by any signatory Contractor, Agency or Construction Manager.

SECTION 2. DISCHARGE FOR VIOLATION

A Contractor may discharge any employee violating Section 1, above, and any such employee will not be eligible thereafter for referral under this Agreement for a period of 100 days.

SECTION 3. NOTIFICATION

If a Contractor contends that any Union has violated this Article, it will notify the Local Union involved advising of such fact, with copies of the notification to the Council. The Local Union shall instruct and order, the Council shall request, and each shall otherwise use their best efforts to cause, the employees (and where necessary the Council shall use its best efforts to cause the Local Union), to immediately cease and desist from any violation of this Article. If the Council complies with these obligations, it shall not be liable for the unauthorized acts of a Local Union or its members. Similarly, a Local Union and its members will not be liable for any unauthorized acts of the Council. Failure of a Contractor or the Construction Manager to give any notification set forth in this Article shall not excuse any violation of Section 1 of this Article.

SECTION 4. EXPEDITED ARBITRATION

Any Contractor or Union alleging a violation of Section 1 of this Article may utilize the expedited procedure set forth below (in lieu of, or in addition to, any actions at law or equity that may be brought).

A. A party invoking this procedure shall notify J.J. Pierson and Gayle Gavin; who shall alternate (beginning with Arbitrator J.J. Pierson) as Arbitrator under this expedited arbitration procedure. If the Arbitrator next on the list is not available to hear the matter within 24 hours of notice, the next Arbitrator on the list shall be called. Copies of such notification will be simultaneously sent to the alleged violator and Council.

B. The Arbitrator shall thereupon, after notice as to time and place to the Contractor, the Local Union involved, the Council, Agency and the Construction Manager, hold a hearing within 48 hours of receipt of the notice invoking the procedure if it is contended that the violation still exists. The hearing will not, however, be scheduled for less than 24 hours after the notice required by Section 3, above.

C. All notices pursuant to this Article may be provided by telephone, telegraph, hand delivery, or fax, confirmed by overnight delivery, to the Arbitrator, Contractor, Agency, Construction Manager and Local Union involved. The hearing may be held on any day including Saturdays or Sundays. The hearing shall be completed in one session, which shall not exceed 8 hours duration (no more than 4 hours being allowed to either side to present their case and conduct their cross examination) unless otherwise agreed. A failure of any Union or Contractor to attend the hearing shall not delay the hearing of evidence by those present or the issuance of an award by the Arbitrator.

D. The sole issue at the hearing shall be whether a violation of Section 1, above, occurred. If a violation is found to have occurred, the Arbitrator shall issue a Cease and Desist Award restraining such violation and serve copies on the Contractor and Union involved. The Arbitrator shall have no authority to consider any matter in justification, explanation or mitigation of such violation or to award damages (any damages issue is reserved solely for court proceedings, if any). The Award shall be issued in writing within 3 hours after the close of the hearing and may be issued without an Opinion. If any involved party desires an Opinion, one shall be issued within 15 calendar days, but its issuance shall not delay compliance with, or enforcement of, the Award.

E. The Agency and Construction Manager (or such other designee of the Agency) may participate in full in all proceedings under this Article.

F. An Award issued under this procedure may be enforced by any court of competent jurisdiction upon the filing of this Agreement together with the Award. Notice of the filing of such enforcement proceedings shall be given to the Union or Contractor involved, and the Agency and Construction Manager.

G. Any rights created by statute or law governing arbitration proceedings which are inconsistent with the procedure set forth in this Article, or which interfere with compliance thereto, are hereby waived by the Contractors and Unions to whom they accrue.

H. The fees and expenses of the Arbitrator shall be equally divided between the involved Contractor and Union.

SECTION 5. ARBITRATION OF DISCHARGES FOR VIOLATION

Procedures contained in Article 9 shall not be applicable to any alleged violation of this Article, with the single exception that an employee discharged for violation of Section 1, above, may have recourse to the procedures of Article 9 to determine only if the employee did, in fact,

violate the provisions of Section 1 of this Article; but not for the purpose of modifying the discipline imposed where a violation is found to have occurred.

ARTICLE 8 - LABOR MANAGEMENT COMMITTEE

SECTION 1. SUBJECTS

The Program Labor Management Committee (the "LMC") will meet on a regular basis to: 1) promote harmonious relations among the Contractors and Unions; 2) enhance safety awareness, cost effectiveness and productivity of construction operations; 3) protect the public interests; 4) discuss matters relating to staffing and scheduling with safety and productivity as considerations; and 5) review efforts to meet applicable participation goals for MWBEs or DBEs and workforce participation goals for Residence-Based Community Hires, minority and female employees.

SECTION 2. COMPOSITION

The LMC shall be jointly chaired by a designee of the Agency and the President of the Council. It may include representatives of the Local Unions and Contractors involved in the issues being discussed. The parties shall mutually designate a Community Hiring Construction Careers, MWBE or DBE representative to participate in appropriate LMC discussions. The LMC may conduct business through mutually agreed upon sub-committees.

ARTICLE 9 - GRIEVANCE & ARBITRATION PROCEDURE

SECTION 1. PROCEDURE FOR RESOLUTION OF GRIEVANCES

Any question, dispute or claim arising out of, or involving the interpretation or application of this Agreement (other than jurisdictional disputes or alleged violations of Article 7, Section 1) shall be considered a grievance and shall be resolved pursuant to the exclusive procedure of the steps described below, provided, in all cases, that the question, dispute or claim arose during the term of this Agreement. Grievances shall include the City contract number and the Program Work

address; such information is posted at the work site if already commenced and is available in the City Record and Notice to Proceed for projects not already commenced.

Local Union grievances as to whether a scope of work is included or excluded from this Agreement shall be submitted to the LMC in the first instance rather than Step 1 below. To be timely, such notice must be given no later than five days prior to the bid opening date advertised in the City Record and bid documents for that contract, or any adjourned date publicly noticed if the grievance is challenging a determination by an Agency that the contract is not subject to this Agreement. Compliance with this limit shall operate as a statute of limitations and shall be a condition precedent to arbitration. For other grievances as to contractor and/or subcontractor scope of work issues, notice of such challenges shall be submitted to the LMC within 7 calendar days after the act, occurrence or event giving rise to the grievance. If the scope of work grievance is not resolved within 21 days of its submission to the LMC, then the grievance may proceed directly to Step 3 below.

Step 1:

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

by serving the involved Contractor with written copies of the grievance setting forth a description of the claimed violation, the date on which the grievance occurred, and the provisions of the Agreement alleged to have been violated. Grievances and disputes settled at Step 1 are non-precedential except as to the specific Local Union, employee and Contractor directly involved unless the settlement is accepted in writing by the Agency (or designee) as creating a precedent.

(b) Should any signatory to this Agreement have a dispute (excepting jurisdictional disputes or alleged violations of Article 7, Section 1) with any other signatory to this Agreement and, if after conferring, a settlement is not reached within 7 calendar days, the dispute shall be reduced to writing and proceed to Step 2 in the same manner as outlined in subparagraph (a) for the adjustment of employee grievances.

Step 2:

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

Step 3:

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

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

(b) Failure of the grieving party to adhere to the time limits set forth in this Article shall render the grievance null and void. These time limits may be extended only by written consent of the Agency (or designee), involved Contractor and involved Local Union at the particular step where the extension is agreed upon. The Arbitrator shall have authority to make decisions only on the issues presented to him and shall not have the authority to change, add to, delete or modify any provision of this Agreement.

SECTION 2. LIMITATION AS TO RETROACTIVITY

No arbitration decision or award, with the exception of those related to compliance with requirements to pay prevailing wages and supplements in accordance with federal or State law, may provide retroactivity of any kind exceeding 60 calendar days prior to the date of service of the written grievance on the Construction Manager and the involved Contractor or Local Union.

SECTION 3. PARTICIPATION BY AGENCY AND/OR CONSTRUCTION MANAGER

The Agency and Construction Manager (or such other designee of the Agency) shall be notified by the involved Contractor of all actions at Steps 2 and 3 and, at its election, may participate in full in all proceedings at these Steps, including Step 3 arbitration.

ARTICLE 10 - JURISDICTIONAL DISPUTES

SECTION 1. NO DISRUPTIONS

There will be no strikes, sympathy strikes, work stoppages, slowdowns, picketing or other disruptive activity of any kind arising out of any jurisdictional dispute. Pending the resolution of the dispute, the work shall continue uninterrupted and as assigned by the Contractor. No jurisdictional dispute shall excuse a violation of Article 7.

SECTION 2. ASSIGNMENT

All Program Work assignments shall be made by the Contractor to unions affiliated with the BCTC consistent with the New York Plan for the Settlement of Jurisdictional Disputes ("New York Plan") and its Greenbook decisions, if any. Where there are no applicable Greenbook decisions, assignments shall be made in accordance with the provisions of the New York Plan and local industry practice.

SECTION 3. NO INTERFERENCE WITH WORK

There shall be no interference or interruption of any kind with the Program Work while any jurisdictional dispute is being resolved. The work shall proceed as assigned by the Contractor until finally resolved under the applicable procedure of this Article. The award shall be confirmed in writing to the involved parties. There shall be no strike, work stoppage or interruption in protest of any such award.

ARTICLE 11 - WAGES AND BENEFITS

SECTION 1. CLASSIFICATION AND BASE HOURLY RATE

All employees covered by this Agreement shall be classified in accordance with the work performed and paid the hourly wage rates applicable for those classifications as required by the applicable prevailing wage laws.

SECTION 2. EMPLOYEE BENEFITS

A. The Contractors agree to pay on a timely basis contributions on behalf of all employees covered by this Agreement to those established jointly trusteed employee benefit funds designated in the applicable Schedule "A" CBA (in the appropriate Schedule "A" amounts), provided that such benefits are required to be paid on public works under any applicable prevailing wage law. Bona fide jointly trusteed fringe benefit plans established or negotiated through collective bargaining during the life of this Agreement may be added if similarly required under applicable prevailing wage law. Contractors, not otherwise contractually bound to do so, shall not be required to contribute to benefits, trusts or plans of any kind which are not required by the prevailing wage law provided, however, that this provision does not relieve Contractor's signatory to local collective bargaining agreement with any affiliated union from complying with the fringe benefit requirements for all funds contained in the CBA. Furthermore, employees that may remain unaffiliated with any local union at the completion of their employment under the terms of this Agreement may apply for any distributions to which they may be entitled from the funds in accordance with the applicable rules and governing documents of the unions and the employee benefit funds that they have participated in under the terms of this Agreement.

B. 1. Notwithstanding Section 2 (A) above, and subject to 2 (B)(2) below, Contractors who designate Core Employees pursuant to Article 4, Section 2 (B) and (C) that are not signatory to a Schedule "A" CBA and who maintain bona fide private benefit plans that satisfy

the requirements of Section 220 of the New York State Labor Law, may satisfy the above benefit obligation with respect to those employees by providing those employees with coverage under their private benefit plans (to the extent consistent with Section 220). The total benefit payments to be made on behalf of each such employee must be equal to the total Section 220 supplement amount and any shortfall must be paid by cash supplement to the employee.

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

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

C. The Contractors agree to be bound by the written terms of the legally established jointly trusteed Trust Agreements specifying the detailed basis on which payments are to be paid into, and benefits paid out of, such Trust Funds but only with regard to Program Work done under this Agreement and only for those employees to whom this Agreement requires such benefit payments.

D. 1. To the extent consistent with New York City's Procurement Policy Board Rules with respect to prompt payment, as published at www.nyc.gov/ppb, §4-06(e), and in consideration of the unions' waiver of their rights to withhold labor from a contractor or subcontractor delinquent in the payment of fringe benefits contributions ("Delinquent Contractor"); the Agency agrees that where any such union and/or fringe benefit fund shall notify the Agency, the General Contractor, and the Delinquent Contractor in writing with back-up documentation that the Delinquent Contractor has failed to make fringe benefit contributions to it as provided herein and the Delinquent Contractor shall fail, within ten (10) calendar days after receipt of such notice, to furnish either proof of such payment or notice that the amount claimed by the union and/or fringe benefit fund is in dispute, the Agency shall withhold from amounts then or thereafter becoming due and payable to the General Contractor an amount equal to that portion of such payment due to the General Contractor that relates solely to the work performed by the Delinquent Contractor which the union or fringe benefit fund claims to be due it, and shall remit the amount when and so withheld to the fringe benefit fund and deduct such payment from the amounts then otherwise due and payable to the General Contractor, which payment shall, as between the General Contractor and the Agency, be deemed a payment by the Agency to the General Contractor; provided however, that in any month, such withholding shall not exceed the amount contained in the General Contractor's monthly invoice for work performed by the Delinquent Contractor. The union or its

employee benefit funds shall include in its notification of delinquent payment of fringe benefits only such amount it asserts the Delinquent Contractor failed to pay on the specific project against which the claim is made and the union or its employee benefit funds may not include in such notification any amount such Delinquent Contractor may have failed to pay on any other City or non-City project.

2. In addition, where a union or employee benefit fund gives notice to the City that a Contractor is Delinquent as defined in subsection 2(D)(1) above and the City determines that the notice includes appropriate back-up documentation that the Contractor is delinquent, the City will promptly, but not later than twenty (20) days after receipt of the notice, provide a copy of said notice to City Agencies. In the event the City determines there is insufficient back-up documentation, it will notify the appropriate union and/or fringe benefit fund promptly, but not later than twenty (20) days after receipt of the Delinquency Notice, and shall include notice of what additional documentation is requested. Any determination by the City that there is insufficient back-up must be reasonable. This provision is intended to enhance compliance with the prevailing wage law and this Agreement with respect to the payment of fringe benefits and is not intended as a substitute for the resolution of a disputed claim pursuant to any applicable law or agreement.

The City and the relevant Agency(s) will thereafter require the Delinquent Contractor to provide cancelled checks or other equivalent proof of payment of benefit contributions that have come due, to be submitted with certified payroll reports for all Program Work covered by this Agreement on which the Delinquent Contractor is engaged, for at least a one-year period or such earlier period if the Contractor is ultimately determined not to be a Delinquent Contractor. Such proof of payment when required is a condition of payment of the Delinquent Contractor's invoices

by any entity, including, but not limited to, the City, the relevant Agency(s), Construction Manager, General Contractor, the prime or higher level subcontractor, as is appropriate under the Delinquent Contractor's engagement. The union and the funds shall upon request receive copies of the certified payrolls, cancelled checks, or other proof of payment from the City and/or the relevant Agency(s).

E. In the event the General Contractor or Delinquent Contractor shall notify the Agency as above provided that the claim of the union or fringe benefit fund is in dispute, the Agency shall withhold from amounts then or thereafter becoming due and payable to the General Contractor an amount equal to that portion of such payment due to the General Contractor that relates solely to the work performed by the Delinquent Contractor that the union and/or fringe benefit fund claims to be due it, pending resolution of the dispute pursuant to the union's Schedule "A" CBA, and the amount shall be paid to the party or parties ultimately determined to be entitled thereto, or held until the Delinquent Contractor and union or employee benefit fund shall otherwise agree as to the disposition thereof; provided however, that such withholding shall not exceed the amount contained in the General Contractor's monthly invoice for work performed by the Delinquent Contractor. In the event the Agency shall be required to withhold amounts from a General Contractor for the benefit of more than one fringe benefit fund, the amounts so withheld in the manner and amount prescribed above shall be applied to or for such fund in the order in which the written notices of nonpayment have been received by the Agency, and if more than one such notice was received on the same day, proportionately based upon the amount of the union and/or fringe benefit fund claims received on such day. Nothing herein contained shall prevent the Agency from commencing an interpleader action to determine entitlement to a disputed

payment in accordance with section one thousand six of the civil practice law and rules or any successor provision thereto.

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

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

SECTION 1. WORK WEEK AND WORKDAY

A. The standard work week shall consist of 40 hours of work at straight time rates, Monday through Friday, 8 hours per day, plus ½ hour unpaid lunch period. For renovation and rehabilitation projects only, the standard work week may be reduced to 35 or 37 ½ hours of work at straight time rates, Monday to Friday, 7 or 7 ½ hours per day, plus ½ hour unpaid lunch period in those limited circumstances where the City states in the bid documents that the Contractor will not be given access to the site to accommodate an 8 hour day. The 8 hour, 7 ½ hour or 7-hour workday must be established at the commencement of the renovation and rehabilitation project and may not be altered by the Contractor.

B. In accordance with project needs, there shall be flexible start times with advance notice from Contractor to the Union. The Day Shift shall commence between the hours of 6:00 a.m. and 9:00 a.m. and shall end between the hours of 2:30 p.m. and 5:30 p.m., for an 8-hour day, and up to 7:30 p.m. for a 10-hour day. The Evening Shift shall commence between the hours of 3:00 p.m. and 6:00 p.m., unless different times are necessitated by the Agency's phasing plans on specific projects. The Night Shift shall commence between the hours of 11:00 p.m. and 2:00 a.m.,

unless different times are necessitated by the Agency's phasing plans on specific projects. Subject to the foregoing, starting and quitting times shall occur at the Program Work site designated by the Contractor.

C. Scheduling - Except as provided above, Monday through Friday is the standard work week; 8 hours of work plus ½ hour unpaid lunch. Notwithstanding any other provision of this Agreement, a Contractor may, for renovation and rehabilitation projects only, schedule a four-day work week, 10 hours per day ("4/10") at straight time rates, plus a ½ hour unpaid lunch, at the commencement of the job.

D. Notice - Contractors shall provide not less than 5 days prior notice to the Local Union involved as to the work week and work hour schedules to be worked or such lesser notice as may be mutually agreed upon.

SECTION 2. OVERTIME

Overtime shall be paid for any work exceeding either (i) an employee's regularly scheduled work day, i.e., work over eight (8) hours in a day where 5/8s is scheduled, work over ten (10) hours in a day where 4/10s is scheduled, or work over seven (7) or seven and one half (7½) hours where such hours are scheduled pursuant to Article 12, section 1(A); or (ii) an employee's regularly scheduled work week, i.e., over forty (40) hours in a week, or over thirty five (35) or thirty seven and one-half (37 ½) where such hours are scheduled pursuant to Article 12, Section 1(A). Overtime shall be paid at time and one half (1½) Monday through Saturday. All overtime work performed on Sunday and Holidays will be paid pursuant to the applicable Schedule "A" CBA. There shall be no stacking or pyramiding of overtime pay under any circumstances. There will be no restriction upon the Contractor's scheduling of overtime or the nondiscriminatory designation of employees who shall be worked, including the use of employees, other than those who have

worked the regular or scheduled work week, at straight time rates. The Contractor shall have the right to schedule work so as to minimize overtime or schedule overtime as to some, but not all, of the crafts and whether or not of a continuous nature.

SECTION 3. SHIFTS

A. Flexible Schedules - Scheduling of shift work, including Saturday and Sunday work, shall be within the discretion of the Contractor in order to meet Program Work schedules and existing Program Work conditions including the minimization of interference with the mission of the Agency. It is not necessary to work a day shift in order to schedule a second or third shift, or a second shift in order to schedule a third shift, or to schedule all of the crafts when only certain crafts or employees are needed. Shifts must have prior approval of the Agency or Construction Manager and must be scheduled with not less than five workdays' notice to the Local Union or such lesser notice as may be mutually agreed upon.

B. Second and/or Third Shifts - The second shift shall start between 3 p.m. and 6 p.m. and the third shift shall start between 11 p.m. and 2 a.m., subject to different times necessitated by the Agency phasing plans on specific projects. There shall be no reduction in shift hour work. With respect to second and third shift work performed Monday—Friday on renovation and rehabilitation projects, there shall be a 5% shift premium, or the rate required by the applicable prevailing wage laws, whichever is less. With respect to second shift work performed Monday – Friday on new construction projects, there shall be a 10% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. With respect to third shift work on work performed Monday – Friday on new construction projects, there shall be a 15% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. No other premium or other payments for such work shall be required unless such work is in excess of the employee's regularly

scheduled work week, i.e., forty (40) hours in the week or thirty-five (35) or thirty-seven and one half (37 ½) pursuant to Article 12, Section 1(A). All employees within the same classification performing Program Work will be paid at the same wage rate regardless of the shift or work, subject only to the foregoing provisions.

C. Flexible Starting Times - Shift starting times will be adjusted by the Contractor as necessary to fulfill Program Work requirements subject to the notice requirements of paragraph A.

SECTION 4. HOLIDAYS

A. Schedule - There shall be nine (9) recognized holidays on the project:

New Year's Day	
Martin Luther King Day	President's Day
Memorial Day	Veteran's Day
Labor Day	Thanksgiving Day
Independence Day	Christmas Day

All said holidays shall be observed on the calendar date except those holidays which occur on Saturday shall be observed on the previous Friday and those that occur on Sunday shall be observed on the following Monday.

B. Payment - Regular holiday pay, if any, for work performed on such a PLA recognized holiday shall be in accordance with the applicable Schedule "A" for work performed on a holiday, even where the PLA holiday differs from the CBA holidays.

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

SECTION 5. MAKE-UP DAYS

When severe weather, power failure, fire or natural disaster or other similar circumstances beyond the control of the Contractor prevent work from being performed on a regularly scheduled weekday, the Contractor may schedule a Saturday make-up day (or Friday make-up day in the case of a 4/10 schedule) and such time shall be scheduled and paid as if performed on a weekday. Any other Saturday work shall be paid at time and one-half (1½). The Contractor shall notify the Local Union on the missed day or as soon thereafter as practicable if such a make-up day is to be worked.

SECTION 6. REPORTING PAY

A. Employees who report to the work location pursuant to their regular schedule and who are not provided with work shall be paid two hours reporting pay at straight time rates. An employee whose work is terminated early by a Contractor due to severe weather, power failure, fire or natural disaster of for similar circumstances beyond the Contractor's control, shall receive pay only for such time as is actually worked. In other instances, in which an employee's work is terminated early (unless provided otherwise elsewhere in this Agreement), the employee shall be paid for their full shift. Contractors shall not be permitted to call, text or email or voicemail employees in advance of their regularly scheduled shift starting time to avoid reporting pay. Notwithstanding the above, in the event that the National Weather Service issues a weather advisory for the area in which the work location is situated, and the entire project is shut down as a result of the Weather Advisory, the Contractor shall be permitted to speak to employees no less than four (4) hours in advance of their shift starting time, unless the Local Union consents to a shorter notice in writing, to advise them not to report to work due to the National Weather Service advisory, and employees who are so notified shall not receive two (2) hours reporting pay if they report to the work location. The Contractor shall make every effort to notify each employee

directly and confirm that notification has been received. Voice, text, and email messages left for employees without confirmation of delivery and receipt by employee do not constitute sufficient notice under this provision.

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

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

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

E. There shall be no pay for time not actually worked except as specifically set forth in this Article and except where an applicable Schedule "A" CBA requires a full weeks' pay for forepersons.

SECTION 7. PAYMENT OF WAGES

A. Termination - Employees who are laid off or discharged for cause shall be paid in full for that which is due them at the time of termination. The Contractor shall also provide the employee with a written statement setting forth the date of layoff or discharge.

SECTION 8. EMERGENCY WORK SUSPENSION

A Contractor may, if considered necessary for the protection of life and/or safety of employees or others, suspend all or a portion of Program Work. In such instances, employees will

be paid for actual time worked, except that when a Contractor requests that employees remain at the job site available for work, employees will be paid for that time at their hourly rate of pay.

SECTION 9. INJURY/DISABILITY

An employee who, after commencing work, suffers a work-related injury or disability while performing work duties, shall receive no less than a full day's pay in accordance with the employee's regularly scheduled workday under Article 12, Section (1)(A). Further, the employee shall be rehired at such time as able to return to duties provided there is still Program Work available for which the employee is qualified and able to perform.

SECTION 10. TIME KEEPING

A Contractor may utilize systems to check employees in and out. Each employee must check in and out and sign a daily sign-in sheet, or other attendance methodology approved in writing by the Agency(s). The Contractor will provide adequate facilities for checking in and out in an expeditious manner.

SECTION 11. MEAL PERIOD

A Contractor shall schedule an unpaid period of not more than 1/2-hour duration at the work location between the 3rd and 5th hour of the scheduled shift. A Contractor may, for efficiency of operation, establish a schedule which coordinates the meal periods of two or more crafts, or which provides for staggered lunch periods within a craft or trade. If an employee is required to work through the meal period, the employee shall be compensated in a manner established in the applicable Schedule "A" CBA.

SECTION 12. BREAK PERIODS

There will be no rest periods, organized coffee breaks or other non-working time established during working hours. Individual coffee containers will be permitted at the employee's

work location. Where 4/10s are being worked, there shall be a morning and an afternoon coffee break.

ARTICLE 13 - APPRENTICES AND WORKFORCE DEVELOPMENT

SECTION 1. APPRENTICE RATIOS AND REFERRALS

A. Recognizing the need to maintain continuing supportive programs designed to develop adequate numbers of competent workers in the construction industry and to provide craft entry opportunities for minorities, women and economically disadvantaged non-minority males, Contractors will employ apprentices in their respective crafts to perform such work as is within their capabilities and which is customarily performed by the craft in which they are indentured. Contractors may utilize apprentices and such other appropriate classifications in the maximum ratio permitted by the New York State Department of Labor ("NYSDOL"), or the maximum allowed per trade. Apprentices and such other classifications as are appropriate shall be employed in a manner consistent with the provisions of the appropriate Schedule "A" CBA. The parties encourage, as an appropriate source of apprentice recruitment consistent with the rules and operations of the affiliated unions' apprentice-programs, the use of the Edward J. Malloy Initiative for Construction Skills, Non-Traditional Employment for Women, New York Helmets to Hardhats, and Pathways to Apprenticeship (P2A). Should a Contractor request that apprentices be provided for Program Work, the referring Local Union shall comply with that request so long as it is consistent with the maximum ratios permitted by NYSDOL. Where the Agency sets forth goals regarding Residence-Based Community Hire apprentices, the Contractor shall request such Residence-Based Community Hire apprentices from the Local Union so long as it is consistent with the maximum ratios permitted by NYSDOL.

SECTION 2. WORKFORCE DEVELOPMENT

A. The parties to this Agreement recognize the mutual interest in increasing training

and career opportunities for Residence-Based Community Hires. The parties are committed to (i) increasing opportunities for Residence-Based Community Hires in pre-apprenticeship and apprenticeship programs, and (ii) using the work opportunities provided by this Agreement to increase the career opportunities for qualified Residence-Based Community Hires, and (iii) assuring the continued availability of a skilled and qualified, readily available construction workforce for this program and future work.

B. Specifically, the parties have established an initiative entitled Community Hiring Construction Careers, which is an initiative to advance career opportunities for Residence-Based Community Hires.

C. The Community Hiring Construction Careers initiative will work with the Office of Talent and Workforce Development ("NYC Talent") and the City's Workforce1 Centers to recruit Residence-Based Community Hires interested in employment in the construction industry.

D. Community Hiring Construction Careers intends to capitalize on the work opportunities presented by this Agreement to create a pathway to career opportunities in the construction workforce. To this end the Community Hiring Construction Careers initiative includes a workforce goal of at least 30% of all hours worked under this Agreement, including by subcontractors pursuant to Article 3, Section 1(b)(12) and Article 4, Sections 2(B) and (C), to be worked by Residence-Based Community Hires. Where the Agency sets forth workforce goals in its solicitation, Contractors shall request Residence-Based Community Hires from the Local Unions to achieve the required workforce goal.

E. In order to encourage recruitment of new workers, Community Hiring Construction Careers has established a goal that at least 30% of all of those hours are to be worked

by apprentices who are Residence-Based Community Hires.

F. The Contractors and Unions agree to cooperate and participate in the implementation of Community Hiring Construction Careers to assist Residence-Based Community Hires with educational and training opportunities related to access to pre-apprenticeship, apprenticeship, and Program Work as set forth in this Agreement.

G. Reporting Requirements:

i. The Contractors shall report the residence zip code information on all certified payroll reports and any additional information regarding Residence-Based Community Hires that may be required by rule or law.

ii. The Local Unions, their referral systems, the affiliated pre-apprentice programs, and Contractors shall cooperate with any protocol developed for monitoring the Community Hiring Construction Careers initiative.

H. The City and BCTC agree that no less than annually, the LMC shall review the implementation of Community Hiring Construction Careers, as well as Residence-Based Community Hire opportunities afforded as a result of the initiative. The City and BCTC will collaborate to develop monitoring protocol for the purpose of measuring the success of Community Hiring Construction Careers. The City and BCTC may, on mutual consent, modify the goals, procedures and protocols, as necessary to afford continued opportunity to Residence-Based Community Hires.

I. To facilitate the commitments set forth in this Agreement, each Local Union shall designate a Community Hiring Construction Careers lead representative to work in partnership with NYC Talent to implement these workforce and apprenticeship provisions within the union

and across City construction contracts.

ARTICLE 14 - SAFETY PROTECTION OF PERSON AND PROPERTY

SECTION 1. SAFETY REQUIREMENTS

Each Contractor will ensure that applicable OSHA and safety requirements are at all times maintained on the Program Work site and the employees and Unions agree to cooperate fully with these efforts to the extent consistent with their rights and obligations under the law. Employees will cooperate with employer safety policies and will perform their work at all times in a safe manner and protect themselves and the property of the Contractor and Agency from injury or harm, to the extent consistent with their rights and obligations under the law. Failure to do so will be grounds for discipline, including discharge. The Construction Manager and/or Contractor may adopt, and the Unions shall agree to, the Drug and Alcohol Testing Policy attached as Schedule "B".

SECTION 2. CONTRACTOR RULES

Employees covered by this Agreement shall at all times be bound by the reasonable safety, security, and visitor rules as established by the Contractors and the Construction Manager for Program Work. Such rules will be published and posted in conspicuous places throughout the Program Work sites. Any site security and access policies established by the Construction Manager or General Contractor intended for specific application to the construction workforce for Program Work and that are not established pursuant to an Agency directive shall be implemented only after notice to the BCTC and its affiliates and an opportunity for negotiation and resolution by the Labor Management Committee.

SECTION 3. INSPECTIONS

The Contractors and Construction Manager retain the right to inspect incoming shipments of equipment, apparatus, machinery and construction materials of every kind.

ARTICLE 15 - TEMPORARY SERVICES

SECTION 1.

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

ARTICLE 16 - NO DISCRIMINATION

SECTION 1. COOPERATIVE EFFORTS

The Contractors and Unions agree that they will not discriminate against any employee or applicant for employment because of creed, race, color, religion, sex, sexual orientation, national origin, marital status, citizenship status, disability, gender identity, age or any other status provided by law, in any manner prohibited by law or regulation.

SECTION 2. LANGUAGE OF AGREEMENT

Any words signifying any gender shall be interpreted to mean any or all gender identities.

ARTICLE 17 - GENERAL TERMS

SECTION 1. PROJECT RULES

A. The Construction Manager and the Contractors shall establish such reasonable Program Work rules that are not inconsistent with this Agreement or rules common in the industry and are reasonably related to the nature of work. These rules will be explained at the pre-job conference and posted at the Program Work sites and may be amended thereafter as necessary. Notice of amendments will be provided to the appropriate Local Union. Failure of an employee to observe these rules and regulations shall be grounds for discipline, including discharge. The fact that no order was posted prohibiting a certain type of misconduct shall not be a defense to an employee disciplined or discharged for such misconduct when the action taken is for cause.

B. The parties adopt and incorporate the BCTC's Standards of Excellence as annexed hereto as Exhibit "B".

SECTION 2. TOOLS OF THE TRADE

The welding/cutting torch and chain fall are tools of the trade having jurisdiction over the work performed. Employees using these tools shall perform any of the work of the trade. There shall be no restrictions on the emergency use of any tools or equipment by any qualified employee or on the use of any tools or equipment for the performance of work within the employee's jurisdiction.

SECTION 3. SUPERVISION

Employees shall work under the supervision of the craft foreperson or general foreperson.

SECTION 4. TRAVEL ALLOWANCES

There shall be no payments for travel expenses, travel time, subsistence allowance or other such reimbursements or special pay except as expressly set forth in this Agreement.

SECTION 5. FULL WORKDAY

Employees shall be at their work area at the starting time established by the Contractor, provided they are provided access to the work area. The signatories reaffirm their policy of a fair day's work for a fair day's wage.

SECTION 6. COOPERATION AND WAIVER

The Construction Manager, Contractors and the Unions will cooperate in seeking any NYSDOL, or any other government, approvals that may be needed for implementation of any terms of this Agreement. In addition, the Council, on their own behalf and on behalf of its participating affiliated Local Unions and their individual members, intend the provisions of this Agreement to control to the greatest extent permitted by law, notwithstanding contrary provisions of any applicable prevailing wage, or other, law and intend this Agreement to constitute a waiver of any such prevailing wage, or other, law to the greatest extent permissible only for work within the scope of this Agreement, including specifically, but not limited to those provisions relating to shift, night, and similar differentials and premiums. This Agreement does not, however, constitute a waiver or modification of the prevailing wage schedules applicable to work not covered by this Agreement.

ARTICLE 18 - SAVINGS AND SEPARABILITY

SECTION 1. THIS AGREEMENT

In the event that the application of any provision of this Agreement is enjoined, on either an interlocutory or permanent basis, or is otherwise determined to be in violation of law, or if such application may cause the loss of project funding or any New York State Labor Law exemption for all or any part of the Program Work, the provision or provisions involved (and/or its application to particular Program Work, as necessary) shall be rendered, temporarily or permanently, null and void, but where practicable the remainder of the Agreement shall remain in full force and effect to

the extent allowed by law (and to the extent no funding or exemption is lost), unless the part or parts so found to be in violation of law or to cause such loss are wholly inseparable from the remaining portions of the Agreement and/or are material to the purposes of the Agreement. In the event a court of competent jurisdiction finds any portion of the Agreement to trigger the foregoing, the parties will immediately enter into negotiations concerning the substance affected by such decision for the purpose of achieving conformity with the court determination and the intent of the parties hereto for contracts to be let in the future.

SECTION 2. THE BID SPECIFICATIONS

In the event that the Agency's (or Construction Manager's) bid specifications, or other action, requiring that a successful bidder (and subcontractor) become signatory to this Agreement is enjoined, on either an interlocutory or permanent basis, or is otherwise determined to be in violation of law, or may cause the loss of project funding or any New York State Labor Law exemption for all or any part of the Program Work, such requirement (and/or its application to particular Program Work, as necessary) shall be rendered, temporarily or permanently, null and void, but where practicable the Agreement shall remain in full force and effect to the extent allowed by law and to the extent no funding or exemption is lost. In such event, the Agreement shall remain in effect for contracts already bid and awarded or in construction only where the Agency and Contractor voluntarily accepts the Agreement. The parties will enter into negotiations as to modifications to the Agreement to reflect the court or other action taken and the intent of the parties for contracts to be let in the future.

SECTION 3. NON-LIABILITY

In the event of an occurrence referenced in Section 1 or Section 2 of this Article, neither the Agency, the Construction Manager, any Contractor, nor any Union shall be liable, directly or

indirectly, for any action taken, or not taken, to comply with any court order or injunction, other determination, or in order to maintain funding or a New York State Labor Law exemption for Program Work. Bid specifications will be issued in conformance with court orders then in effect and no retroactive payments or other action will be required if the original court determination is ultimately reversed.

SECTION 4. NON-WAIVER

Nothing in this Article shall be construed as waiving the prohibitions of Article 7 as to signatory Contractors and signatory Unions.

ARTICLE 19 - FUTURE CHANGES IN SCHEDULE "A" AREA CONTRACTS

SECTION 1. CHANGES TO AREA CONTRACTS

A. Schedule "A" to this Agreement shall continue in full force and effect until the Contractor and/or Union parties to the Area CBAs that are the basis for the Schedule "A" notify the Mayor's Office of Contract Services ("MOCS"), Agency and Construction Manager in writing by providing a copy of the updated CBA(s) incorporating the changes agreed to in that Area CBA which are applicable to work covered by this Agreement and their effective dates.

B. It is agreed that any provisions negotiated into Schedule "A" CBAs will not apply to work under this Agreement if such provisions are less favorable to those uniformly required of contractors for construction work normally covered by those agreements; nor shall any provision be recognized or applied on Program Work if it may be construed to apply exclusively, or predominantly, to work covered by this Agreement.

C. Any disagreement between signatories to this Agreement over the incorporation into Schedule "A" of provisions agreed upon in the renegotiation of Area CBAs shall be resolved in accordance with the procedure set forth in Article 9 of this Agreement.

SECTION 2. LABOR DISPUTES DURING AREA CONTRACT NEGOTIATIONS

The Unions agree that there will be no strikes, work stoppages, sympathy actions, picketing, slowdowns or other disruptive activity or other violations of Article 7 affecting the Program Work by any Local Union involved in the renegotiation of Area Local CBAs nor shall there be any lock-out on such Program Work affecting a Local Union during the course of such renegotiations.

ARTICLE 20 - WORKERS' COMPENSATION ADR

SECTION 1.

A. An Alternative Dispute Resolution ("ADR") program may be instituted by a Contractor and participation in such an ADR program will be optional by trade.

B. The BCTC acknowledges that there may be some instances where an Agency seeks to institute an ADR program for disputes regarding Workers' Compensation claims for work performed under certain Contracts performed under this Agreement. Where an Agency seeks to utilize an ADR program for a project it shall notify the BCTC and the BCTC and the City shall enter into negotiations over the terms and conditions of such ADR program. No such program shall be instituted without the full and complete agreement of the BCTC, and the City, including the applicable Agency. If an ADR program is agreed to by the BCTC and the City, including the applicable Agency, for a project performed under this Agreement, all Contractors shall require their employees to participate.

ARTICLE 21 - HELMETS TO HARDHATS

SECTION 1.

The Contractors and the Unions recognize a desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Contractors and Unions agree to utilize the services of the New York City Helmets

to Hardhats Program ("H2H") to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the parties.

SECTION 2.

The Unions and Contractors agree to coordinate with H2H to create and maintain an integrated database of veterans interested in working on this project and of apprenticeship and employment opportunities for this project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

[THIS SPACE INTENTIONALLY LEFT BLANK]

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

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

BY: _____
Gary LaBarbera
President

FOR NEW YORK CITY

BY: _____
First Deputy Mayor
Randy Mastro

APPROVED AS TO FORM:

KF

_____
ACTING CORPORATION COUNSEL NEW YORK CITY

Date: 11/5/2025

LIST OF SIGNATORY UNIONS
International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, AFL-CIO, Local Lodge No.5
Bricklayers and Allied Craftworkers, Local Union No. 1
Building Concrete & Excavating Laborers, Local Union No. 731
N.Y.C. and Vicinity District Council of Carpenters
Cement Masons, Local Union No. 780
Concrete Workers District Council No. 16
Asbestos, Lead & Hazardous Waste, Laborers Local Union No. 78
Construction & General Building Laborers Local Union No. 79
Derrickmen and Riggers Local Union No. 197
International Brotherhood of Electrical Workers, Local Union No. 3
International Union of Elevator Constructors, Local Union No. 1
Heat & Frost Insulators & Allied Workers, Local Union No. 12
Heat & Frost Insulators & Allied Workers, Local Union No. 12A
Pavers & Road Builders, Laborers Local Union No. 1010
New York State Iron Workers District Council
Structural Iron Workers, Local Union No. 40
Structural Iron Workers, Local Union No. 361
Mason Tenders District Council
Metallic Lathers & Reinforcing Ironworkers, Local No. 46
Ornamental Iron Workers, Local Union No. 580
Glaziers No. 1087, District Council 9
Painters, District Council No. 9
Metal Polishers, Local Union No. 8A-28A; District Council No. 9
Drywall Tapers Local Union No 1974, District Council 9
Bridge & Structural Steel Painters, Local Union No. 806, District Council 9
Operative Plasterers Local Union No. 262
UA Plumbers Local Union No. 1
Private Sanitation, Teamsters Local Union No. 813
Roofers & Waterproofers, Local Union No. 8
Sheet Metal Workers, Local Union No. 28
Sheet Metal Workers, Local Union No. 137
UA Steamfitters, Local Union No. 638
Teamsters, Local Union No. 282
Tile, Marble & Terrazzo, B.A.C. Local Union No. 7

SCHEDULE "A" - CBAS

Union	Current Agreement w/
Architectural and Ornamental Iron Workers Local Union 580, AFL-CIO	Allied Building Metal Industries, Inc.
Building, Concrete, Excavating & Common Laborers Local 731	Independent
Building, Concrete, Excavating & Common Laborers Local 731	Members of the General Contractors Association of New York, Inc.
Bricklayers Local 1 of the International Union of Bricklayers and Allied Craftworkers	Independent
District Council No. 9, I.U.P.A.T Glaziers Local 1087	Window and Plate Glass Dealers Association
Drywall Tapers and Painters Local 1974, affiliated with International Union of Painters & Allied Trades and Drywall Taping Contractor's Association & Association of Wall-Ceiling & Carpentry Industries NY, Inc.	Independent
Enterprise Association of Steamfitters and Apprentices Local 638	Mechanical Contractors Association of NY, Inc.
Enterprise Association of Steamfitters and Apprentices Local 638	Independent
Elevator Constructors Local 1 of NY and NJ	ThyssenKrupp Elevator Corporation
Elevator Constructors Local 1 of NY and NJ	Independent
Highway Road and Street Laborers Local Union 1010 of the District Council of Pavers and Road Builders of the Laborers' International Union of North America AFL-CIO	Independent
Highway Road and Street Laborers Local Union 1010 of the District Council of Pavers and Road Builders of the Laborers' International Union of North America AFL-CIO	Member of the General Contractors Association of New York, Inc.
International Association of Heat and Frost Insulators and Allied Workers Local No. 12 of New York City	Independent

International Association of Heat and Frost Insulators and Allied Workers Local No. 12 of New York City	The Insulation Contractors Association of New York City, Inc.
International Association of Heat and Frost Insulators and Allied Workers Local No. 12A of New York City	Independent
International Association of Heat and Frost Insulators and Allied Workers Local No. 12A of New York City	Environmental Contractors Association, Inc.
International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, AFL-CIO, Local Lodge No. 5	Boilermakers Association of Greater New York
Local Union No. 3 International Brotherhood of Electrical Workers, AFL-CIO	New York Electrical Contractors Association
International Brotherhood of Teamsters, Local 282, High Rise Contract	Building Contractors Association & Independents
International Brotherhood of Teamsters, Local 282, High Rise Contract	General Contractors Association
Local 46 Metallic Lathers Union and Reinforcing Iron Workers of NY and Vicinity of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers	General Contractors Association
Local 46 Metallic Lathers Union and Reinforcing Iron Workers of NY and Vicinity of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers	Independent
Local 8 Roofers, Waterproofers & Allied Workers	Roofing and Waterproofing Contractors Association of New York and Vicinity
Local Union 1 of the United Association of Journeymen and Apprentices of the Pipe Fitting Industry of the United States and Canada	Association of Contracting Plumbers of the City of New York
Local Union 1 of the United Association of Journeymen and Apprentices of the Pipe Fitting Industry of the United States and Canada	Independent
Local Union Number 40 & 361 of Bridge, Structural Ornamental and Reinforcing Iron Workers AFL-CIO	Independent

Mason Tenders DC & Laborers' International Union – Local 78 & 79	Building Contractors Association
Mason Tenders DC & Laborers' International Union – Local 78 & 79	Interior Demolition Contractors Association
Mason Tenders DC & Laborers' International Union – Local 78 & 79	Independent
Mason Tenders DC & Laborers' International Union – Local 78 & 79	NYCDCA
Mason Tenders DC & Laborers' International Union – Local 78 & 79	Environmental Contractors Association
Mason Tenders DC & Laborers' International Union – Local 78 & 79	ABMC
Operative Plasterers' and Cement Masons' International Association Local No. 262	Independent
Painters and Allied Trades AFL-CIO, District Council No. 9 (Painting and Protective Coatings CBA)	Independent
Painters and Allied Trades AFL-CIO, District Council No. 9 (Painting and Protective Coatings CBA)	The Association of Master Painters & Decorators of NY, Inc. and The Association of Wall, Ceiling & Carpentry Industries of NY, Inc. and The Window and Plate Glass Dealers Association
Sheet Metal Workers' International Association, Local 28	Sheet Metal & Air Conditioning Contractors Association of New York City, Inc.
Sheet Metal Workers' International Association, Local 137	The Greater New York Sign Association
Structural Steel and Bridge Painters Local 806, DC 9 International Union of Painters and Allied Trades, AFL-CIO	New York Structural Steel Painting Contractors Association
Teamsters Local 813	Independent
Teamsters Local 813	IESI NY Corporation
The Cement Masons' Union, Local 780	Cement League
The District Council of Cement and Concrete Workers (comprised of Local 6A; Local 18A and Local 20)	Cement League

The District Council of Cement and Concrete Workers (comprised of Local 6A; Local 18A and Local 20)	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Heavy Carpenters	GCA
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Dockbuilders Local No. 1556	Concrete Contractors of NY
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Dockbuilders Local 1556	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Millwright Local 740	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Timbermen Local 1556	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Timbermen Local 1556	GCA
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Heavy Carpenters	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Manufacturing Woodworkers Association of Greater New York Incorporated
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Hoisting Trade Association of New York, Inc.
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Test Boring Association
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	Building Contractors Association

The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Association of Wall-Ceiling & Carpentry Industries of New York, Incorporated
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners	The Cement League
The District Council of NYC and Vicinity of the United Brotherhood of Carpenters and Joiners of America	New York City Millwright Association
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners	Greater New York Floor Covering Association
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Association of Architectural Metal & Glass
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Concrete Contractors of NY
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Building Construction Carpenters	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Local 2287	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Shop Carpenters	Independent
The Tile Setters and Tile Finishers Union of New York and New Jersey, Local 7 of the International Bricklayers and Allied Craftworkers	The Greater New York and New Jersey Contractors Association
United Derrickmen & Riggers Association, Local 197 of NY, LI, Westchester & Vicinity	Contracting Stonesetters Association Inc.
United Derrickmen & Riggers Association Local 197 of NY, LI, Westchester and Vicinity	Building Stone and Pre-cast Contractors Association

Exhibit A

Project Labor Agreement - Letter of Assent

Dear: _____

The undersigned party confirms that it agrees to be a party to and be bound by the New York Agency, Project Labor Agreement as such Agreement may, from time to time, be amended by the parties or interpreted pursuant to its terms. The terms of the Project Labor Agreement, its Schedules, Addenda and Exhibits are hereby incorporated by reference herein.

The undersigned, as a Contractor or Subcontractor (hereinafter Contractor) on the Project known as the 2025 NYC Agency Citywide Renovation & New Construction PLA and located at _____ (hereinafter PROJECT), for and in consideration of the award to it of a contract to perform work on said PROJECT, and in further consideration of the mutual promises made in the Project Labor Agreement, a copy of which was received and is acknowledged, hereby:

(1) Accepts and agrees to be bound by the terms and conditions of the Agreement, together with any and all schedules; amendments and supplements now existing or which are later made thereto:

(2) Agrees to be bound by the legally established collective bargaining agreements; local trust agreements for employee benefit funds; and trust documents for joint apprentice programs as well as apprentice program rules and procedures but only to the extent of Program Work and as required by the PLA.

(3) Authorizes the parties to such local trust agreements to appoint trustees and successor trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor but only to the extent of Program Work as required by the PLA.

(4) Certifies that it has no commitments or agreements that would preclude its full and complete compliance with the terms and conditions of said Agreement. The Contractor agrees to employ labor that can work in harmony with all other labor on the Project and shall require labor harmony from every lower tier subcontractor it has engaged or may engage to work on the Project. Labor harmony disputes/issues shall be subject to the Labor Management Committee provisions.

(5) Agrees to secure from any Contractor(s) (as defined in said Agreement) which is or becomes a Subcontractor (of any tier), to it, a duly executed Agreement to be Bound in from identical to this document.

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

Local Union: _____

Description of Work: _____

_____

Contract Number(s): _____

Dated: _____

_____
(Name of Contractor or Subcontractor)

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

_____
(Authorized Officer & Title)

_____
(Address)

_____
(Signature)

_____
(Phone) (Fax)

Contractor's State License #_____

Sworn to before me this
____ day of _____,

_____
Notary Public

Exhibit B

NEW YORK CITY BUILDING AND CONSTRUCTION TRADES COUNCIL STANDARDS OF EXCELLENCE

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

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

- ***Provide a full day's work for a full days pay;***
- ***Safely work towards the timely completion of the job;***
- ***Arrive to work on time and work until the contractual quitting time;***
- ***Adhere to contractual lunch and break times;***
- ***Promote a drug and alcohol free work site;***
- ***Work in accordance with all applicable safety rules and procedures;***
- ***Allow union representatives to handle job site disputes and grievances without resort to slowdowns, or unlawful job disruptions;***
- ***Respect management directives that are safe, reasonable and legitimate;***
- ***Respect the rights of co-workers;***
- ***Respect the property rights of the owner, management and contractors.***

The Unions affiliated with the New York City Building and Construction Trades Council will expect the signatory contractors to safely and efficiently manage their jobs and the unions see this as a corresponding obligation of the contractors under this Standard of Excellence. The affiliated unions will expect the following from its signatory contractors:

- ***Management adherence to the collective bargaining agreements;***
- ***Communication and cooperation with the trade foremen and stewards;***
- ***Efficient, safe and sanitary management of the job site;***
- ***Efficient job scheduling to mitigate and minimize unproductive time;***
- ***Efficient and adequate staffing by properly trained employees by trade;***
- ***Efficient delivery schedules and availability of equipment and tools to ensure efficient job progress;***
- ***Ensure proper blueprints, specifications and layout instructions and material are available in a timely manner***
- ***Promote job site dispute resolution and leadership skills to mitigate such disputes;***
- ***Treatment of all employees in a respectful and dignified manner acknowledging their contributions to a successful project.***

The affiliated unions and their signatory contractors shall ensure that both the rank and file members and the management staff shall be properly trained in the obligations undertaken in the Standard of Excellence.

Exhibit "C" – Community Hiring Construction Careers

Non-exhaustive list of ZIP codes where at least 15% of the population lives below the federal poverty threshold (ZIP codes within ~100 mile radius of NYC)

Zip Code	State	County

The Office of Community Hiring and Workforce Development maintains and publishes the list of Economically Disadvantaged Regions in accordance with Section 3502(b) of the New York City Charter. The list of Economically Disadvantaged Regions within a 100-mi. radius of the city, in a format similar to the above, will be provided for each fiscal year.

Division of Labor DEP Centrifuge Contract

BLACK= Union Millwright

RED= Centrifuge Technicians

I. Scheduled Preventative Maintenance of The Centrifuge System

1. Preliminary centrifuge monitoring, operation and readings before scheduled PM

i. As part of the centrifuge system evaluation to produce a PM report and while still in operation, take vibration, temperature readings, monitor torque and back-drive conditions prior to shutdown of the centrifuge system. In addition, evaluate the operation and condition of the pneumatic knife gate and cake cross conveyor. Queries are made with plant operations and maintenance staff asking for a history with operation of the system, mechanical, electrical and issues of the centrifuge system in general.

ii. If necessary, based on the results of monitoring differential while process sludge, a pressure test is performed on the Rexroth hydraulic pump and or the Rotodiff hydraulic motor to determine if there are internal mechanical issues that require replacement of said components

2. Remove and prepare rotating assembly for yearly maintenance

i. Shut down centrifuge system and coordinate with the owner for lock out tag out of system

ii. Remove belt guards and frame case top

iii. Remove hoses, drive belts and disconnect RTD wiring associated with the rotating assembly Remove the Rotodiff (hydraulic motor)

iv. Remove the rotating assembly from the base using overhead crane

3. Disassembly/Assembly of the rotating assembly:

i. Remove the liquid headwall

ii. Remove the scroll

iii. Mechanical de-scaling of rotating assembly rotor, headwall and scroll with a needle gun.

iv. Inspect all components. Check critical dimensions with instruments and verify to print key components or components that appear worn and or damaged.

v. Inspect internal bowl strips that run the length of the bowl. Change bushings wear liners & wear shoes. If necessary, remove the bowl strip welds with a grinder and weld new strips. Weld minor repairs on scroll when necessary. If necessary, repair the hard-face protection on the conveyor blades with addition of hard surface. Clean return tubes on the conveyor.

vi. Replace o-rings, seals and scroll bearings. Bearings are installed using factory procedure that specifies heat tolerances for bearing inner race and proper placement of bearing race on fit surfaces.

vii. Prime paint bare steel components

viii. Assemble and check stack-up dimension of scroll bearings
ix. Install scroll into outer bowl assembly using conveyor extractor tool, overhead crane.
x. Check conveyor stack-up dimension
xi. Assemble headwall
xii. Check for scroll clearance by rotating scroll with spline shaft
xiii. Install stellite wear shoes with epoxy adhesive.

4. **Service and repair of centrifuge frame top and bottom**
   i. Scrape process material from frame bottom and top
   ii. Mechanical de-scaling of the inside frame bottom and top using a needle gun
   iii. If required, welding repair panels on the outer and internal portions of the frame top and bottom. Also, replacing baffles with stainless steel baffles; requiring flame burning off old baffles, grinding to fit and welding new baffles
   iv. Checking case bottom threaded holes and repairing with thread inserts
   v. Painting case top and bottom: prime and applying two part epoxy paint

5. **Back –Drive and Main Bearing Lubrication System Maintenance**
   i. Drain back-drive oil and bearing lubrication oil reservoirs
   ii. Scrape clean reservoirs internally
   iii. When required, replace heat exchangers, dials, solenoids or fittings
   iv. Replace filters
   v. When required, replace hoses
   vi. Replenish reservoirs with new oil

6. **Service main drive and back-drive motors**
   a) Remove covers and clean cooling fan
   b) Check run-out and condition of drive end bearing on the main drive motor. If there is an internal problem with the motor, it is sent to a motor repair center for service.
   c) Grease bearings
   d) Check condition of bearing RTD and replace if necessary

7. **Service the Voith fluid coupling**
   i. Clean fluid coupling exterior surface
   ii. Drain and change the ATF fluid. Inspect condition of the drained fluid for possible internal mechanical issues.
   iii. Remove the fluid coupling with a factory pulling device from the main drive motor shaft.
   iv. Remove the sheave and bearing housing from the fluid coupling.
   v. Remove the old grease from the bearing housing, clean the bearing with rags and solvent.
   vi. Repack the bearing housing with grease
   vii. Install the fluid coupling on the motor shaft
   viii. Replenish fluid to the factory level.
   ix. Verify the Voith BTS proximity sensor gap. Adjust necessary
   x. Verify the milliamp signal at the BTS junction box terminal. Adjust the gap accordingly to bring the milliamp reading to factory specifications. If this adjustment cannot be done to

bring it to factory specification, then the switching element and or the initiator may have to be replaced.

8. **After evaluation, and when necessary, rebuild the pneumatic knife gate**
   i. Assemble custom scaffolding under the centrifuge on the lower level
   ii. Disassemble all knife gate components
   iii. Replace all components
   iv. Test operation of knife gate and adjust if necessary

9. **After evaluation, and when necessary, rebuild the cake cross conveyor system**
   i. Assemble staging and scaffolding
   ii. Disassemble all cross conveyor components
   iii. Replace all mechanical and electrical components
   iv. Check electrical and pneumatic connections
   v. Test operation of cross conveyor in manual mode, troubleshoot and adjust if necessary
   vi. Verify operation of cross conveyor while the centrifuge produces cake.

10. **After evaluation, and when necessary, replace the hydraulic pump and or the Roto-diff hydraulic motor**
   i. Remove the components: hydraulic pump and or Rotodiff
   ii. Install the hydraulic pump: check drive alignment, test units and adjust for mechanical base RPM and squash plate indicator. Verify by monitoring the Viscotherm differential indicator. Also, the RPM can be monitored and checked by verifying the pulse count on the Viscotherm 400 card.
   iii. Install the Rotodiff: torque to specification, verify rotation plate position, and use a dial indicator to verify factory specifications for eccentricity. Shim accordingly if needed to adjust the eccentricity to factory specifications.

11. **Install rotating assembly on centrifuge frame**

   i. Wipe down main bearing machined surface with solvent. Use a honing stone to remove high spots on the machines surface.
   ii. Prepare the frame machined portion that accepts the pillow blocks; wipe down machined surface with solvent. Use a honing stone to remove high spots on the machines surface.
   iii. Rig the rotating assembly for lifting and lowering with slings and a factory spreader lifting device – making sure that the rotating assembly is precisely balanced horizontally. Lower the rotating assembly on the centrifuge frame.
   iv. Center the rotating assembly so there is proper clearance for the frame baffles.
   v. Perform a preliminary check of the main bearing alignment using double dial indicators, 180 degrees apart. Check for alignment at the 9 & 3 o'clock positions and at the 12 & six o'clock positions. All alignments must be within factory specifications.
   vi. Torque the main bearing fasteners to factory specifications using a torque multiplier.
   vii. Check the rotating assembly stem run-out for eccentricity using a dial indicator. Note and record the readings.

viii. Install the sheave and gear flange; Heat the components to 275 degrees making sure not to overheat the components. Install fasteners to factory torque specifications.
ix. Install the main drive belts
x. Verify alignment of the motor sheave to rotating sheave alignment. Adjust the motor base as necessary to align the sheaves.
xi. Install the Rotodiff as outlined previously
xii. Grease the internal scroll bearings. Purge the grease until all traces of air bubbles are eliminated.
xiii. Inspect the Rotodiff and belt guards. If cracked, bevel-grind the crack area and weld with a MIG welder. Paint the guards with safety yellow.
xiv. Flush the supply and return lines of the main bearing lubrication system.
xv. Terminate wires for the main bearing RTD
xvi. Run the back-drive on local (manual) to ensure that the hydraulic pump is primed. Prime the pump if necessary.

12. Test the centrifuge system.

In addition to testing the mechanical and electrical components as a centrifuge system, this portion of the scheduled PM work entails monitoring, evaluation, and adjustment of the centrifuge system components which is an Andritz specific, technical process. This process will produce de-watered municipal sludge to exacting specifications in: cake dryness, capture of solids and polymer dose.

i. Remove the electrical and mechanical lock-out tag-outs.
ii. Verify the centrifuge control panel powers up correctly, verify electrical components conditions:
    I. Verify that the PLC processor board does not have a fault condition
    II. Verify that there are LED indications of both the input and out modules of the PLC
    III. Press the "test light" button to acknowledge all indicator lamps work
    IV. Verify that the proportional amplifier card of the Viscotherm controller does not have fault indications
    V. Verify that there is bar, bowl rpm & differential indication of the Viscotherm controller
    VI. Verify that the main bearing temperature and vibration monitor are reading ambient temperature and zero in/sec respectively. If necessary, calibrate the instrument with a 4-20 milliamp signal generator to factory specifications.
    VII. Verify that there are no fault indications present of the PLC *(if so, troubleshoot the cause of the fault – see Service, diagnostic section)*
    VIII. Verify that there are no fault conditions on the main drive monitor screen – Eaton MP-3000. *(if so, troubleshoot the cause of the fault – see Service, diagnostic section).*
iii. Start and test the centrifuge system:
    I. Monitor and verify operation of the main drive bearing lubrication panel:

- Check flow to each bearing, adjust to factory specifications
- Purge air from the system by switching filters
- Check pressure of the oil flow to verify that it is within factory specification

II. Monitor and verify operation of the back-drive system.
   - Verify that the Viscotherm controller displays the minimum differential as adjusted in the hydraulic pump replacement section.
   - Check for unusual noises, vibration and leaks.

III. Monitor and verify the time to achieve the full speed of the bowl.
   - The time to full speed is determined by the Voith fluid coupling ATF level. If necessary, shut down the centrifuge system and adjust the TF level accordingly to increase or decrease the time to full bowl speed.
   - Monitor the main drive motor amperage and bearing temperature.

IV. Monitor the rotating assembly main bearing temperature and centrifuge vibration. Allow the unit to reach full operating temperature and begin vibration readings of the centrifuge frame and rotating assembly. These readings are then taken with flush water and then while sludge is fed into the centrifuge. Readings are taken with factory authorized vibration instruments:
   - Observe and record horizontal readings of the frame at the centrifuge frame vibration switch, axially at the main drive bearing pillow block, horizontal and vertical readings of the main bearing pillow block. Panel vibration readings are also recorded.

V. In conjunction with DEP operations, the centrifuge is then fed polymer and sludge to begin dewatering operations of sludge.
   - The polymer and sludge pump flows are monitored for proper flow and operation. If a polymer or sludge feed alarm is present during this portion of testing, then the centrifuge system is diagnosed for issues with wiring or component failure. If necessary, and as an aide to troubleshoot an alarm, the PLC program is monitored using PLC factory application software and a laptop computer plugged into the PLC.
   - The Viscotherm controller is then monitored for: bowl speed, bar pressure and differential. Differential monitoring is simultaneously checked with bar pressure to ensure that the back-drive system is working correctly under automatic control. If necessary, there may have to be adjustments made with the: squash plate indicator, base mechanical speed of the hydraulic pump, electronic base speed of the analog 500 card, boost pressure and base speed. While the Viscotherm controller is in auto control, the 600 card is the adjusted for ramp up speed and base differential.
   - The bar pressure/torque on automatic control is then adjusted to produce the driest cake possible while using the lowest amount of polymer and still have acceptable solids in the effluent stream. In

addition to this, adjustments in sludge flow and or polymer flow may have to be adjusted to achieve the desired product cake dryness and or effluent capture of solids.

iv. The centrifuge is released to DEP operations for operation. The scheduled preventative maintenance is completed with a full report and recorded readings. This is followed by completion of the DEP issued work orders entailing recorded work hours and an itemized list of parts installed.

II. Service and repair of the centrifuge system: Mechanical and Electrical

Mechanical repair and or corrective action of the centrifuge system: including the centrifuge rotating assembly, centrifuge frame and cover, back-drive system, lube oil panel system, Voith fluid coupling, pneumatic knife gate and cross conveyor

I. Diagnose, inspect, repair or replace defective mechanical components of the centrifuge system or component systems
II. Perform a visual inspection of the failed or failing component while in operation or if necessary, remove and inspect. If necessary, refer to a factory print to verify that critical dimensions are within tolerance. Replace or repair the component as necessary.
III. If applicable, repair the component or part that may include weld repairs but limited to machining. If machining is necessary, the component would have to be sent to our service center for machining.

Electrical repair of the centrifuge system: including centrifuge system control panel components, motor starter panel components, back-drive system electrical components, lube oil panel system electrical components, Voith BTS circuit, pneumatic knife gate electrical components and cross conveyor electrical components.

I. Monitor, diagnose, troubleshoot electrical and software issues of the centrifuge system using electrical prints. Replace components as required to repair the electrical issue. When required, make adjustments and or calibrate sub components as specified by individual manufacturers; e.g. Viscotherm 500, 600 cards. Red Lion frequency converters, Newport Digital Displays, Voith BTS circuit, etc.

- When required, monitor the PLC program while the centrifuge system is in operation to determine, on a program level, if there is a problem with field devices or the program itself. There are two PLC systems currently in use at NYC DEP centrifuge system installation: Siemens TI Soft Rockwell Automation RS Logix 5000. This requires the licensed program, the application software, a laptop

computer; factory wired serial port connectors and a computer port adapter. Competent knowledge of the PLC application software and basic programming knowledge is necessary for this portion of the electrical diagnostics. In addition and when necessary, downloading of the program software may be necessary if the loaded program was deleted.

III. Evaluation, diagnostics and remedy of process performance as it relates to the centrifuge system

1. Evaluation to determine if the centrifuge system or sludge process conditions will need changes to produce require cake dryness and or solids capture in the effluent stream. In some instances, diagnose total upset in dewatering.

i. Query DEP operations to determine if there is an upset in process condition: e.g. polymer solution makeup, stratification of sludge holding tanks that would allow supernatant to be fed into the centrifuge (low feed solids), etc.

ii. If process conditions are within normal plant parameters, determine if the centrifuge system has to be diagnosed:

I. Monitor the Viscotherm controller to evaluate minimum differential and regulation of the back-drive.

- Determine if there is a mechanical or electrical issue with the regulation of the back-drive while under automatic control
- If electrical, determine if the problem is with the proportional amplifier or with the automatic card, 600.
- Verify proper adjustment of the squash plate indicator and mechanical base differential of the hydraulic pump.

II. If a mechanical issue is suspected with regulation of the back-drive, perform a factory pressure test of the hydraulic pump and or Rotodiff. Replace component/s if necessary

iii. Determine if there is a regulation issue with sludge feed and or polymer feed.

I. Adjust the Siemens PID process controller for sludge feed and or polymer feed. If necessary, replace the controller

iv. Monitor process conditions after adjustments and or replacement of components to determine if cake dryness and or effluent solids capture are acceptable.

Rig rotating assembly onto flatbed truck from centrifuge room floor.
Rig rotating assembly off of flatbed truck onto centrifuge room floor.

SCHEDULE "B" - DRUG AND ALCOHOL POLICY

PREAMBLE

WHEREAS, [CONSTRUCTION MANAGER] ("Construction Manager"), for the construction project located at [PROJECT ADDRESS] ("Project") desires to provide for a safe, drug and alcohol-free work site for the Project;

WHEREAS, the parties have entered into a separate Project Labor Agreement for the Project and have agreed to negotiate in good faith a Project Drug & Alcohol Testing Policy;

WHEREAS, this Testing Policy is collectively negotiated between the Construction Manager and the New York City Building and Construction Trades Council ("Council") (the Construction Manager and BCTC are collectively referred to hereafter as the "Parties");

WHEREAS, the Parties each currently have respective drug and alcohol policies, including the Projects' Zero-Tolerance policy;

WHEREAS, the Parties desire to maximize project safety conditions for the Project personnel and public, as well as deter violations of the Parties' respective drug and alcohol policies;

NOW, THEREFORE, the Parties agree to this Policy as of the date hereof,

ARTICLE 1 - PARTIES

This Drug & Alcohol Testing Policy ("Policy") is hereby established by the Construction Manager and the Council, on behalf of itself and its affiliated local union members, and the signatory local unions on behalf of themselves and their members.

ARTICLE 2-GENERAL CONDITIONS

SECTION 2.1 - SUMMARY

In order to reinforce the Parties' respective drug and alcohol policies, including the Projects' zero tolerance policy regarding the prohibition of the use of drugs and alcohol, and to deter Project personnel from violating those policies, the Parties agree that all Project Personnel (defined later) will be required to submit to drug and/or alcohol testing randomly, post-accident, and for reasonable suspicion provided such testing is in accordance with applicable state and/or federal law, including the limitations in NYS Labor Law 201-d applicable to the lawful use of marijuana.

Any individual on site that violates this Policy is subject to disciplinary action, including, without limitation, loss of site access privileges.

SECTION 2.2 - REVOCATION OF PROJECT ACCESS PRIVILEGES

Any one of the following occurrences will result in the immediate revocation of a Project Personnel's project access privileges:

1. An individual is found selling or using drugs or alcohol, or otherwise is under the influence of drugs or alcohol, subject to the other terms of this Policy, on a Project Site;
2. An individual has been convicted under any criminal drug or alcohol statute for a violation occurring in the workplace within the past two years;
3. An individual who refuses to abide by the Projects' drug and alcohol policy, or refuses to submit to a test in accordance with this Policy;
4. An individual who switches, adulterates, or in any way tampers with a specimen required to be submitted in accordance with this Policy.

SECTION 2.3 - DEFINITIONS

Confirmed Positive Test: The presence of drugs, drug metabolites, or alcohol in a person's body that equals or exceeds the established cut off levels as defined in Exhibit 1. For drugs, the sample will have undergone Laboratory screening and confirmation testing and must have been verified as positive by a Medical Review Officer. A positive test result for alcohol obtained through Evidential Breath Testing is considered a Confirmed Positive Test.

Employee Assistance Program (EAP): An EAP is generally considered a workplace-based, confidential program designed to help employees deal effectively with a variety of personal problems, and, of relevance to this policy, substance abuse problems. The EAP promotes assessments and short-term counseling. An EAP shall also include any similar education or rehabilitation program provided by the Councilor its respective members. The Project Personnel that are required to participate in the EAP shall be responsible for the cost of their consultation with an EAP and/or participation in any education or rehabilitation program.

Evidential Breath Testing Device (EBT): A device that is used to measure alcohol in the breath and which meets National Highway Traffic Safety Administration's specifications for precision and accuracy.

Laboratory: A laboratory that is SAMHSA (Substance Abuse and Mental Health Services Administration) certified for the testing of drugs.

Medical Review Officer (MRO): A licensed physician responsible for receiving laboratory results generated by an employer's drug testing plan who has knowledge of substance abuse disorders and medical training to interpret and evaluate a donor's confirmed positive test result together with his/her medical history and all other relevant information.

Previous Worker: All individuals whose employment relationship with the contractor, company or organization no longer exists.

Project Site: The construction area for respective Project.

Reasonable Suspicion: When a qualified trade contractor, the Developer or Construction Manager as set forth in Section 3.7, reasonably believes that an individual has violated this Policy. Reasonable suspicion is based upon (1) specific, current, behavioral or performance indicators, (2) the possible manufacture, distribution, consumption or possession of unauthorized drugs, drug paraphernalia, or alcohol, or (3) documented investigation by an agency retained by, or otherwise independent from, the Developer or Construction

Manager.

SECTION 2.4 - INCLUDED SUBJECTS

This Policy shall cover all employees of the Owner, Construction Manager and Project trade contractors, their subcontractors and any other of their respective personnel at any level that are performing any activity at a Project Site, inclusive of managers, superintendents and supervisors, except as specifically excluded by Section 2.5 of this Policy (collectively and singularly, "Project Personnel").

SECTION 2.5 - EXCLUDED SUBJECTS

The following persons are not subject to the provisions of this Policy:

- **A.** Employees and entities engaged in off-site manufacture, modifications, repair, maintenance, assembly, painting, handling or fabrication of components, materials, equipment or machinery;
- **B.** Vendors and employees of vendors engaged on a Project Site in equipment testing, inspection, training, warranty work, or engaged in corrections of defective or nonconforming work, unless such employees are expressly included in the bargaining unit of a local signatory to this Agreement;
- **C.** Employees engaged in ancillary work on a Project which is performed by third parties, such as electric utilities, gas utilities, telephone companies, and railroads, or any other work not constituting Project work;
- **D.** Employees of any governmental authority (state, local or otherwise);
- **E.** Employees and contractors engaged in work on the Project Site as part of due diligence or monitoring, which work is ancillary to Project work; and
- **F.** Emergency responders.

SECTION 2.6 - PRESCRIPTION AND NON-PRESCRIPTION DRUGS

The use of prescription drugs not prescribed directly to Project Personnel is prohibited, including the use of drugs prescribed to a spouse or domestic partner. The use of non-prescription drugs that are sold outside the United States and that contain substances that are illegal or require a prescription in the United States are prohibited, unless prescribed by a licensed physician.

SECTION 2.7 - SEARCHES

In order for the Construction Manager to ensure the safety of Project Personnel and for the Construction Manager to protect its assets, the Construction Manager shall have the right upon good cause (such as reasonable suspicion of a violation of this Policy) to conduct reasonable searches for alcohol, drugs and related paraphernalia anywhere within the boundaries of a Project Site. A search may include any assets owned or leased by any Project Personnel that is on a Project Site, including without limitation, vehicles, lockers, gang boxes, desks and personal property brought onto a Project Site, but excluding personal body searches or physical contact with employees.

ARTICLE 3 - DRUG & ALCOHOL TESTING

SECTION 3.1 - COLLECTION PROCESS

As of the execution date of this PLA, Project Personnel may be required to submit urine samples ("Preliminary Drug Screening") for the purpose of detecting the presence of drugs as part of the random, post-accident or reasonable suspicion testing, in accordance with chain of custody protocols as established by Substance Abuse and Mental Health Services Administration (SAMHSA), utilizing an instant result test cup for Preliminary Drug Screenings, such testing is to be performed on-site by an independent service provider. The results from the instant result test cup will be considered preliminary. The sample will be sent to a SAMHSA certified testing laboratory for confirmation.

As of the date hereof, all Project Personnel will be required to submit to an Evidential Breath Test (EBT) for the purpose of detecting the presence of alcohol when submitting to random, post-accident or reasonable suspicion testing. Alcohol testing will not be conducted for pre-access testing.

SECTION 3.2 - NEGATIVE PRELIMINARY DRUG SCREENING

Project Personnel with a negative Preliminary Drug Screening will be considered conditionally accepted for Project site access, pending confirming laboratory results. Site access privileges will be revoked if the subsequent laboratory results determine that the sample has tested positive for drugs or that the sample has been adulterated.

SECTION 3.3 POSITIVE PRELIMINARY DRUG SCREENING

If the Preliminary Drug Screening indicates a positive result, the individual will not be allowed access to the Project Site. The sample will be sent to the certified laboratory for analysis and, if applicable, reviewed by the Medical Review Officer (MRO). If the laboratory confirmation results are also positive, the individual will be considered in violation of this Policy and their site access will be revoked for at least 30 days. If the laboratory confirmation results are negative, the Project Personnel's site access will not be revoked.

SECTION 3.4 CONFIRMED POSITIVE TEST RESULTS

A. POSITIVE DRUG TEST

A drug test is considered positive if the test results exceed the limits shown in Exhibit 1, which is attached hereto and incorporated herein by reference. The test will be confirmed through a second analysis process and reviewed by an MRO before results are reported. Project Personnel with confirmed positive drug test results will have their site access revoked. In case of a "false positive" result, any such Personnel shall be entitled to the reimbursement of any wages lost during the suspension caused by any such false positive result.

B. POSITIVE EBT

An EBT is considered positive if the test results exceed .04 BrAC, or as otherwise set forth in Exhibit 1. Project Personnel with a positive alcohol test result will be subject to the remedies set forth in Exhibit 1.

C. REINSTATEMENT OF SITE ACCESS PRIVILEGES

(a) Subject to section 3.4(C)(a) immediately below, if the site access of a Project Personnel has been revoked pursuant to this Policy, then any such person may request that their site

access be reinstated after 30 days, provided that all of the following conditions are met to the reasonable satisfaction of the Construction Manager. :

1. The individual has provided proof of wellness from an accredited rehabilitation facility or has provided proof that treatment isn't needed as attested to by a licensed health care provider specializing in the diagnosis and treatment of alcohol and drug abuse.
2. A current drug and alcohol test is obtained within three (3) days of the request for re-access to the site and proof of a negative test result has been received; and
3. The individual agrees to submit to multiple testing for two (2) full years from the date of gaining re-access to the project, the scheduling of which will be determined at the sole discretion of the Construction Manager. If all of these conditions have been met, the Construction Manager agrees that it will not unreasonably withhold their consent to any such request.

(b) Unlawful possession, concealment, use, purchase, sale, manufacture, dispensation or distribution of illegal drugs or un-prescribed controlled substances on the Project site will subject the Project Personnel Employee to immediate removal from the Project site and shall bar such Project Personnel Employee from returning for a minimum of three (3) months, which return shall, in any event, be subject to the reasonable approval by Construction Manager.

(c) All of the Parties agree that any such Project Personnel will only be entitled to any such reinstatement of site access privileges one time and that any subsequent violation of this Policy will result in the permanent termination of access to the Project Site.

SECTION 3.5 - RANDOM TESTING

A third-party provider designated by the Construction Manager will randomly select by an objective criteria a testing pool for random drug and/or alcohol testing from all Project Personnel with site access cards. Any individual selected for a random drug and/or alcohol test will be required to submit to an Evidential Breath Test (EBT) and/or drug test. Individuals may be tested more than once during any given time period. The Parties acknowledge and agree that an EBT may be required without a drug test and that a drug test may be required without an EBT, as solely determined by the Construction Manager.

If an individual is unable to attend the first scheduled random drug test as a result of being involved in a work-related task, such drug test will be rescheduled and will be completed at or before the conclusion of such employee’s then current work shift. If the second drug test is missed for any reason, the incident will be reviewed by the Construction Manager, who shall have the right to terminate the site access privileges of any such Project Personnel until such time as that Project Personnel has complied with this Policy. If the individual refuses to take the test, their access privileges will be immediately terminated for cause.

SECTION 3.6 - POST ACCIDENT TESTING

After each work-related incident or injury requiring the services of a licensed health care provider, all Project Personnel involved with the incident will be required to submit to a drug and/or alcohol test immediately following the incident. In instances where emergency care is necessary, the drug and/or alcohol test shall be obtained by the care facility, if

possible, within 24 hours after treatment is rendered. If more than 48 hours have passed before an injury is reported and treated by a licensed health care provider, an alcohol test will not be required.

In addition, any Project Personnel involved in a non-injury related incident at a Project Site with damages at or in excess of $200 will be required to submit to a drug and/or alcohol test unless:

A. It is determined, after conducting an investigation and interviewing all employees involved and any witnesses, that the employee's performance can be completely discounted as a contributing factor to the incident; or
B. It is determined, after conducting an incident investigation and interviewing all employees and any witnesses that the incident was caused by inadequate equipment or system design, and/or premature failure of equipment or system components.

SECTION 3.7 - REASONABLE SUSPICION TESTING

All Project Personnel will be required to submit to a drug and/or alcohol test when there is reasonable suspicion the individual has violated this policy.

Reasonable suspicion includes, without limitation, the following:

A. Violent or irrational behavior;
B. Emotional or physical unsteadiness;
C. Sensory or motor-skill malfunctions;
D. Slurred speech;
E. The odor of alcohol or drugs on clothing or breath in conjunction with other indicators;
F. Possession of alcohol, unauthorized drugs or drug paraphernalia; or
G. Documented evidence of an independent investigation regarding Project Personnel's consumption of what is reasonably believed to be an alcoholic beverage or drugs in violation of the Project's policies and/or this Policy.

Reasonable suspicion testing may only be ordered by supervisory personnel that: (a) have been trained to recognize the above referenced factors; or (b) have received credible documentary evidence from an independent investigator that a Project Personnel has violated a drug and/or alcohol policy. It is agreed that any certified training program shall satisfy the training requirement.

SECTION 3.8 - PRIVACY CONSIDERATIONS

The Parties agree to use reasonable efforts to conduct any testing pursuant to this Policy in accordance with the privacy concerns of Project Personnel. To address these concerns, the Parties agree that:

1. The testing station(s) shall be screened off, or otherwise closed off from public view.
2. All documents and information regarding the testing, including test results, shall be maintained by the respective custodian(s) of record in accordance with

their respective privacy policies, which any Project Personnel shall be entitled to review upon timely request.

3. The Parties agree to make a good faith effort to resolve any other privacy concern of Project Personnel regarding this Policy, provided that any such concerns do not interfere with the purpose of this Policy.

ARTICLE 4 – GRIEVANCE

SECTION 4.1 - REPRESENTED WORKERS

Nothing in this Policy shall restrict a member of a signatory local union from filing a grievance in accordance with the member's collective bargaining agreement or a Project Labor Agreement, provided that the grievance shall be limited to whether the removal of a member for violation of this Policy was conducted in compliance with the terms and conditions set forth herein.

SECTION 4.2 - HOLD HARMLESS

The Construction Manager agrees to hold harmless and indemnify the Union/Council and its representatives from any liability that may be incurred as a result of the Company's Drug and Alcohol Policy to the extent caused by the negligence or intentional misconduct of the Construction Manager.

IN WITNESS WHEREOF the parties have agreed to this Policy as of _____, 20___.

FOR [CONSTRUCTION MANAGER]

By: _____

Name: [INSERT NAME]_____

Title: [INSERT TITLE]_____

FOR GREATER NEW YORK CITY BUILDING TRADES COUNCIL

By: _____

Name: Gary LaBarbera _____

Title: President

EXHIBIT 1

CLASS OF DRUGS TESTED AND THEIR RESPECTIVE CUT-OFF LIMITS

The cut-off limits established are those recommended by the U.S. Department of Health and Human Services in their mandatory Guidelines for Federal Workplace Drug Testing Programs.

Drug Class	Screening Cut-Off Limit (ng/ml)	Confirmation Cut-off Limit (ng/ml)
Amphetamines	1000	500
Benzoylecgonine (Cocaine Metabolite)	300	150
Cannabinoids (THC)	50	15
*Opiates	2000	10
Phencyclidine (PCP)	25	25

Confirmation screening is done by means of GC/MS analysis.

*The GC/MS confirmation for opiates will be for both codeine and morphine separately. If morphine is equal to or greater than 2,000ng/ml then the GC/MS confirmation analysis for 6- acetylmorphine (6-MAM) is at a cut-off level of 10ng/ml.

Alcohol Screening

All Project Personnel will be required to submit to an EBT under the random, post-accident, and reasonable suspicion test arenas, for the purpose of detecting presence of alcohol. If this test supports a positive result for presence of alcohol, the Project Personnel will be considered in violation of this Policy.

If the results of the EBT are:

1. Above 0.001 BrAC, but at or below 0.020 BrAC, a second test will be conducted within approximately 15 minutes.
    - If the second BrAC test is less than the first BrAC, the results will be deemed negative and the Project Personnel may return to work, if there are no other outstanding issues.
    - If the second BrAC is increasing, but below 0.04 BrAC, the results will be deemed negative, but the Project Personnel will be sent home for the day and the Construction Manager shall be notified. If a Project Personnel is sent home two times within a six-month period pursuant to this Section I, then any such Project Personnel shall be deemed to have tested positive and will be subject to the applicable remedies set forth in Section 2 below.
2. Above 0.02 BrAC, but below 0.06 BrAC, a second test will be conducted after approximately 15 minutes.

- Notwithstanding anything set forth above to the contrary, a Project Personnel may elect to voluntarily go home for the day instead of taking a second test and the results will be deemed negative, provided that any such Project Personnel may not voluntarily go home more than once within a twelve month period.
- If the second BrAC test is at or below 0.02 BrAC, the results will be deemed negative and the Project Personnel may return to work if there are no other outstanding issues.
- If the second BrAC test is above 0.020, but below 0.06, the results will be deemed positive, the Project Personnel will be sent home for the day and their site access will be revoked for at least five [5] calendar days and until such time as the Project Personnel has been evaluated by an EAP professional skilled in substance abuse and confirmed fit for duty.
- Any Project Personnel who is deemed positive two times within two years pursuant to this Section 2 will have their site access privileges terminated and will be entitled to the limited relief set forth in Section 3 .4(c) of the Policy.

3. At or above .06 BrAC, the Project Personnel will have their site access privileges terminated, after which they will be entitled to the limited relief set forth in Section 3.4(C) of the Policy.

SECTION 01 11 00 – SUMMARY OF WORK
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. This section summarizes the scope of work for replacement of the existing screen with a higher performing multi-rake screen and to provide redundancy for the degritter/grit classifier system

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

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	Special Warranty Provisions / Guarantee Periods	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	Application	4
3.03	Field Testing / Quality Control	4
3.04	Startup / Demonstration	4
3.05	Adjusting / Protection / Cleanup	4

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. Not Used

1.05 DESCRIPTION

A. Location of Work

1. Work is to be performed under this Contract at the following Site:

a. Site #1:

1) Site is 127-01 Powell Cove Boulevard in the College Point neighborhood of Queens.

2) Work Access to the Site: Access to site through main gate on Powell Cove Boulevard. Refer to Contract Drawings.

B. Work Included in the Contract.

1. Contract Name: TI-181 – Upgrade of Existing Solids Screen and Degritting System Installation

2. Work Description:

a. The scope of the Project includes replacement of the existing screening system and channel along with installation of a new degritting system.

3. Principal Items of Work are listed below, but these should not be construed as being a complete description or scope of the Work to be performed under this Contract:

a. Structural Work: Lowering of bypass channel slab to match the main channel slab elevation, raising the walls of existing main channel by and providing and opening in the grit screening slab for chute opening.

b. Mechanical Work: Replace the existing climber screen with a new multi-rake screen. Put in a manual bar rack in the bypass channel. Replace one of the degritters. Replace manual bar racks in sludge thickener distribution box.

c. Electrical Work: Add new control panels for the screen, compactor, conveyor, and classifiers. Extend fiber optic to the building for SCADA monitoring of the process.

d. HVAC Work: Demoing ten hydronic unit heaters of the grit building and adding new ones along with new insulated piping. Replacing exhaust fans with new fans. New supply fan on the roof.

C. Other Construction Contracts

1. Contracts in Progress or Contracts to be Started:

a. TI-167 Dock Improvements

b. TI-168 Headworks Improvements

c. TI-169 Electrical Upgrades

d. TI-182 Chlorination Improvements

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

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

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

D. 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 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 Bureau of Engineering Design and Construction, 5th Floor, Low Rise, 96-05 Horace Harding Expressway, Corona, New York 11368-5107. Access to the site for inspection purposes prior to bidding will only be on the date advertised for the pre-bid tour.

E. Datum Plane

1. All elevations indicated or specified refer to the site datum plane of Queens Borough Datum.

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 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

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. 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

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	2
1.03	Related Sections	2
1.04	References	2
1.05	Description	2
1.06	Quality Assurance	5
1.07	Submittals	5
1.08	Delivery, Storage, and Handling	6
1.09	Spare Parts, Special Tools, and Supplies	6
1.10	Warranty	6
PART 2	PRODUCTS	6
2.01	Manufacturers	6
2.02	Materials / Equipment	6
2.03	Fabrication / Assembling / Finishes	6
2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
3.01	Examination / Preparation	6
3.02	Implementation	6
3.03	Field Testing / Quality Control	7
3.04	Startup / Demonstration	7
3.05	Adjusting / Protection / Cleanup	7

C. 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

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 Administrative Code, Section 24-163

1.05 DESCRIPTION

A. Working Hours

1. "Normal Project Working Hours" for this Contract are between the hours of 7 AM through 6 PM, Monday through Friday (except for holidays). The Contractor shall have the management, labor, equipment and subcontracted capabilities needed to complete the Work within the Period of Performance indicated in the General Conditions – Schedule A, by working only during "Normal Project Working Hours".

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.

B. Emission Control Technology for Non-Road Vehicles

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

2. 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. 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.

F. 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.

G. 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

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

NO TEXT ON THIS PAGE

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.

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 Checklist	
Contractor Requirements	**Assessment/Comment**
(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-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.	

PART 1 GENERAL

1.01 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 Item (Contract Item UP-1)

3. Allowance (Contract Item A-1)

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:

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2.04	Source Quality Control / Shop Tests	6
PART 3	EXECUTION	6
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3.02	Application	6
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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 for 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 10 – Progress Scheduling

C. Section 01 35 27 – Environmental Health and Safety Requirements

D. Section 01 35 45- Hazardous Material Control

E. Section 01 74 17 – Cleaning and Site Maintenance

F. Section 01 78 25 – Operations and Maintenance Manuals

G. Section 01 78 39 – Final Record Documents

H. Section 02 82 05 – Asbestos Management

I. Section 02 83 05 – Lead Management

J. Section 02 84 05 – PCB Management

K. Section 02 84 10 – Mercury Management

L. Section 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Lump Sum Price Contract Items LS - 1 to LS - 3

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.

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

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

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

4. The value for De-Mobilization shall not exceed 1% of the Total Bid Price for the Contract, in accordance with Section 1.05(A).1.b above. 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, after the Resident Engineer has certified that all Work under this item has been satisfactorily completed. 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.

B. Unit Price Items

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

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

   b. 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 price Work performed during the performance period.

2. Contract Item UP-1 – Repair Work of Existing Spalled Concrete

   a. Perform all Work necessary to perform repair Work of existing spalled concrete where ordered in writing by the Engineer. Only concrete repair Work authorized in writing by the Engineer will be paid for under this Contract Item. Work shall be in accordance with Contract Drawings and Section 03 01 30.71 – Rehabilitation of Cast-in-Place Concrete.

   b. Measurement for Payment: The quantity of repair Work of existing concrete to be measured for payment under this Contract Item will be the total area in square feet for the repair Work of existing spalled or damaged concrete as ordered, and approved and computed by the Engineer, specified or required to perform the Work under Contract Item LS-1. Unauthorized repair Work of existing concrete will not be measured for payment.

   c. Payment: Repair work of existing spalled or damaged concrete ordered by the Engineer will be made at the Contract unit price bid per square foot to the one-tenth decimal place (i.e., X.X) for Contract Item UP-1.

C. Allowances

1. Allowance Contract Item A-1

a. Descriptions of the Work to be performed under the allowance can be found in the related Sections referenced herein. The amount of the allowance is given in the Bid Schedule of Prices. The Allowance will be included, as listed under this Article, in the Total Bid Price for the Contract.

b. All work under the Allowance item 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 "Allowance" as outlined in this Section.

2. Contract Item A-1: Hazardous Material Abatement Allowance

a. Allowance for unforeseen hazardous materials remediation undertaken as per Section 01 35 45- Hazardous Material Control and Division 2. Payment will be as described below. The allowance is a not-to-exceed amount listed on the Bid Schedule of Prices.

b. Description: Allowance for unforeseen and suspect/confirmed hazardous materials abatement/removal and disposal undertaken as per Section 01 35 45 – Hazardous Materials Control, Section 02 82 05 – Asbestos Management, Section 02 83 05 – Lead Management, Section 02 84 05 – PCB Management, and Section 02 84 10 – Mercury Management. The Inspection and Sampling Plans/Reports, sampling, and laboratory analysis of presumed hazardous materials shall be covered under LS-3.

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 29 10 – SCHEDULE OF VALUES
CONTRACT TI-181

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:

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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

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

NO TEXT ON THIS PAGE

TABLE 1
PRELIMINARY SCHEDULE OF VALUES
(Major Work Results)

I. CONTRACT TI-181

1. LS-1 Mobilization
2. LS-2 Work Result
    a. General Building Work
    b. Process Mechanical Work
    c. Building Mechanical Work
    d. Electrical Work
    e. I&C Work
3. LS-3 De-Mobilization

II. CONTRACT ###-H

III. CONTRACT ###-P

IV. CONTRACT ###-E

TABLE 2
FINAL SCHEDULE OF VALUES
(Minimum Detail Required for Contracts ###-G, H, P, E)

I. Lump Sum 01 - Mobilization

II. Lump Sum 02 – Work Results

1 Existing Conditions.....Div. 02
   a. Detailed Work Results as required
2 Concrete .....Div. 03
   a. Detailed Work Results as required
3 Metals Div. 05
   a. Detailed Work Results as required
4 Finishes .....Div. 09
   a. Detailed Work Results as required
5 Specialties .....Div. 10
   a. Detailed Work Results as required
6 Fire Suppression.....Div. 21
   a. Detailed Work Results as required
7 Plumbing.....Div. 22
   a. Detailed Work Results as required
8 HVAC Div. 23
   a. Detailed Work Results as required
9 Electrical .....Div. 26
   a. Detailed Work Results as required
10 Process Interconnections.....Div. 40
   a. Detailed Work Results as required
11 Material Processing and Handling Equipment .....Div. 41
   a. Detailed Work Results as required
12 Process Gas and Liquid Handling, Purifications, and Storage Equipment....Div. 43
   a. Detailed Work Results as required
13 Water and Wastewater Equipment.....Div. 46
   a. Detailed Work Results as required

(Minimum Detail Required for Contracts ###-G, H, P, E)

III. Lump Sum 03 – De-Mobilization

SECTION 01 32 10 – PROGRESS SCHEDULING
CONTRACT TI-181

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. Near Critical Activities - Generally defined as any activity that could become critical in the next update period. Activities within 20 workdays of the primary critical path shall be considered near critical.

O. 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.

P. 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.

Q. 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

R. 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.

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

T. 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 will be acceptable only if the description accurately identifies such a restraint and if they are realistic with respect to the scheduling and sequencing of the Work and overall control of the project.

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 2**, 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 and number of shifts;

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) Backfill;
6) Formwork erection;
7) Rebar placement;
8) Placing of concrete;
9) Stripping forms;
10) Concrete curing;
11) Installation of process piping and valves;
12) Electrical conduits and wiring;
13) Instrumentation and controls conduits and wiring;
14) Terminations;
15) Maintenance and exercising activities;
16) Other materials and plant equipment;
17) 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 7 calendar days of receipt.

B. CPM Schedule

1. The preliminary CPM Schedule shall be submitted **fifteen (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 **sixty (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
@-###	@-### – STIC Facility Rehabilitation
@-###.CO	STIC Rehab - Contract
@-###.CO.CO	STIC Rehab - Construction
@-###.CO.CO.STE	STIC Site
@-###.CO.CO.STC	STIC Building
@-###.CO.CO.STC.BFS	Bypass Flow System
@-###.CO.CO.STC.FGA	Slide Gates
@-###.CO.CO.STC.HVC	HVAC System

@-###.CO.CO.STO.ELE	Electrical System
	Screening Channel
	Degritters and Grit Classifiers
@-###.CO.CO.CON	Contractor Staging Area
@-###.CO.CO.CON.TP	Temporary Power

EXHIBIT 2 – ACTIVITY ID FORMAT

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

EXHIBIT 4 -- PROPOSED ACTIVITY CODES

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

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

2. **@-### _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
M5	5	Substantial Completion

3. **@-### _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
STIC	1	Shandaken Tunnel Intake Chamber Site - @-###
GGWW	2	Grand Gorge Wastewater Treatment Plant

4. **@-### _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
STSS	1	STIC - Substructure
STFB	2	STIC - Facility Building
STFS	3	STIC - Facility Site
GGWT	4	Grand Gorge Wastewater Treatment Plant office

5. **@-### _OPER** - Operation Code - The operation or type of Work

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

VALUE	SEQUENCE	TITLE
01	1	General Requirements
02	2	Site Clearing
03	3	Site Earthwork
04	4	Utilities
05	5	Access Roads
06	6	Temp Facilities
07	7	Erosion Control
08	8	Concrete
09	9	Landscape
10	10	Drainage
11	11	Temp Power
12	12	Lighting
13	13	Dewatering
14	14	Masonry
15	15	Metals
16	16	Wood and Plastics
17	17	Thermal and Moisture Protection
18	18	Doors and Windows
19	19	Finishes
20	20	Specialties
21	21	Equipment
22	22	Furnishings
23	23	Special Construction
24	24	Conveying Systems
25	25	Mechanical
26	26	Electrical
27	27	Instrumentation and Control
28	28	Site Restoration
29	29	Piping modifications
30	30	Electrical modifications

VALUE	SEQUENCE	TITLE
31	31	Maintenance Activities

6. **@-### _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. **@-### _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. **@-### _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
H1	3	HVAC sub -Contractor
Continued – to be updated by Contractor in each Progress Schedule		

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

NO TEXT ON THIS PAGE

SECTION 01 32 30 – JOB PHOTOGRAPHS AND VIDEOS
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Pre-Construction Photographs and Videos
2. Construction Photographs and Videos
3. Post-Construction Photographs and Videos
4. Aerial Photographs
5. Videos

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

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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	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. Not Used

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. Unless specifically noted otherwise, all Work of this Section shall be performed by the General Contractor.

B. 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.

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

D. Pre-Construction Photographs and Videos

1. The photographer, when directed by the Engineer, shall visit the Site prior to start of construction to take a total of 100 Photographs and make a 60 minute video showing existing conditions of the entire project site and any adjacent areas which could possibly be disturbed during construction.

E. Construction Photographs and Videos

1. The photographer, when directed by the Engineer, shall visit the Site during construction on a monthly basis unless the Engineer requests different frequencies of the visits, to take a total of 100 Photographs for the project and to visit the site when directed by the Engineer to tape a total of 2 hours of videos. Photographs taken and video minutes taped shall be distributed evenly among the visits and visits shall be distributed evenly over the course of the Project, all subject to the direction of the Engineer.

F. Post-Construction Photographs and Videos

1. The photographer, when directed by the Engineer, shall visit the Site at the completion of construction to take a total of 100 Photographs and make a 60 minute video showing the completed Work, the entire Project Site and any adjacent areas which were disturbed during construction.

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

G. Informational Video

1. The 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.

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. Aerial Photographs

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

C. 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.

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

NO TEXT ON THIS PAGE

SECTION 01 33 00 – SUBMITTAL PROCEDURES
CONTRACT TI-181

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 32 10 – Progress Scheduling

B. Section 01 78 39 – Final Record Documents

C. Section 09 91 00 – Painting

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.

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, 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 10 - 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.

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:

450

451

NO TEXT ON THIS PAGE

SECTION 01 35 27 – ENVIRONMENTAL, HEALTH AND SAFETY REQUIREMENTS
CONTRACT TI-181

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. The Contractor shall comply with all existing and any new enacted EHS laws and regulations applicable to the project.

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

1.04 REFERENCES

A. Definitions

1. "Competent Person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees or the environment, and who has authority to take prompt corrective measures to eliminate them. A Competent Person has stop-work authority.

2. "EHS Resources" shall mean the Contractor's EHS Professional(s) and its EHS Site Representative (EHS Rep), as approved by the Engineer. 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 the Engineer 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 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 DEP Project Manager or Engineer, as applicable. 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 (Construction Management). The Construction Manager's EHS staff/consultant and Contractor's EHS staff shall work closely together(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. 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 in accordance with the premise "fit for duty". 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/cannabis or illegal drugs, or b) an employee has been in involved in an Incident, or involved in an unsafe practice. The Contractor must prohibit any employee from being under the influence of any illegal drug or alcohol/cannabis 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. Construction scrap and debris shall be removed daily during the course of construction, alterations and repairs. Contractor shall not be allowed to accumulate refuse materials 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 DEP Policies and Procedures.

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.

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 the SP (always) and the EP (only when scope of work may result in significant risk to the environmental) . The EHASP must be signed by a principal or senior manager of the company and project management staff. The EHASP shall be submitted to the Engineer for BWT EHS review and approval prior to the start of any work. As applicable, As applicable, JHAs will be developed as the Work progresses, 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, which shall be in accordance with the facility's current EAP. The facility EAP can be adopted by the Contractor and modified to encompass the project scope of work.

a. The Contractor is responsible for providing or supplementing the facility's existing, emergency alarm/siren/annunciation system to

ensure that all Contractor and CM 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. The Contractor can adopt and modify the facility's existing SPCC Plan.

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 30-Hour training within the last five (5) years.

2. The EHS Professional(s) shall possess a combination of safety and environmental skills as needed to manage the EHS hazards and issues presented by this Project. The EHS Professional may be one or more persons meeting the individual qualifications for Safety and Environmental Professionals as detailed below.

3. Safety Professional (SP): Persons recognized as 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 (with annual refresher, as required).

4. 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, construction and demolition debris (C&D), universal waste, hazardous materials management/disposal, 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.

5. 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. Thirty-hour OSHA construction safety and health training;

b. For projects that require hazardous waste remediation or response, forty-hour HAZWOPER training;

c. Resource Conservation Recovery Act/DOT hazardous waste/manifesting training

d. Permit- required confined space;

e. Spill prevention and control;

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

6. 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, the Engineer may require additional experience or training for approval. Performance Evaluations

7. The Contractor, in conjunction with its Subcontractors, shall be evaluated by the Engineer 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.

8. In conjunction with the Contractor evaluation, the EHS Professional(s) and EHS Rep shall also be evaluated by the Engineer. Unsatisfactory evaluation results may result in removal of personnel from the Project.

9. 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. Using the BWT-provided EHASP template, the Contractor shall submit the draft site-specific EHASP to the Engineer for review and acceptance; no other format will be accepted. The draft EHSAP shall be submitted within thirty (30) business days from issuance of the Notice to Proceed. In no case shall Work be allowed to commence without written confirmation of an approved EHASP from the Engineer. The EHASP shall include, but not be limited to the following information:

a. Provide the Contract title, Contract number, Contract type, Contractor's registered business name, and the scheduled start date.

b. Identify all BWT facilities where Work will occur.

c. List names and phone numbers of personnel assigned to the project, including project managers, supervisors, and other key roles.

d. A signature and date from an officer or duly authorized representative acknowledging the EHASP and acceptance of responsibility for compliance with applicable safety requirements.

e. Identify personnel designated as competent persons for Work requiring such designation under applicable regulations, and include required certifications or licenses. Competent persons shall be assigned to the Work and qualified for the specific tasks to be performed. If no competent person is required, make an affirmative declaration to that effect.

f. Provide a description of the Work to be performed under the Contract, identifying primary activities, major tasks, and general work environment in sufficient detail to convey the nature of the Work and reflect actual or projected Site conditions, without duplicating contract specifications or including procedural steps.

g. Identify the specific areas within each facility where Work will occur, to the extent known at the time of submission.

h. Describe the measures used to regulate movement within the Work area and to reduce exposure to hazardous conditions specific to the Work, including restricted zones, signage, barriers, and other necessary controls.

i. Outline plans for sampling and monitoring of hazardous exposures, identifying the company performing the work and the methods to be used, and provide sufficient detail to demonstrate how monitoring will be conducted for the Work.

j. Describe the frequency of safety inspections, programs covered, and personnel responsible for conducting inspections, ensuring the description reflects the actual Work activities and Site conditions. Include copies of anticipated inspection checklists.

k. Provide a list of employees expected to be on Site, including relevant training, certifications, and licenses, and ensure all listed training and certifications are current at the time of submission. Include documentation and submit additional records as personnel are added.

l. Provide equivalent training information for subcontractor personnel and submit updates as staffing changes, prior to subcontractor personnel beginning Work on Site.

m. Identify tasks to be performed, hazards associated with each task, the measures used to control those hazards, and any specialized EHS equipment needed to support those measures. Mitigation measures shall be task-specific and reflect actual or projected Site conditions, including controls applicable to worker protection on walking-working surfaces, hazardous waste handling, contaminated material removal, and

decontamination activities. Mitigation measures shall address protection of Contractor personnel, subcontractors, BWT employees, the public, and the environment.

n. Describe housekeeping procedures to be implemented throughout the duration of the Work, providing sufficient detail to reflect actual or projected Site conditions and to ensure safe, orderly, and unobstructed Work areas.

o. Identify activities that may impact the surrounding environment and describe methods and controls to be used to minimize such impacts. Controls shall be specific to the Work and reflect actual or projected Site conditions, including measures for spill prevention, containment, and response during loading, transit, unloading, and on-Site handling of hazardous or contaminated materials. The Contractor shall identify any environmental plans, procedures, or external resources necessary to maintain compliance with applicable requirements for spill prevention, waste management, and environmental protection, and shall confirm that such resources will be available for the duration of the Work.

p. Provide a list of chemicals to be brought onto the Site and maintain Safety Data Sheets on Site for the duration of the Work, ensuring the list reflects actual or projected chemical use associated with the Work.

q. Provide procedures for evacuation, assembly areas, notification, nearest hospital, and directions. Coordinate these procedures with the facility where Work will occur.

r. A completed acknowledgment page signed and dated by all required personnel. The acknowledgment shall confirm that the signatories have reviewed the EHASP, accept the conditions outlined therein, and agree to perform the Work in accordance with applicable regulations and BWT policies. The acknowledgment shall also confirm that the final EHASP will be provided to all subcontractors.

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 acceptance, the Contractor shall ensure that all electronic distributions of the accepted EHASP remain in PDF format. The EHASP shall be available to all of the Contractor's employees working on the Contract.

5. Review and acceptance 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.

6. The Contractor 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.

7. The Contractor must notify the Engineer, who in turn shall notify Bureau 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 project shall have a site-specific EAP in accordance with the facility Emergency Action Plan (EAP) . The Contractor may adopt the facility EAP and modify it to include the Project scope of work.

C. Contractor EHS Employees

1. The Contractor shall submit to the Engineer 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. The Engineer 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 Engineer 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 Bureau EHS 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 and provide a summary of hazardous waste inventory to Bureau EHS (prior to disposal). 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 provided to the BWT CBS section prior to mobilization of additional onsite chemical bulk storage tanks by the Contractor.

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 be provided to BWT PBS Section prior to mobilization of additional onsite petroleum bulk storage tanks by the Contractor. 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. An emergency contact list, including all appropriate Federal State, and local agencies who must be contacted in case of a discharge including the facility response coordinator, National Response Center (NRC), the NYSDEC Spill hotline, and the designated spill remediation/cleanup contractors with whom the Contractor has an agreement for emergency response;

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;

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

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

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 in accordance with 40 CFR 112. 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 and BWT EHS/PBS/CBS Sections of oil quantity changes, including the mobilization of additional petroleum tanks to the facility requiring registration, and updating the SPCC Plan, as necessary.

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 applicable

regulatory or industry standards. 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, as well as any visitors entering the job site shall wear the appropriate personal protective equipment (PPE) required as specified in the EHASP. 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. 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 and facility/site-specific information relevant to writing the EHASP can be obtained and reviewed and obtained at this time. .

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 and CM 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, 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 EHS Rep shall be at the job Site full time whenever work is in progress during all shifts.

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

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

h. 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.

i. 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.

j. Whenever the Engineer performs 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 upon request. The Contractor shall take immediate corrective action, where feasible, to eliminate hazards identified by the Engineer. The Contractor, if requested, shall develop and implement a plan detailing corrective action necessary to mitigate the presence of noncompliant conditions and actions following Incidents, citations, NOVs, or identification of patterns of noncompliant conditions and acts. All EHS incidents/injuries shall be managed and documented (investigation, contributing factors and root cause analysis, corrective actions and implementation, and tracking) by the Contractor. Corrective actions may include safety standdown, toolbox talks, retraining, or disciplinary actions.

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

l. Implement an effective fire protection and prevention program at the Site throughout all phases of the construction Work. The Contractor will ensure the availability of fire protection and suppression equipment adequate to control the degree of fire hazard encountered during construction.

m. 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 DEP's Contractor Selection and Management Policy.

n. 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 -BWT-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

(to be tabulated in excel and SIRS Contractor Input Spreadsheet). 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 BWT Hot Work permit from the Permit Authorizing Individual (PAI). The PAI shall be provided by the Engineer. DEP Hot Work policy requirements shall be met – Policy attachment is signed by the contractor/ sub-contractor.

2. The Contractor shall provide the Engineer with a JHA for review and approval at least five (5) days prior to the performance of Hot Work. If the JHA is not approved by the Engineer, the planned hot work activity cannot proceed. The JHA shall identify the following:

   a. The locations where the Work is to performed;

   b. Equipment to be used;

   c. Gases or vapors within or adjacent to the location that have the potential to create a combustible atmosphere;

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

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

3. The Fire Guard cannot be the person performing the hot work, and must have a FDNY Certificate of Fitness for Fire Watch and appropriate fire extinguisher training.

4. The person performing the Hot Work must have the appropriate FDNY Certificate of Fitness for the Work being performed.

5. For Hot Work in hazardous (classified) locations, refer to the requirements of Section 01 35 44 – Working in Hazardous (Classified) Locations.

D. Electrical Equipment Lockout

1. Following facility lockout of electrical equipment, and/or equipment turnover to the Contractor, the 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 OSHA 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; ;andsignatory authorization indicating approval by the Plant Chief or Facility Manager. A lock out/tag out (LOTO) walkthrough by the facility, the CM and the Contractor is required prior to the start of work to ensure that LOTO has been completed to the satisfaction of all parties.

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: _____

BWT Contractor
Environmental Health & Safety Plan (EHASP)

All contractors or vendors who perform work for BWT must develop a written Environmental Health and Safety Plan (EHASP) to address the hazards of the work and outline the mitigation methods to be employed. The EHASP must be accepted before the commencement of work. All work performed under a BWT or DEP contract must comply with all federal, state, and local regulations. A readily accessible copy of the accepted EHASP, either electronic or printed, must always be available during work. The following outlines the required information and format for the EHASP.

Contract Information

Contract Type:	☐ TOC	☐JOC	☐PO	☐OMO	☐CC	☐SC
	☐ Other (Specify):					

Contract Title:	
Contract #:	
Name of Contractor:	
Scheduled Start Date:	

BWT Facilities Where Work Will Occur Under This EHASP
(Check All that Apply)

☐26W	☐BB	☒CI	☐HP	☐JA	☐NC	☐NR	☐OB
☐OH	☐PR	☐RH	☐RO	☐TI	☐WI	☐CFN	☐CFS

Other BWT Facilities (specify):

Title	Name	Phone #
BWT Project Engineer/Manager		
BWT Construction Manager		
Contractor Project Manager		
Contractor Emergency After Hours Contact		
Contractor Emergency After Hours Contact (Back-up)		
Contractor On-Site Supervisor		
Contractor Safety Officer		

The below section needs to be signed off by an officer or duly authorized representative.

By signing below, the Contractor confirms their commitment to ensuring that the bureau's environmental, health, and safety provisions will be followed by both their workers and subcontractors' workers.

Name: **Signature:**

Title: **Date:**

A) COMPETENT PERSON(S):

If work for the performance of this contract does not require a *Competent Person, as defined by OSHA, Check here ☐

*Refer to instruction sheet

CONTRACTOR: Name of Competent Person(s)	**Type of Work**	**Company Name**
SUB-CONTRACTOR: Name of Competent Person(s)	**Type of Work**	**Company Name**

B) SCOPE of WORK: *Describe the scope of work at the subject location. Include methodology for accomplishing each task (use additional pages if required. Check here ☐)*

1.

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C) PROJECT AREA: *Describe the project location and area. Include unique features or concerns and site map if needed (use additional pages if required. Check here ☐)*

Figure of sampling location:

D) SITE CONTROL: *Outline site control measures to be taken to control movement and minimize worker exposure to hazardous conditions. If Not Applicable, check & provide a brief description* ☒

E) SAMPLING & MONITORING PLAN: *Describe a sampling and monitoring plan for inhalation hazards, noise, skin, ingestion hazards if needed. If unknown at the time of commencement, Contractor shall provide to CM for CM's review and acceptance when known during the life of the contract*

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F) INSPECTIONS: *Describe the frequency of safety inspections, the programs covered by the inspection, and the individual(s) responsible for conducting the inspections, including their name(s) and title(s). Providing copies of checklists, if utilized.* ***If at the time of EHASP review, this information cannot be provided, the contractor and/or sub-contractor are required to furnish this information to the CM and/or FEHS at a later date.***

G) EMPLOYEE TRAINING RECORDS

(*Company's training records of employees which are required for employees to perform the work associated with this contract (i.e.: Confined Space Entry if to be performed)).Copies of training certificates shall be included in Appendix A at the back of the EHASP.* ☐ Check here if additional pages are included.

Employee Name	Type of Certificate/License	Last Training Date

H) SUBCONTRACTOR EMPLOYEE TRAINING RECORDS

(*Company's training records of employees which are required for employees to perform the work associated with this contract (i.e.: Confined Space Entry if to be performed). Copies of training certificates shall be included in Appendix A at the back of the EHASP.* ☐ Check here if additional pages are included.

Subcontractor's		
Employee Name	**Type of Certificate/License**	**Last Training Date**

I) POTENTIAL HAZARDS / HAZARD MITIGATION METHODS

Describe individual tasks as indicated in the scope of work, potential hazards and the mitigation methods to be employed to protect the contractor's works, the subcontractors' workers, DEP employees, the public and all others in the area of the work.

The below table is a list of potential equipment or tasks which could involve hazards. It is not a complete list and is included as a guide for the contractor in preparing this EHASP.

Aerial/ Scissor Lift	Flammables/Combustibles	Energy Control/ LOTO	Utility Service Interruption
Bloodborne Pathogens	Hand/Power Tools	Power Tools	Head Hazards
Chemicals	Lifting	Radiation	Eye Hazards
Confined Space Entry	Heavy Equipment	Respiratory hazards	Face Hazards
Cranes and Hoists	Hot Work	Sanitation	Body Hazards
Demolition/ Dust	Interruption of any Safety System Operation	Scaffolding	Hand Hazards
High Voltage/ Arc Flash	Ladders	Special PPE	Foot Hazards
Excavation	Material Handling	Spills, Leaks, Releases	Electrical Hazards
Fall Protection	Noise	Traffic /Work Zone	Ergonomics

☐ *Check here if using additional sheets*

Hazard:

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Hazard:
Hazard:
Hazard:

-

Hazard: Working On or Near Water

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Hazard: Slips, Trips and Falls

J) HOUSEKEEPING: *Detail housekeeping procedures that will be utilized throughout project duration (setup, execution, and completion) If additional pages used, check here* ☒

K) ENVIRONMENTAL MANAGEMENT

Consideration shall be given to the impacts the activities within the scope of work will have on the surrounding environment and the methods that will be used to minimize the potential environmental impact. The contractor shall describe and include SOPs, methodologies and all environmental compliance tasks, and site control measures utilized for impact mitigation.

The table below is a list of potential environmental concerns that should be considered. It is not a complete list and is included as a guide for the contractor in preparing this EHASP.

Chemicals Bulk Storage	Petroleum Bulk Storage	Environmental Permits	COC Sampling & Remediation	Spill Containment & Reporting
Regulated Waste Management (i.e. Asbestos)	Universal Waste Management	Electronic Waste Management	Hazardous Waste Management	Recycling and Pollution Prevention
Soil Sampling & Management	Stormwater Management	Used Oil and Oily Rags	Air Emissions	Pesticides Management

☐ *Check here if using additional sheets*

Environmental Consideration:

-

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Environmental Consideration:
Mitigation Measures:

Environmental Consideration:
Mitigation Measures:

Environmental Consideration:
Mitigation Measures:

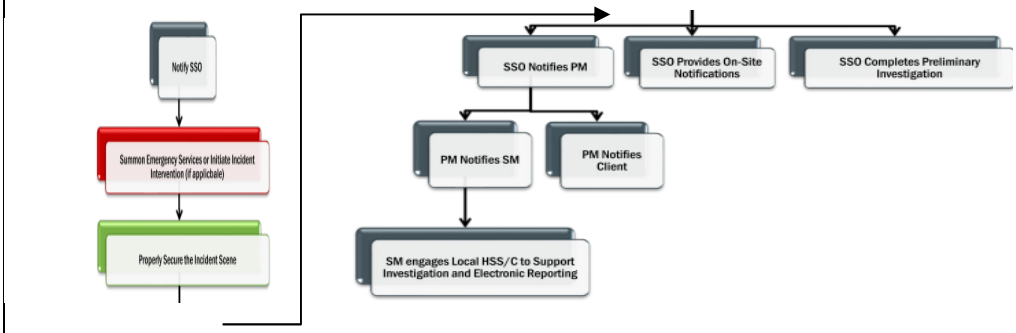
L) SAFETY DATA SHEET (SDS) INFORMATION	
NAME OF CHEMICAL	SDS on Site (Yes or No) ***A copy of the SDS must be kept on site throughout the project***
N/A	

M) EMERGENCY ACTION PLAN / FIRE PREVENTION PLAN
This section of the EHASP describes potential emergencies at this site, procedures for responding to those emergencies, roles and responsibilities during emergency response, and training that workers must receive in order to follow emergency procedures. This chapter also describes the provisions this site has made to coordinate its emergency response planning with the DEP facility, other contractors on the site and with off-site emergency response organizations.
M1) Evacuation Procedures

M2) Facility Assembly Areas

Will be provided during site specific safety orientation.

M3) Notification Procedures



M4) Nearest Hospital

New York presbyterian Queens Hospital
55-45 Main Street Queens, New York 11355
See BC PW-119 FWSP for Tallman Island WRRF

M5) Directions

See BC PW-119 FWSP for Tallman Island WRRF

1. Turn left onto 127st 0.4mi
2. Turn left onto 11th Ave 0.8mi
3. Turn right onto Malba Dr 0.1mi
4. Continue onto Whitestone Expy 0.5mi
5. Merge onto I-678 S to Kennedy Airport 1.3mi
6. Take exit 12A for college Pt Blvd toward 1-45 E/LI Expy/ Eastern LI 1.4mi
7. Turn left onto College Point Blvd 466ft
8. Slight right onto Booth Memorial Ave 0.3mi
9. Turn left onto 137th st. 0.1mi
10. Turn right onto 56th Ave- Destitation will be on your right.

N) EHASP ACKNOWLEDGEMENT

I hereby acknowledge that I have read, understand, and accept the conditions outlined in the EHASP. I agree to perform work in accordance with this plan, following safe work practices, OSHA regulations, industry standards, and DEP Policies and Procedures. In the case of subcontractor(s) work, a copy of the final EHASP will be provided to the subcontractor(s). Job Hazard Analysis (JHAs) will be prepared for tasks not covered by this EHASP and will be reviewed with all workers.

Company Name:		
Title	**Signature**	**Date**
Project Manager		
Field Supervisor		
Site Safety Officer		
Competent Person		

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Appendix A

Contractor and Subcontractors Employee Certificated Training Records

Contractor Selection and Management

Environmental, Health and Safety Policy and Procedure

EHS Policy Volume:	☐I	☑**II**	☐III	☐IV
Revision Number:	**4**			
Effective Date:	**June 23, 2022**			
Approved By:	**OEHS**			
Document No:	**OEHS-PS-CTR-4.0-22**			

DEP Office of Environmental Health and Safety Compliance Authorization

I, a duly authorized representative of the DEP Office of Environmental Health and Safety, have reviewed this document, have found it to be acceptable and authorize its use for all DEP operations.

Revision / Action	Signature	
Revision 0, Authorization	On File	Date: 12/21/04
Revision 1, Authorization	On File	Date: 11/03/08
Revision 2, Authorization	On File	Date: 05/10/17
Revision 3, Authorization	On File	Date: 02/26/18
Revision 4, Authorization		Date: 06/23/22
		Date:
		Date:

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1 PURPOSE

One 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, environmentally compliant and cost-effective contractors and to systematically manage, monitor and evaluate contractors that are working on DEP projects and at DEP locations.

The purpose of this policy is to ensure that information associated with a bidder's environmental, health, and safety ***(EHS)*** performance and programs is evaluated when DEP is selecting a Contractor; that the Contractor is aware of its EHS responsibilities; and that the ongoing evaluation of the Contractor by DEP includes the Contractor's EHS performance.

2 SCOPE

This policy addresses the following:

- Review of EHS information prior to Contractor selection.
- Communication to Contractors of DEP's EHS requirements and expectations; and
- Evaluation of a Contractor's EHS performance while it is providing labor or services to DEP.

For purposes of this policy, "***Contractor***" means a non-DEP individual or business retained to provide specific labor or services[1]. This policy is applicable to Contractors that may provide labor or services (e.g., construction, maintenance or repair, inspection services, renovation, or specialty work) on and around DEP facilities or properties. This also applies to work at non-DEP facilities that is under the scope of a DEP contract. This may include, without limitation, reservoirs, watershed properties, distribution and wastewater systems, and public areas (e.g. green infrastructure). Certain requirements (e.g., EHS submittals and site-specific training) also apply to subcontractors, suppliers, contractor visitors and/or field consultants.

The policy is applicable to all contractors retained by DEP, regardless of contract dollar amount, which conduct tasks at DEP work locations, including facility and field work. For emergency contracts, for which award of the contract is particularly time-sensitive, the Agency Chief Contracting Officer (***ACCO)***, in conjunction with the Contract Supervisor and Bureau EHS, will determine how to apply the requirements of this policy in order to achieve DEP's EHS goals.

This policy does 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

[1] There are additional requirements for Contractors who perform work on and around DEP processes regulated under the Occupational Safety and Health Administration (OSHA) Process Safety Management (PSM) requirements [29 CFR 1910.119(h)] and United States Environmental Protection Agency (USEPA) Risk Management Plan (RMP) requirements [40 CFR 68.87]. PSM/RMP processes include those that have chlorine or other extremely hazardous substances in amounts above regulatory threshold quantities. DEP's PSM/RMP Contractor Safety procedure supersedes this procedure for PSM/RMP-regulated processes.

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.

This policy defines DEP's responsibility related to EHS requirements for contract award; it does not define other DEP and City requirements for award. It does not define the specific EHS policies and requirements that contractors must follow while providing labor or services for DEP; every hired contractor must comply with applicable federal, state, and local laws and regulations, contract-specific requirements and all DEP policies and procedures incorporated into the contract.

3 DEFINITIONS

[This section is intentionally blank.]

4 RESPONSIBILITIES

4.1 Responsible Individual

The highest ranking manager or supervisor within each DEP Bureau at each facility (or whose employees perform field operations outside of fixed facilities) is the ***Responsible Individual*** for that facility or operation. The ***Responsible Individual*** or designee will ensure that onsite Contractors receive a facility-specific EHS orientation and that they are following onsite sign-in and notification procedures.

4.2 Contract Supervisor

The ***Contract Supervisor*** is the employee responsible for managing and overseeing the contract. The ***Contract Supervisor*** will:

- Have overall responsibility for meeting the requirements of this policy for contract work on his/her projects;
- Contact and obtain from the apparent successful bidder the documentation specified in **Attachment A** for the pre-award EHS evaluation within five business days of the request;
- Assemble pre-award EHS evaluation documents into a complete package; review and evaluate the pre-award EHS submissions of the bidder with assistance from ***Bureau EHS,*** as needed;

- Prepare **Attachment F** for review and sign-off by ***Bureau EHS*** within 10 business days of receiving the bidder's EHS submittal. At the Bureau discretion, the ***Contract Supervisor*** may sign the recommendation memo to ***ACCO*** in lieu of ***Bureau EHS;***
- Inform Contractor about EHS evaluation requirements (provide *Contractor EHS evaluation form* **(Attachment E)** and other specific requirements, if applicable);
- With assistance from ***Bureau EHS*** as needed, perform Contractor EHS evaluations; Contract Supervisor shall retain the original EHS evaluation (**Attachment E**) in the contract files; and ***Bureau EHS*** may retain a copy;
- Coordinate with the ***Responsible Individual*** and ensure that the Contractor does the following:
  - corrects non-compliant or unsafe practices in accordance with DEP policies and procedures, its contract, and regulatory requirements in a timely manner.
  - closes out all violations, summonses, etc. issued by regulatory agencies, and pays the appropriate fines before final or subsequent payments are made by DEP;
  - Reports all contractor employee injuries and any other adverse event (chemical spills, fires, damage to equipment or property damage (contractor or DEP) and reports those incidents to Bureau EHS. All contractor incidents are required to be entered into Agency EHS management information systems.
- Ensure that the inspection performed under Article 16 of the City of New York Standard Construction Contract for occupation or use prior to completion includes an evaluation of compliance with applicable EHS requirements.

4.3 Bureau EHS

Bureau EHS is responsible for determining, within 10 business days of receiving the bidder's EHS program evaluation submittal, whether the past EHS performance of an apparent successful bidder meets the criteria established by this policy. ***Bureau EHS*** will assist the ***Contract Supervisor*** when needed and perform the following activities:

- Review and sign recommendation memo to ***ACCO*** (Attachment F). This memo may be prepared by ***Contract Supervisor*** or ***Bureau EHS***;
- Add the name of contractors that have been given overall periodic "Poor" or "Unsatisfactory" ratings to the Agency-wide shared Contractor EHS Evaluations database.

At the Bureau discretion, the ***Contractor Supervisor*** may sign the recommendation memo to ***ACCO*** in lieu of ***Bureau EHS.***

4.4 Office of Environmental, Health and Safety (OEHS)

OEHS is responsible for the following:

- Monitor agency compliance with this policy through ongoing quality assurance checks and programmatic audits;
- Fulfill the ***Bureau EHS*** responsibilities for Bureaus that do not have a designated EHS division or knowledgeable representative.

4.5 Agency Chief Contracting Officer (ACCO)

After receipt of a bidder's EHS program evaluation from the Bureau, ***ACCO*** will include that information as part of his/her determination as to whether bids are "responsive" and whether the apparent successful bidder is "responsible."

5 PROCEDURE

5.1 Pre-Award Review of Bidder EHS Performance and Program

5.1.1 Communication of EHS Requirements

The Bureau shall ensure that the apparent successful bidder is required to submit all required documentation as specified in **Attachment A,** *Standard Environmental, Health and Safety Specifications*. The specifications in **Attachment A** of this policy shall be included in the ***Invitation for Bids*** package, along with **Attachment B,** *The Bidder's EHS Performance and Program Review Questionnaire* for all affected DEP contracts.

5.1.2 Bidder's EHS Submittals

The apparent successful bidder shall submit all required documents as specified in **Attachment A** under *Standard Environmental, Health and Safety Specifications*, Section 2.1, within five business days of request. Failure to transmit a complete and timely submission may result in a rejection of the bid.

At that same time, the apparent successful bidder must complete the *Bidder's EHS Performance and Program Review Questionnaire* found in **Attachment B** and provided in the Invitation for Bids package. The purpose of **Attachment B** is to help DEP determine the adequacy of a bidder's EHS program.

5.1.3 Review of Bidder Submittals

For a bid to be considered responsive, DEP requires that the bidder meet the requirements specified in Section 2.2 of **Attachment A**.

Within 10 business days of receipt of the EHS submittals from the apparent successful bidder, the ***Contract Supervisor*** (with assistance from ***Bureau EHS*** if needed) will review the information and prepare a memorandum to ***ACCO*** indicating whether the apparent successful bidder is considered responsive to EHS requirements for the award. The ***Contract Supervisor*** shall use the **Attachment F**, *Sample Recommendation Memo to ACCO* (or equivalent), to ensure all required submittals were reviewed. Upon completion of the memo, the ***Contract Supervisor*** shall have it signed (by ***Bureau EHS*** or ***Contract Supervisor***) and submit it and supporting documentation to the ***ACCO***.

5.2 Contract Specifications

Attachment A of this policy contains the *Standard Environmental, Health and Safety Specifications* to be incorporated in every contract that is covered under this policy. Additional stricter EHS requirements may be added at the discretion of the ***Bureau*** depending on the work to be conducted.

5.3 Contractor Orientation

The ***Contract Supervisor*** and ***Responsible Individual*** or designee shall conduct on-site orientation for the Contractor prior to the Contractor's commencing work as specified in **Attachment A,** Section 4. At the ***Responsible Individual's*** discretion, this orientation could include all on-site Contractor personnel.

The ***Contract Supervisor*** and/or ***Responsible Individual*** will document the Contractor orientation on the *Contractor Orientation Checklist* included in **Attachment C** (or an equivalent form). In addition, the Contractor's project manager or site supervisor will certify on the form that he/she understood the orientation and other key obligations presented by the ***Responsible Individual*** or ***Contract Supervisor***. The Contractor is responsible for providing the facility orientation to any new or replacement employees, or any not present during the initial orientation. This includes subcontractors, suppliers (unless they meet the exception requirements specified in Section 2, "Scope" of this policy), Contractor visitors and field consultants.

During orientation, DEP will provide the Contractor with the most current:

- Work site specific hazardous conditions and related information (e.g., hazardous chemicals present at the work site, any applicable formal hazard identification/control documents, locations of Safety Data Sheets, and required safe work practices including minimum Protective Personal Equipment (PPE) requirements);
- Facility specific lockout/tagout requirements;
- 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;
- Access control procedure, as outlined in Section 5.4, below;
- 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;
- DEP's Workplace Violence Prevention Policy;
- DEP's Possession of Firearms in the Workplace Policy;
- All other applicable DEP policies and procedures that will, or may, be necessary for the work; and

- Information on known constituents of concern in the work area, including areas known to contain, or having historically contained, lead, asbestos, PCBs, and mercury.

Prior to commencement of the work, the Contractor must provide training as specified in **Attachment A**, Section 4. The Contractor shall document the training using *Contractor Training Certification* in **Attachment D** (or an equivalent form) and provide a copy to the ***Contract Supervisor*** and ***Responsible Individual***.

5.4 Contractor Access Control Procedure

All Contractor employees shall be subject to the access control requirements:

- Every Contractor employee must maintain an approved means of photo identification while he/she is at the work site;
- All Contractor employees must sign in and out daily on a Contractor/Visitor Log or as required by the particular DEP operation;
- Contractor employees are restricted from entering flammable or toxic material storage or use areas, unless access is required for performance of their work and has been approved by the ***Contract Supervisor***;
- Each Contractor shall maintain a list of each of its employees who are present at the site. In case of evacuation, the Contractor's supervisor on site shall bring this list to the designated gathering point;
- Access to all facilities shall be pre-approved by the ***Responsible Individual*** and ***Bureau of Police and Security***;
- The Contractor must ensure that personal information for each employee is provided to DEP as necessary for the employee to obtain security clearance and DEP photo identification;
- ***Contract Supervisors*** are responsible for ensuring that DEP-issued IDs are returned upon completion of the contract.

5.5 Contractor Incident and Violation Reporting

Notifications concerning Contractor incidents and violations issued by regulatory agencies must be made in accordance with the requirements specified in **Attachment A**, Section 5.7.

Contractors are required to report all injuries or other adverse incidents to the Contract Supervisor.

5.6 Periodic Evaluation of Contractor Compliance

5.6.1 Evaluation Requirements

A compliance evaluation is required on all contracts with a total cost above $1 million and/or when called for by Bureau. The ***Contract Supervisor*** in consultation with ***Operations***

personnel and Bureau EHS (as needed) must perform evaluations at least annually (for contracts with a duration of at least a year) and at the end of the contract.

5.6.2 Conducting Evaluations

To document the evaluation, the ***Contract Supervisor*** with assistance of ***Bureau EHS and/or Operations personnel*** as needed will complete the *Contractor EHS Evaluation Form* (**Attachment E)**. 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. The ***Contract Supervisor*** shall rate the Contractor on each program category on this *Contractor EHS Evaluation* form ("NA"s are acceptable where the program was not required). However, the final rating for the job may be weighted more heavily on specific programs (one or two) if, in the opinion of the ***Contract Supervisor,*** compliance with that/those program requirement(s) is paramount to worker safety and/or environmental protection in connection with the particular contract in question. In this case, the ***Contract Supervisor*** shall notify the Contractor of the program weighting at the time of commencement of work or through the development of risk-based safety plans during the course of the project. Further, if the Contractor repeatedly failed to comply with a requirement, regardless of the weight the ***Contract Supervisor*** may have given it, the final rating can also be based on continuous failure to comply with that single requirement.

Contract Supervisors shall keep records of Contractor's EHS performance and copies of all correspondence related to Contractor's EHS performance for use during the evaluation process.

The ***Contract Supervisor*** shall provide electronic copies of all Contractor EHS Evaluations to the Contractor and ***Bureau EHS Director*** or designee. The ***Bureau EHS Director*** or designee shall add to the agency-wide shared Contractor EHS Evaluations database the name of any Contractor that has been given an overall "Unsatisfactory" or "Poor" rating on final evaluation.

If the Contractor disagrees with a "Poor" or "Unsatisfactory" evaluation, the Contractor may seek reconsideration of the evaluation, as provided in Section 6.5 of the *Standard Environmental Health and Safety Specifications* (**Attachment A**).

6 RECORDKEEPING

Documentation required by this policy will be maintained by the ***Contract Supervisor*** in accordance with *Managing New York City's Records Policy* and DEP Records Retention Schedule.

7 QUALITY ASSURANCE AND AUDITING

Compliance with, and effective implementation of, this policy will be evaluated during regularly scheduled ***OEHS*** and Bureau audits/inspections. During programmatic assessments conducted by OEHS, facilities will be expected to demonstrate compliance with this policy.

Contract Supervisor, Operations personnel and/or ***Bureau EHS*** representative shall conduct "spot" checks to ensure the Contractor's conformance with this policy. The frequency and extent of documentation of the "spot" checks are at the discretion of the ***Contract Supervisor*** or Operations in consultation with ***Bureau EHS***.

Contractor performance as reflected in the Contractor EHS Evaluations agency-wide database will undergo review by ***OEHS*** in consultation with **Bureau EHS** on a periodic basis (not to exceed 1 year).

8 TRAINING

All personnel involved in Contractor selection and management will receive mandatory initial training on this policy and refresher training whenever a change to this policy is released. Training should be recorded in the DEP's Learning Management System.

9 ATTACHMENTS

Bid Package Documents

Attachment A. Standard Environmental, Health and Safety Specifications

Attachment B. Bidder's EHS Safety Record and Program Review Questionnaire

Forms and Checklists

Attachment C. Contractor Orientation Checklist

Attachment D. Contractor Training Certification

Attachment E. Contractor EHS Evaluation Form

Attachment F. Sample Recommendation Memo to ACCO

ATTACHMENT A

STANDARD ENVIRONMENTAL, HEALTH AND SAFETY SPECIFICATIONS

To be included in all contracts where applicable

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.

* * * * * *

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: _____

ATTACHMENT C

CONTRACTOR ORIENTATION CHECKLIST

Contractor Orientation Checklist

1. Reviewed hazardous chemicals present at the work site and locations of Safety Data Sheets.	❑
2. Reviewed chemical inventory and SDSs for any chemicals Contractor or subcontractor will introduce at worksite and provided location of SDSs.	❑
3. Reviewed list of aboveground storage tanks and heavy equipment (e.g., generators) Contractor and subcontractors will introduce at worksite, including type and locations.	❑
4. Reviewed Emergency Action Plan (including map with evacuation routes and gather points, internal notification of facility manager of incident/accident, external medical assistance [call 911], evacuation procedures and description of chemical release alarms) and any other relevant emergency/contingency plans (e.g., SPCC Plan).	❑
5. Contractor agrees to notify operations if any activity will result in air emissions, water discharges, storage of products and waste generations.	❑
6. Informed Contractor of locations of restricted high-hazard process and other restricted areas.	❑
8. Provided to Contractor copy of facility's(ies') Legacy report(s), including data from the LATS2 database, and informed Contractor of areas with mercury-containing equipment (past or present), equipment in or around areas with mercury, and/or areas that have been remediated.	❑
9. Reviewed Contractor-provided facility safe work practices that may be necessary to Contractor's completing the work, including (check all that apply and add all other relevant safe work practices): Lockout/tagout _____ Personal Protective Equipment _____ Respiratory Protection _____ Confined Space Entry _____ Hot Work _____ Other (list) _____	❑
10. Explained Access Control Procedure including: • All Contractor employees must sign in and out daily. • Contractor employees are restricted from entering any PSM/RMP-covered or other high-hazard chemical process areas (locations provided), unless access has been approved by the ***Responsible Individual*** and is required for Contractor employees to perform their work.	❑
11. Informed Contractor of the Workplace Violence Prevention Policy, and the Firearms in the Workplace policy.	❑
12. Explained Contractor's responsibility to immediately inform the facility ***Responsible Individual*** and ***Contract Supervisor*** of all spills of chemical or petroleum products, or disturbance of any contaminants of concern; the Contractor is responsible for proper cleanup, reporting and disposal.	❑
13. Explained Contractor's responsibility to immediately inform the facility ***Responsible Individual*** and ***Contract Supervisor*** of medical injuries or illnesses or any incident or near miss resulting from work performed at the facility.	❑
14. Explained Contractor's responsibility to immediately inform the facility ***Responsible Individual*** and ***Contract Supervisor*** of receipt of any Notices of Violation (NOVs) and other deficiencies and fines issued by regulatory agencies; the Contractor is responsible for remedying any deficiencies and closing out the deficiency (including payment of any fines) with the issuing entity	❑

CONTRACTOR CERTIFICATION: I fully understand the above information and certify that:

- I will provide verbal notification to the ***Contract Supervisor*** or ***Responsible Individual*** as soon as I become aware of any unanticipated hazards associated with our work, and a written statement explaining those hazards and needed controls within 24 hours.
- I understand my responsibility to immediately inform the facility ***Responsible Individual*** and ***Contract Supervisor*** of all spills of chemical or petroleum products, Contractor employee medical injuries or illnesses or any incident or near miss resulting from work performed at the facility, as well as Notices of Violation (NOVs) and other deficiencies and fines issued by regulatory agencies.
- I understand my obligation as a Contractor to ensure that only my employees and my subcontractor's employees who have successfully completed training on the above information, who are trained in the safe execution of their work, and who hold current, valid licenses and certifications as required, will work at the facility and that they will abide by applicable DEP policies and procedures.

_____

Contractor Representative/Date

_____

Contractor (Company Name)

_____

Responsible Individual/Contract Supervisor/Date

ATTACHMENT D

CONTRACTOR ORIENTATION TRAINING CERTIFICATION

Contractor Orientation Training Certification		
Contractor Company Name:		
Contract Number:		
Home Office Address:		
Home Office Phone:		
Contact Name:		
Contact email:		
Facility Name and Location:		
I have received site specific Contractor Orientation training and understand the information provided by the facility (see attached Contractor Orientation Checklist), including project specific Safe-Work Plan, Environmental/Waste Management Plans, facility permit requirements and associated handouts and that I was given the opportunity to ask questions during this training.		
NAME	**SIGNATURE**	**DATE OF TRAINING**

I certify that I have provided training to the employees listed above on the information provided by the facility in the Contractor Orientation (see Contractor Orientation Checklist) and that I prepared a record of the employees' names and date of training. The employees listed above have also been trained in the procedures required to safely perform their work in compliance with regulations and DEP policies (including EHS programs and any manufacturer's equipment repair/rehabilitation procedures applicable to the work).

Contractor Name: _____

Signature: _____

Date: _____

ATTACHMENT E

CONTRACTOR EHS EVALUATION FORM

The following criteria shall be utilized in conducting the Contractor evaluations:

Rating	Description
Excellent (5)	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, best practices and showed alignment with DEP's EHS goals.
Good (4)	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 (3)	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 (2)	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 (1)	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.

DEP considers compliance with and conformance to EHS requirements to be of the utmost importance. The ***Contract Supervisor*** shall rate the contractor/consultant on each program category on this *Contractor EHS Evaluation* form ("NA" is acceptable where the program was not required). However, the final rating for the job may be weighted more heavily on specific programs (one or two) if, in the opinion of the ***Contract Supervisor,*** compliance with that/those program requirement(s) is paramount to worker safety and/or environmental protection in the context of the particular project. In this case, the ***Contract Supervisor*** shall so notify the Contractor of the program weighting, prior to the commencement of work or through the development of risk-based safety plans during the course of the project. Further, if the Contractor repeatedly failed to comply with the requirements of a particular program, regardless of the weight the ***Contract Supervisor*** may have given it, the final rating can also be based on continuous failure to comply with the requirements of that single program. Justification is required for ratings of "1" and "2", and optional for other ratings.

Contractor EHS Evaluation Form	
Contract Number:	
Contract Registration No.:	
Contractor:	
Beginning date of review period:	**Ending date of review period:**

Category	**Rating (1-lowest; 5 highest)**					
Overall Rating (based on Program /Category scores below)	**1**	**2**	**3**	**4**	**5**	
Justification:						
Housekeeping	1	2	3	4	5	NA
Justification:						
Fire Protection	1	2	3	4	5	NA
Justification:						
Personal Protective Equipment	1	2	3	4	5	NA
Justification:						
Electrical Safety	1	2	3	4	5	NA
Justification:						
Fall Protection	1	2	3	4	5	NA
Justification:						

Category	Rating (1-lowest; 5 highest)					
Storage Areas	1	2	3	4	5	NA
Justification:						
Confined Space Program	1	2	3	4	5	NA
Justification:						
Lifting Devices and Cranes	1	2	3	4	5	NA
Justification:						
Classified Locations and Gas Monitoring	1	2	3	4	5	NA
Justification:						
Communication with facility/CM	1	2	3	4	5	NA
Justification:						
Hot Work	1	2	3	4	5	NA
Justification:						
LOTO/Control of Hazardous Energy	1	2	3	4	5	NA
Justification:						

Category	Rating (1-lowest; 5 highest)					
Stormwater Management	1	2	3	4	5	NA
Justification:						
Hazardous Waste Management	1	2	3	4	5	NA
Justification:						
Solid Non-Hazardous Waste Management	1	2	3	4	5	NA
Justification:						
Other Regulated Waste Management	1	2	3	4	5	NA
Justification:						
Petroleum Bulk Storage	1	2	3	4	5	NA
Justification:						
Chemical Bulk Storage	1	2	3	4	5	NA
Justification:						
Air Emissions	1	2	3	4	5	NA
Justification:						

Category	Rating (1-lowest; 5 highest)					
Spill Prevention	1	2	3	4	5	NA
Justification:						
Performance of Site Safety Representative	1	2	3	4	5	NA
Justification:						
Performance of Safety Professional	1	2	3	4	5	NA
Justification:						
Job Hazard Analysis (JHA) Management	1	2	3	4	5	NA
Justification:						
Incident and Investigation Reporting	1	2	3	4	5	NA
Justification:						
Other (specify):	1	2	3	4	5	NA
Justification:						

Contract Supervisor: _____

Signature : _____Date:_____

ATTACHMENT F

SAMPLE RECOMMENDATION MEMO TO ACCO

Memorandum

To: DEP ACCO

From: Bureau EHS / Contract Supervisor

Date:

Subject: **EHS Recommendation Regarding Contract Award**
{Contract Title}
{Contract Number}
{Contractor's Name}

In accordance with the *DEP Contractor Selection and Management* policy, {Bureau EHS/Contract Supervision} has reviewed the EHS submittal package for ***{Contract Number}*** and recommends that it be found ***{responsive/non-responsive}*** to the requirements of the EHS Specifications (***Attachment A***), for the reasons set forth below.

	Acceptable	Unacceptable	N/A	Detailed Explanation (required)
Experience **M**odification **R**ating (**EMR)**	☐	☐	☐	
OSHA 300A & Incident Rates (past three years)	☐	☐	☐	
Regulatory Agency NOVs - regulatory agency notices of violation, fines and reportable releases associated with the bidder's operations (past three years)	☐	☐	☐	
Performance on Previous DEP Projects - EHS evaluations from previous work performed for the NYC DEP	☐	☐	☐	
EHS & Training Program - adequacy of program; demonstrated understanding of regulatory requirements; availability of adequate EHS professionals for project	☐	☐	☐	

	Acceptable	Unacceptable	N/A	Detailed Explanation (required)
Demonstrated **safety record** on similar projects over the past 3 years	☐	☐	☐	

c: ***{Insert names here}***

SECTION 01 35 44 – WORKING IN HAZARDOUS (CLASSIFIED) LOCATIONS
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. Hazardous (Classified) Locations

B. Combustible Gas Detection

C. Qualifications of Combustible Gas Detection Employees

D. Task Hazard Analysis

E. Hot Work Permit

F. Air Monitoring Notices and Reports

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

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

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

D. Rated Equipment and Wiring:

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

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

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

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

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

1.05 DESCRIPTION

A. Hazardous (Classified) Locations

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

2. Hazardous (Classified) Locations at the Work Site include, but are not limited to, the following areas:

a. Lower Floor of the Grit Building.

b. Upper Floor of the Grit Building.

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

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

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

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

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

5. Atmospheric monitoring to ensure the protection of employee health and safety must comply with the requirements of the Contractor's Environmental Health and Safety Plan (EHASP) as per Section 01 35 27 – Environmental Health and Safety Requirements.

B. Working in Hazardous (Classified) Locations:

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

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

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

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

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

4. The Contractor shall provide the Engineer with a Job Hazard Analysis (JHA) at least 48 hours prior to the performance of Hot Work in a Hazardous (Classified) Location. The JHA shall identify the following:
    a. The Hazardous (Classified) Locations where the Work is to be performed;
    b. Equipment and wiring to be used in the Hazardous (Classified) Location;
    c. Gases or vapors within or adjacent to the Hazardous (Classified) Location that have the potential to create a combustible atmosphere;
    d. Controls required to mitigate or prevent the accumulation of gases or vapors in quantities that have the potential to create a combustible atmosphere;
    e. Controls or methods to promptly discontinue the use of and de-energize non-rated equipment when a combustible atmosphere is detected.
5. The Contractor shall not use any non-rated equipment (e.g., powered industrial trucks not specifically rated for the areas to be used) in Hazardous (Classified) Locations without obtaining approval from the Engineer.
    a. Where approval is provided the Contractor shall provide the Engineer with documentation that workers using non-rated equipment in the Hazardous (Classified) Location have been provided training and information on the applicable JHA and emergency procedures prior to working with non-rated equipment.

C. Combustible Gas Detection:

1. The Contractor shall arrange for Combustible Gas Detection to be performed by qualified Combustible Gas Detection personnel, as identified within this Section, anytime Work is to be performed in Hazardous (Classified) Locations with equipment and wiring that is not rated for such use. The Contractor shall certify that all Work in Hazardous (Classified) Locations is being performed in a safe atmosphere.
2. Prior to commencing the Work for Combustible Gas Detection, the Contractor shall submit for the approval of the Engineer a communications protocol detailing the type and sequence of warning signals to be utilized, and describing the evacuation procedure to be employed, whenever a hazardous condition occurs.
3. The Contractor shall ensure that Combustible Gas Detection equipment, which is listed by Underwriters Laboratories (UL) and rated for use in Hazardous (Classified) Locations, is calibrated, tested and maintained

prior to use in a Hazardous (Classified) Location by qualified persons in accordance with the requirements of the equipment's manufacturer.

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

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

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

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

      1) An oxygen level greater than 19.5 percent and less than 23.5 percent concentration;

      2) A LEL less than 5 percent concentration.

   d. Ensure the JHA for performing Hot Work in a Hazardous (Classified) Location is prepared, reviewed and updated by the Contractor's gas detection manager prior to the start of Hot Work and any time:

      1) The scope of Work changes to introduce hazards or a potential for combustible gases or vapors to be present was not previously identified;

      2) The JHA's hazard evaluation does not adequately address the identified hazards;

      3) Hazard controls of the JHA have changed or do not sufficiently mitigate or prevent the accumulation of a combustible atmosphere.

   e. Provide written verification to the Engineer that all gas detection equipment has been properly calibrated and tested prior to the start of Work in any Hazardous (Classified) Location.

   f. Provide written verification to the Engineer that all work areas where non-rated equipment and wiring being used is safe through

the issuance of a Notice of Safe Atmosphere upon calibration and testing of gas detection equipment and prior to the use of non-rated equipment in a Hazardous (Classified) Location.

5. Continuously monitor the Hazardous (Classified) Location with documented readings every 15 minutes. Electronic data logging where gas detection equipment possesses such capabilities is adequate so long as readings are recorded at least every 15 minutes and results are capable of being provided to the Engineer as written documentation.

6. Combustible Gas Detection equipment shall be capable of providing a continuous digital output measuring:

   a. Oxygen in percent concentration;

   b. LEL in percent concentration.

7. A warning condition shall be declared to all affected persons in the area, and the Engineer, by radio, PA, or in person anytime the following condition exists:

   a. LEL greater than 5 percent.

8. Work shall be immediately stopped and non-rated equipment de-energized when any hazardous atmosphere is measured by gas detection equipment. A hazardous atmosphere is determined by the presence of any of the following:

   a. Oxygen levels less than 19.5 percent or greater than 23.5 percent concentration;

   b. LEL greater than 10 percent.

9. When a hazardous atmosphere is present, a hazardous condition shall be declared and the gas detection technicians shall immediately implement the following actions:

   a. Sound a portable air horn to warn all personnel that a hazardous atmosphere exists;

   b. Notify the Contractor and the Engineer by radio communication, PA, or in person that a hazardous condition has been declared;

   c. Notify all persons in the potentially affected areas to immediately evacuate the area and discontinue use of non-rated equipment in Hazardous (Classified) Locations until the Engineer determines the conditions leading to the presence of a hazardous atmosphere, identified corrective actions to mitigate or prevent a re-accumulation of an unsafe atmosphere, and the atmosphere of the Hazardous (Classified) Location has returned to levels that personnel can safely resume operations in the area;

d. Issue a Notice of Unsafe Atmosphere to the Engineer and ensure access is precluded by the Contractor's personnel in areas where a hazardous atmosphere is present;

e. The Contractor shall make combustible gas detection equipment available to the Engineer during the investigation and corrective/preventative action review.

10. When the Contractor determines that a hazardous atmosphere no longer exists, Work may resume upon issuance of a Notice of Safe Atmosphere in accordance with the procedures identified in this Section.

11. Provide all required Combustible Gas Detection equipment in sufficient quantities, with backups.

a. The number of required equipment shall be determined by the gas detection manager and shall consider the size of work area, work to be performed, location of personnel, and configuration. Gas detection shall be adequate to identify potentially hazardous conditions in any area which could present a hazard to personnel.

1.06 QUALITY ASSURANCE

A. Qualification of Combustible Gas Detection Employees:

1. The Contractor shall ensure the following qualified personnel are available when performing Combustible Gas Detection:

a. A gas detection manager who meets at least one (1) of the following and has been approved by DEP:

1) Certified Industrial Hygienist (CIH) by the American Board of Industrial Hygienists (ABIH) with at least five (5) years of documented professional industrial hygiene and air monitoring management experience.

2) Certified Safety Professional (CSP) by the Board of Certified Safety Professionals (BCSP) with at least five (5) years of documented professional industrial hygiene and air monitoring management experience.

3) Bachelor of Science degree in industrial hygiene, occupational safety and health, or environmental health and science and ten (10) years of documented professional industrial hygiene and air monitoring management experience.

b. Gas detection technicians shall be present as necessary to ensure the continuous monitoring for the presence of combustible gases and shall have no other responsibilities than those of a combustible gas detection technician. Technicians shall meet the following prior to operating Combustible Gas Detection equipment:

1) Trained in the calibration, testing, maintenance and operation of the Combustible Gas Detection equipment being used;

2) Have a minimum of six (6) months' experience in the monitoring of combustible gases and vapors;

3) Where confined spaces are involved, possess confined space training to include the responsibilities of the confined space entrant, attendant and entry supervisor.

c. The Engineer shall have the right to interview and review the qualifications of all personnel performing Combustible Gas Detection.

1.07 SUBMITTALS

A. At a minimum, submittals shall include:

1. Prior to the commencement of any Work of this Section, the following items shall be submitted to the Engineer:

a. Qualifications of the Combustible Gas Detection employees.

2. In addition, during the performance of Work, the Contractor shall submit the following items as required in this Section:

a. JHA;

b. Communications protocol;

c. Written verification of equipment calibration;

d. Written review and verification of conditions;

B. Air Monitoring Notices and Reports

1. The Contractor shall prepare and submit the following air monitoring notices and reports to the Engineer:

a. Notice of Safe Atmosphere:

1) When a previously determined hazardous atmosphere has been eliminated, and immediately after completing the procedures required above, the Contractor shall prepare and deliver a Notice of Safe Atmosphere to the Engineer;

2) If the Notice of Safe Atmosphere is issued to rescind a Notice of Unsafe Atmosphere, it shall identify the contributing factors leading to the unsafe atmosphere and the necessary corrective actions to prevent reoccurrence.

b. Notice of Unsafe Atmosphere:

1) This notice shall be prepared on site when a hazardous condition is detected and immediately after all notifications

required above within this Section have been completed. The Notice of Unsafe Atmosphere shall specify the type(s) and concentration(s) of gas(es) detected, the nature of the gas hazard and the location where, and the time when the hazard has been detected;

2) This notice shall be presented to the Engineer immediately upon completion.

C. Daily Log Report

1. The daily log report shall be provided to the Engineer daily and provide the Combustible Gas Detection equipment's readings in 15 minute intervals. Location and other task specific information shall be included in the daily report.

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 35 45 – HAZARDOUS MATERIALS CONTROL
CONTRACT TI-181

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 tables, attached after the End of Section designation, are a part of this Section:

1. Table 1 – Summary of Lead and PCB Analysis on Paints
2. Table 2 - Summary of PCB Analysis on Miscellaneous Materials
3. Table 3 – Summary of Asbestos Analysis

4. Table 4 – Estimated Quantities and Conditions of Known Asbestos Containing Materials
5. Table 5 – Inaccessible Suspect Materials Requiring Further Investigation
6. Reference: Hazardous Materials Mitigation Report for the Tallman Island WRRF, Contract TI-181, Bidwell Environmental, November 2024.

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 41 00 - Regulatory Requirements
C. Section 01 74 20 – Construction Waste Management
D. Section 02 82 05 – Asbestos Management
E. Section 02 84 10 – Mercury Management
F. Section 02 83 05 – Lead Management
G. 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, including lead and PCB-containing paints, miscellaneous PCB-containing materials and asbestos-containing materials, that will require special handling and other safeguard measures in order to minimize chemical exposure hazards to site workers and to prevent environmental impacts to offsite areas. As

applicable to its Work, the Contractor shall incorporate these minimum requirements into its Environmental, Health and Safety Plan (EHASP) or other applicable submittal to ensure a safe and healthful working environment. The EHASP shall be designed in accordance with Section 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. Mercury-containing equipment and material shall be handled in accordance with Section 02 84 10 – Mercury Management.

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

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

e. 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. The Contractor shall attend an initial site inspection, and any other meetings to review hazardous materials control issues in connection with the progress of the Work. The initial site inspection shall be as described below. Other meetings to monitor hazardous materials control issues associated with the Work, including any briefing of DEP personnel, including, but not limited to, facility managers and supervisors, shall be scheduled as necessary.

a. Initial Site Inspection: Within five (5) business days after approval of the environmental health and safety (EHS) Resources, or an agreed upon timeframe, the Contractor, the Engineer, and applicable DEP personnel shall perform an initial site inspection to review all the Work areas that will be affected by contaminated, potentially hazardous and hazardous materials. EHS Resources are defined in Section 01 35 27 – Environmental Health and Safety Requirements.

1) Initial site inspection shall be organized by the Contractor who shall contact DEP, and the Engineer to determine the representatives that should attend.

2) A minimum of one representative from each party shall be present for the inspection.

3) Competent Persons shall lead the site inspection.

4) Sampling outside of the Work to be performed may not be performed without DEP approval.

5) A site inspection report shall be distributed by the Contractor at the beginning of the site inspection. The site inspection report shall include drawing(s) and associated text that describes the work in sufficient detail to aid in the site inspection.

6) The Contractor shall note in the site inspection report any special requirements that they have to perform their Work during the inspection.

7) The Contractor shall prepare and distribute a summary of the site inspection and any comments noted during the inspection to all parties present at the site inspection.

8) In the event that the initial site inspection does not satisfactorily identify the contaminated, potentially hazardous, and hazardous materials potentially affecting the Work, follow-up inspection(s) shall be organized and held as required.

B. 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, in accordance with the following Specifications:

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

   b. Mercury-containing equipment and material shall be handled in accordance with Section 02 84 10 – Mercury Management.

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

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

   e. 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.

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

Table 1
Summary of Lead and PCB Analysis on Paints

Sample ID	Location	Sample Description	Substrate	Color	Result (mg/kg)	
					Lead	PCBs
TI01-PC-39[a]	Grit Building, First Floor	Interior wall	Concrete	White	29.2	ND
TI01-PC-40[a]	Grit Building, First Floor	Exterior wall	Concrete	White	8.64	ND
TI01-PC-69[a]	Grit Building, Basement	Wall	Concrete	White	115	7.04
TI01-PC-70[a]	Grit Building, Basement	2" piping	Metal	Red	342	18.6
TI169-PC-23[b]	Grit Building, First Floor	Conduit	Metal	Black	1,540	ND
TI169-PC-24[b]	Grit Building, Second Floor	Distribution Center 18	Metal	Grey	5,450	ND
TI169-PC-25[b]	Grit Building, Second Floor	Wall	Concrete	White	16.3	ND
TI169-PC-26[b]	Grit Building, Second Floor	Grit washer motor	Metal	Blue	ND	ND
TI169-PC-27[b]	Grit Building, Second Floor	Grit washer control switch	Metal	Grey	ND	ND
TI004-PC-01	Grit Building, Second Floor	Hydrogritter support	Metal	Blue	11.6	ND
TI004-PC-02	Grit Building, Second Floor	Floor	Concrete	Grey	15.7	0.67
TI004-PC-03	Grit Building, Second Floor	Wall	Concrete	White	665	2.5
TI004-PC-04	Grit Building, Second Floor	Floor pad cover	Metal	Grey	61.8	ND
TI004-PC-05	Grit Building, Second Floor	Grit motor	Metal	Dark Blue	61.3	1.2
TI004-PC-06	Grit Building, Second Floor	Washer compactor discharge pipe	Metal	Grey	14.0	0.63
TI004-PC-07	Grit Building, Second Floor	Grit climber	Metal	Red	50.3	ND
TI004-PC-08	Grit Building, Second Floor	Grit piping	Metal	Green over tan	24.7	6.5
TI004-PC-09	Grit Building, Second Floor	Hydrogritter classifier piping	Metal	White	6,160	ND
TI004-PC-10	Grit Building, Second Floor	Mixed flow piping	Metal	Black	42.5	1.8
TI004-PC-11	Grit Building, Second Floor	Grit piping	Metal	Black over red	106	4.6
TI004-PC-12	Grit Building, Second Floor	Grit piping	Metal	Grey over red	222,000	5.6
TI004-PC-13	Grit Building, First Floor	Hydronic piping	Metal	Orange	487	1.2
TI004-PC-14	Grit Building, First Floor	Fan	Metal	Grey	199,000	ND
TI004-PC-15	Grit Building, Second Floor	Hydrocyclone	Metal	Blue	ND	ND
TI004-PC-16	Grit Building, Second Floor	Hydronic pipe insulation	Fiberglass	Grey	75,800	ND
TI004-PC-17	Grit Building, Third Floor	Wall	Block	Tan	69.2	2.4
TI004-PC-18	Grit Building, Third Floor	Conduit	Metal	Black	758	ND

Table 1
Summary of Lead and PCB Analysis on Paints

Notes:
(1) Samples collected by Bidwell Environmental in June and October, 2024.
(2) The NYC Health Code defines lead based paints as containing 2,500 mg/kg or greater. The regulatory limit for defining TSCA-regulated PCBs is 50 mg/kg. However, any detected concentration of lead or PCBs in paint has the potential to affect worker health and safety during certain construction activities and shall be addressed in the Contractor's health and safety protocol for the affected work.
(3) Sample results noted above are considered representative of similarly painted structures, equipment and substrates within the same general location.
(4) Contractor to verify the locations and extent of each material.
[a] - Samples collected by Bidwell Environmental in June and September 2019 in support of Design Contract RLCY-TI-01.
[b] - Samples collected by Bidwell Environmental in February 2020 in support of Design Contract TI-169.
ND - Not detected

Table 2
Summary of PCB Analysis on Miscellaneous Materials

Sample ID	Area	Location	Material Description	Color	Result (mg/kg)
TI01-PCB-08[a]	Grit Building, Exterior	Base of exterior wall	Caulk	Grey	ND
TI01-PCB-09[a]	Grit Building, Exterior	Base of exterior wall	Tar	Black	ND
TI004-PCB-01	Grit Building, Second Floor	Valve handle	Grease	Brown	1.1
TI004-PCB-02	Grit Building, First Floor	Exterior wall vent	Caulk	White	ND
TI004-PCB-03	Grit Building, Second Floor	Around exterior door frame	Caulk	Grey	ND
TI004-PCB-04	Grit Building, Second Floor	Around interior door frame	Caulk	Grey	ND
TI004-PCB-05	Grit Building, Third Floor	Ductwork	Sealant	Black	8.3

Notes:
(1) Samples collected by Bidwell Environmental in June, July and October 2024.
(2) The regulatory limit for defining TSCA-regulated PCBs is 50 mg/kg. However, any detected concentration of PCBs has the potential to affect worker health and safety and safety protocol for the affected work during certain construction activities and shall be addressed in the Contractor's health and safety protocol for the affected work.
(3) Sample results noted above are considered representative of materials with similar age, appearance, and texture within the same general area.
(4) Contractor to verify the locations and extent of each material.
(5) Any detected concentration of PCBs may limit options for recycling or disposal depending a given facility's permit requirements.
ND - Not detected

Table 3
Summary of Asbestos Analysis

Sample ID	HMG	Area	Sample Location	Material Description	Analytical Results (%)		
					PLM	PLM-NOB	TEM
TI01-ASB-41[a]	A	Grit Building, Exterior	Base of exterior wall	Grey caulk	NA	ND	<1
TI01-ASB-42[a]	B	Grit Building, Exterior	Base of exterior wall	Black tar	NA	ND	ND
TI01-ASB-43[a]	B	Grit Building, Exterior	Base of exterior wall	Black tar	NA	ND	ND
TI01-ASB-44[a]	A	Grit Building, Exterior	Base of exterior wall	Grey caulk	NA	ND	ND
TI01-ASB-45[a]	C	Grit Building, Exterior	Exterior wall	White stucco	ND	NA	NA
TI01-ASB-46[a]	C	Grit Building, Exterior	Exterior wall	White stucco	ND	NA	NA
TI01-ASB-47[a]	C	Grit Building, Exterior	Exterior wall	White stucco	ND	NA	NA
TI01-ASB-48[a]	C	Grit Building, Exterior	Exterior wall	White stucco	ND	NA	NA
TI004-ASB-01	1	Grit Building, Second Floor	Hydrocyclone	Grey rubber gasket	NA	ND	ND
TI004-ASB-02	1	Grit Building, Second Floor	Hydrocyclone	Grey rubber gasket	NA	ND	ND
TI004-ASB-03	2	Grit Building, Second Floor	Hydrogritter piping	Yellow pipe repair patch	NA	ND	ND
TI004-ASB-04	2	Grit Building, Second Floor	Hydrogritter piping	Yellow pipe repair patch	NA	ND	ND
TI004-ASB-05	3	Grit Building, Second Floor	Sewage piping	Black rubber gasket	NA	ND	ND
TI004-ASB-06	4	Grit Building, Second Floor	Sewage pipe valve	Black gasket	NA	ND	ND
TI004-ASB-07	3	Grit Building, Second Floor	Sewage piping	Black rubber gasket	NA	ND	ND
TI004-ASB-08	4	Grit Building, Second Floor	Sewage pipe valve	Black gasket	NA	ND	ND
TI004-ASB-09	5	Grit Building, Second Floor	Hydronic piping insulation	Silver paper	ND	NA	NA
TI004-ASB-10	6	Grit Building, Second Floor	Hydronic piping insulation	White cementitious joint	ND	NA	NA
TI004-ASB-11	7	Grit Building, Second Floor	Hydronic piping insulation	White wrap on cementitious joint	ND	NA	NA
TI004-ASB-12	8	Grit Building, Second Floor	Fan above door	White fibrous sealant	NA	ND	ND
TI004-ASB-13	9	Grit Building, Second Floor	Sludge piping	Red gasket	NA	ND	ND
TI004-ASB-14	9	Grit Building, Second Floor	Sludge piping	Red gasket	NA	ND	ND
TI004-ASB-15	8	Grit Building, Second Floor	Fan above door	White fibrous sealant	NA	ND	ND
TI004-ASB-16	5	Grit Building, First Floor	Hydronic piping insulation	Silver paper	ND	NA	NA
TI004-ASB-17	6	Grit Building, First Floor	Hydronic piping insulation	White cementitious joint	ND	NA	NA

Table 3
Summary of Asbestos Analysis

Sample ID	HMG	Area	Sample Location	Material Description	Analytical Results (%)		
					PLM	PLM-NOB	TEM
TI004-ASB-18	7	Grit Building, First Floor	Hydronic piping insulation	White wrap on cementitious joint	ND	NA	NA
TI004-ASB-19	5	Grit Building, First Floor	Hydronic piping insulation	Silver paper	ND	NA	NA
TI004-ASB-20	6	Grit Building, First Floor	Hydronic piping insulation	White cementitious joint	ND	NA	NA
TI004-ASB-21	7	Grit Building, First Floor	Hydronic piping insulation	White wrap on cementitious joint	ND	NA	NA
TI004-ASB-22	**10**	**Grit Building, First Floor**	**Around fan wall penetration**	**Black gasket**	**NA**	**ND**	**<1**
TI004-ASB-23	**10**	**Grit Building, First Floor**	**Around fan wall penetration**	**Black gasket**	**NA**	**ND**	**1.3**
TI004-ASB-24	**11**	**Grit Building, First Floor**	**Around louver on exterior wall**	**White caulk**	**NA**	**ND**	**2.3**
TI004-ASB-25	**11**	**Grit Building, First Floor**	**Around louver on exterior wall**	**White caulk**	**NA**	**ND**	**NA**
TI004-ASB-26	5	Grit Building, Basement	Hydronic piping insulation	Silver paper	ND	NA	NA
TI004-ASB-27	6	Grit Building, Basement	Hydronic piping insulation	White cementitious joint	ND	NA	NA
TI004-ASB-28	**12**	**Grit Building, Second Floor**	**Around exterior door frame**	**Grey caulk**	**NA**	**2.2**	**NA**
TI004-ASB-29	**12**	**Grit Building, Second Floor**	**Around exterior door frame**	**Grey caulk**	**NA**	**NA**	**NA**
TI004-ASB-30	**13**	**Grit Building, Second Floor**	**Around interior door frame**	**Grey caulk**	**NA**	**1.9**	**NA**
TI004-ASB-31	**13**	**Grit Building, Second Floor**	**Around interior door frame**	**Grey caulk**	**NA**	**NA**	**NA**
TI004-ASB-32	14	Grit Building, Third Floor	Wall	Grey mortar	ND	NA	NA
TI004-ASB-33	14	Grit Building, Third Floor	Wall	Grey mortar	ND	NA	NA
TI004-ASB-34	**15**	**Grit Building, Third Floor**	**Ductwork**	**Black sealant**	**NA**	**1.6**	**NA**
TI004-ASB-35	**15**	**Grit Building, Third Floor**	**Ductwork**	**Black sealant**	**NA**	**1.5**	**NA**
TI004-ASB-36	16	Grit Building, Third Floor	Ductwork	Black vibration damper	NA	ND	ND
TI004-ASB-37	16	Grit Building, Third Floor	Ductwork	Black vibration damper	NA	ND	ND
TI004-ASB-38	17	Grit Building, Third Floor	Starter switch	Grey gasket	NA	ND	ND
TI004-ASB-39	17	Grit Building, Third Floor	Starter switch	Grey gasket	NA	ND	ND
TI004-ASB-40	18	Grit Building, Third Floor	Conduit	Black gasket	NA	ND	ND
TI004-ASB-41	18	Grit Building, Third Floor	Conduit	Black gasket	NA	ND	ND
TI004-ASB-42	19	Grit Building, Third Floor	Ductwork door	Black cloth	ND	NA	NA

Table 3
Summary of Asbestos Analysis

Sample ID	*HMG*	*Area*	*Sample Location*	*Material Description*	*Analytical Results (%)*		
					PLM	**PLM-NOB**	**TEM**
TI004-ASB-43	19	Grit Building, Third Floor	Ductwork door	Black cloth	ND	NA	NA
TI004-ASB-44	20	Grit Building, Third Floor	Ductwork access door	Black foam gasket	NA	ND	ND
TI004-ASB-45	20	Grit Building, Third Floor	Ductwork access door	Black foam gasket	NA	ND	ND

Notes:
(1) Samples collected by Bidwell Environmental in June, July and October 2024.
(2) Materials containing more than 1% asbestos are considered asbestos containing materials. Items in bold are asbestos-containing materials. While the removal of materials containing trace levels of asbestos is not regulated, DEP requires that the work be performed in accordance with minimum safe work practices.
ND - No asbestos detected.
NA - Not analyzed.
HMG - Homogenous materials group. Samples with the same HMG are considered representative of that substrate. The lab stops analysis of the HMG at first positive detection, therefore all other samples of that HMG are considered to be asbestos-containing.

Table 4
Estimated Quantities and Condition of Known Asbestos Containing Materials

Material Description	*Location*	*Sample ID*	*Quantity*	*Type/Friability*	*Condition*
Black gaskets around interior fan wall penetration	Grit Building, First Floor	TI004-ASB-22&23	18 linear feet of gasket in the 20 ft^2 opening	Chrysotile/ Non-friable	Good
White caulk around louver on exterior wall	Grit Building, First Floor	TI004-ASB-24&25	16 linear feet of caulk in the 16 ft^2 opening	Chrysotile/ Non-friable	Good
Grey caulk around fans above doors (2)	Grit Building, Second Floor, Exterior	TI004-ASB-28&29	Unknown - Material is not being removed by the Contract. However, caulking may be disturbed during the removal of the fans.	Chrysotile/ Non-friable	Significantly damaged
Grey caulk around fans above doors (2)	Grit Building, Second Floor, Interior	TI004-ASB-30&31	18 linear feet (9 linear feet around each of the 2 fans). It is assumed that the contractor will only remove caulking to be impacted by replacement of the fans. Contractor is not expected to abate all caulking present around the door frames.	Chrysotile/Non-friable	Significantly damaged
Black sealant in ductwork	Grit Building, Third Floor	TI004-ASB-34&35	142 linear feet in multiple seams	Chrysotile/Non-friable	Good

Table 5
Inaccessible Suspect Materials Requiring Further Investigation

Material Description	*Location*	*Quantity*	*Comments*
Screen and associated piping	Grit Building, Second Floor	18 gaskets	A number of gaskets were not accessible during the hazards survey. An asbestos survey should be performed prior to work on these gaskets.
Hydronic unit heaters	Grit Building, First Floor	7 hydronic unit heaters	The hydronic unit heaters should be surveyed for PCB oils prior to removal.
Hydronic unit heaters	Grit Building, Second Floor	4 hydronic unit heaters	The hydronic unit heaters should be surveyed for PCB oils prior to removal.

SECTION 01 35 63 – SUSTAINABILITY CERTIFICATION PROJECT REQUIREMENTS
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the Envision requirements of this Project. Work includes environmental and sustainable practice requirements related to the Institute for Sustainability Infrastructure's (ISI) Envision Rating System. A goal of this Project is to construct a facility that meets ISI's Envision Rating System.

B. The intent is for Envision 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.

C. Attachments

1. Attachment A: Sustainability Construction Envision Documentation
2. Attachment B: Environmental Materials Reporting Form

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

Article	Title	Section Page
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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 74 20 – Construction Waste Management

C. Section 07 22 16 – Roof Board Insulation

D. Section 09 91 00 – Painting

1.04 REFERENCES

A. ISI's Envision Version 3 (V3) as released on April 17, 2018, is the Envision framework used and referenced herein.

B. "Pathway A" refers to the Envision V3 compliance pathway being utilized for this Project. Pathway A includes a submission to ISI during 90% Design and a follow-up submission to ISI Post-Construction. The first submission is herein referred to as the ISI Design Submission.

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 Envision Evidence Documentation.

2. Contractor role within Envision certification:

a. The Contractor shall develop a New Material Implementation Plan and the Envision Evidence Document, which will be submitted the Design Engineer for use as Evidence to support a "Gold" certification.

b. The ISI Design Submission is generated by the Engineer and included in the bid exhibit documents. The ISI Design Submission is expressly excluded from and is not a part of this Contract and is available for information purposes only.

c. The Contractor shall submit evidence as listed in Attachment A - Sustainability Construction Envision Documentation. The Contract Documents are not intended to limit alternative means of achieving Envision 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 have an Envision Qualified Professional on staff who shall be responsible for Envision issues compliance and coordination.

1. The Envision Qualified Professional shall be an Envision Sustainability Professional (ENV SP). The Envision Qualified Professional shall be responsible for sustainability considerations described in this section including the New Materials Sustainable Implementation Plan and the Envision Evidence 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. Envision Evidence Documentation

1. The Envision Project Manager shall prepare and submit the initial, monthly and final Envision Evidence 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 Envision Evidence 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. Envision Qualified Professional duties:

1. The Envision Qualified Professional shall attend a minimum of three (3) on-site coordination meetings. The Envision Qualified Professional shall make available for review at each meeting a set of Contract Drawings and specifications, the New Materials Sustainable Implementation Plan, the updated Envision Evidence Documentation.

    a. The first meeting will be a preconstruction meeting to review the New Materials Sustainable Implementation Plan and establish roles including the Envision Qualified Professional and the Engineer.

    b. The second meeting will be a pre-closeout meeting to review the Envision Evidence 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 Envision Evidence Documentation.

3.04 STARTUP / DEMONSTRATION

A. Not used.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not used.

END OF SECTION

Attachment A

Sustainability Construction Envision Documentation

Indicator	Minimum Required Level[1]	Envision Credit Reference	Reporting Template
Recycled Material	20%[2]	RA1.2	Attachment B
Regional Material	90%[3]	-	Attachment B
Sustainable Procurement	50%[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

1. Minimum required level was established based on project-specific goals
2. 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
3. Based on all new materials or supplies, procured during the Work, excluding mechanical, electrical, and plumbing equipment
4. Based on all new materials, supplies, equipment, or anything procured during the Work
5. 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 weight (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

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SECTION 01 41 00 – REGULATORY REQUIREMENTS
CONTRACT TI-181

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:

K.

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PART 2	PRODUCTS	5
2.01	Manufacturers	5
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2.04	Source Quality Control / Shop Tests	5
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3.01	Examination / Preparation	6
3.02	Installation	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. Not Used

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) NYCDEP - Asbestos Project Notification related documents (Form ACP5/ACP7/ACP20/ACP21)

2) NYCDOB – Plan Approval

b. Permits to be initiated and acquired for construction include, but are not limited to the following:

1) FEMA - Elevation Certificate (at end of construction phase)

2) NYSDEC - Waste Transporter Permit

3) NYSDOT - Divisible Load Overweight Permits (Form PERM 92)

4) NYSDOT - Divisible Load Overweight Permits

5) NYCDEP - Trailer Connection Permit

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 GENERAL

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

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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

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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

NO TEXT ON THIS PAGE

SECTION 01 43 05 – CONTRACTOR'S WORK QUALITY
CONTRACT TI-181

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. Not Used

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. 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

NO TEXT ON THIS PAGE

SECTION 01 43 10 – QUALITY ASSURANCE INSPECTION
CONTRACT TI-181

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:

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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

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. List of Equipment Subject to Quality Assurance (QA) Inspection

1. DEP's Bureau of Wastewater Treatment, intends to perform QA inspection for specific items being supplied under this Contract.

2. The selected equipment is subject to QA inspection by the Engineer 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 Engineer.

2. For items designated for QA inspection, the following statement shall appear on the face of purchase orders and shop drawings issued by the Contractor for work to be incorporated in this Contract. The Contractor shall also instruct the approved manufacturers or dealers to place this statement on purchase orders and shop drawings issued by them for such work.

   "This order is subject to inspection by the Bureau of Wastewater Treatment 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."

3. 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.)

4. For items designated for QA inspection, the Contractor shall not proceed with the work until the inspection instructions have been issued. Once the receipt of the inspection instructions has been acknowledged and verified, the Contractor shall provide advance notice of readiness for inspection at the required witness points. 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.

5. 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.

6. The requirements for inspection are in addition to and separate from any specified witness shop testing and shall in no way affect procedures or requirements with respect to the same.

7. The Engineer may reject any item or material if manufactured prior to inspection or where the requirements specified in the inspection instructions are not followed.

D. 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 Engineer, 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

NO TEXT ON THIS PAGE

Appendix

TABLE 1
LIST OF EQUIPMENT SCHEDULED FOR QA INSPECTION

Specification Reference		Equipment Scheduled for QA Inspection
Section No.	Section Title	
05 05 23.02	Miscellaneous Metal Fastenings	Miscellaneous Metal Fastenings
05 53 01.02	Stainless Steel Floor Gratings	Stainless Steel Floor Gratings
40 05 05	Exposed Piping Installation	Process Piping
40 05 07	Hangers and Supports for Process Piping	Hangers and Supports for Process Piping
40 05 19	Ductile Iron Process Pipe	Ductile Iron Process Pipe
40 05 22	Steel and Stainless Steel Process Pipe	Steel and Stainless Steel Process Pipe
40 05 53	Process Valves Four-inch Diameter and Larger	Process Valves Four-inch Diameter and Larger
40 05 59.16 01	Stop Logs (Aluminum)	Stop Logs
46 21 13	Screenings Washer Compactor	Screenings Washer Compactor

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required, to perform all Witness Shop Tests. The Contractor shall be responsible for all expenses for scheduled Witness Shop Testing.

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

C.

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

1. Schedule 01 43 15–1, Witness Shop Test 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. All equipment listed in Schedule 01 43 15-1, Witness Shop Test Schedule, located after the End of Section designation, shall undergo witness shop testing as specified.

B. Witness Shop Testing of Additional Items: The City reserves the right to require Witness Shop Tests for additional items that are not listed in Schedule 01 43 15-1 or designated as requiring Witness Shop Tests in the Contract Documents.

1. When additional Witness Shop Tests are required by the Engineer, any additional costs resulting therefrom shall be paid either:

a. Out of a specified allowance, or

b. By change order procedure.

C. Advance Notice for Witness Shop Testing:

1. The Contractor shall notify the Engineer in advance of all scheduled witness shop tests as follows:

a. Sixty consecutive calendar days (60 ccd) in advance for witness shop tests in the continental United States.

b. Ninety consecutive calendar days (90 ccd) in advance for witness shop tests outside the continental United States.

2. The Contractor's advance notification shall include, at a minimum, the following information, which will be submitted to the Engineer for approval as specified herein:

a. A diagram of the proposed testing arrangement.

b. A description of the proposed manufacturer's inspection and testing facilities and procedures.

c. A list of all instruments the manufacturer proposes to use for the tests with initial and last calibration reports certified by an approved independent testing laboratory. (All instruments shall be of ranges suitable for the quantities to be measured.)

d. Sample test data sheets.

e. Sample calculations.

f. Descriptive matter on the testing equipment which shall contain illustrative photographs, drawings, and such other matter as may be requested by the Engineer.

g. The approved Shop Drawing(s) for installation of the equipment to be tested shall be listed in the Contractor's notice and made available to Agency representatives during witness shop testing.

D. Should the equipment or instrumentation not be ready, as per prior submitted approved data, the witnesses shall return to the home office at Contractor's expense. The cost of the additional trip will be borne by the Contractor.

E. Witness Shop Testing Attendee Requirements:

1. Contractor: A duly authorized representative of the Contractor shall be present during each witness shop test.

2. Engineer: When Schedule 01 43 15-1 and/or the Engineer require witness shop tests for equipment, the only tests which will be accepted are those made in the presence of the Engineer or the Engineer's representative.

F. Witness Shop Test Facility: Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified, shall be tested in an approved facility in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents.

G. Tests shall be conducted in accordance with the test codes of the ASME and the IEEE.

H. Witness Shop Test Results:

1. The results of the shop tests shall be considered official and conclusive for the purpose of determining whether or not the equipment is in accordance with the performance requirements as specified.

2. No such equipment shall be shipped to the work site until the Engineer notifies the Contractor in writing that the results of the Witness Shop Test(s) are acceptable.

I. Certificate of Authenticity:

1. Inspection and shop test data and interpreted results thereof accompanied by a certificate of authenticity sworn to, before a notary, by an officer of the manufacturing company, shall be forwarded to the Engineer for review and approval as required.

2. When witness shop tests are waived by the Engineer, the manufacturer's actual test data and the interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be submitted to the Engineer for approval.

J. Serial Numbers: All equipment and material to be Witness Shop Tested shall be identified with serial numbers and/or approved permanent type identification marks.

K. Expenses:

1. Witness Shop Testing:
    a. For the equipment to be witness shop tested, whether of foreign or domestic manufacture, the Contractor shall be responsible for the costs for a minimum of two (2) representatives of the Engineer or the Agency, including all transportation, food, lodging, and miscellaneous expenses for each witness shop test.
        1) Refer to the corresponding specification section(s) listed in Schedule 01 43 15-1 for additional requirements.
    b. The Contractor shall make all required travel and lodging arrangements that shall be in accordance with the New York City Comptroller's Office Directive No. 6 or a later or equivalent City document. All arrangements shall be submitted for approval of the Engineer.
2. The duration of each witness shop test shall be as required for conducting all specified performance tests, as determined by the Agency.
3. Retesting:
    a. If a retest is required, the entire retest cost of the retest shall be borne by the Contractor.

1.06 QUALITY ASSURANCE

A. Unless otherwise approved by the Engineer, all Witness Shop Tests for equipment shall take place at the point of manufacture and/or origin.

B. Witness shop testing of equipment shall be performed in accordance with:
1. The procedures described herein, and
2. The Witness Shop Test requirements of the Specification Section(s) referenced in Schedule 01 43 15-1, Witness Shop Test Schedule, located after the End of Section designation.

C. Where applicable, prior to the witness shop testing, the Contractor shall ensure that the equipment to be witness shop tested have met the requirements and approved by the Engineer.

1.07 SUBMITTALS

A. Submittals shall comply with the requirements of the Contract Documents.

B. In addition, for each item of equipment listed in Section 01 43 15-1, Witness Shop Test Schedule, located after the End of Section designation, the Contractor shall submit the following:
1. Action Submittals:
    a. Advance notice for each item, as specified herein.

b. Test Report Documents: Submit two (2) copies of a detailed Witness Shop Test performance test report, including but not limited to the following documents:

1) Copy of the Witness Shop Test procedure.

2) Final diagram of the testing arrangement.

3) Copies of the raw test data sheets.

4) Copies of the tabulated test data work sheets.

5) Copies of the instrumentation calibration certificates.

6) Calculations.

7) Characteristic curves, for graphical representation of the performance test data.

8) Copies of the photos taken during the test.

9) Certification of authenticity by the Manufacturer, as specified herein.

10) Non-editable electronic (e.g., PDF) copy of the complete report including all supporting documents.

11) Additional information necessary for evaluating performance of the equipment against the requirements of the Contract Documents.

C. Refer to the individual Specification Section(s) referenced in Schedule 01 43 15-1 for additional submittal requirements regarding Witness Shop Testing.

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

SCHEDULE 01 43 15–1
WITNESS SHOP TEST SCHEDULE

Specification Reference:		**Equipment Scheduled for Witness Shop Testing:**
Section No.	**Section Title:**	
46 21 12	Mechanically Cleaned Bar Screens	Mechanical Screen
46 23 63	Grit Classifying and Washing Equipment	Grit Classifier

SECTION 01 43 20 – APPROVAL OF PRODUCT MANUFACTURERS
CONTRACT TI-181

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. Named Product Manufacturers Not on the List in the Bid Booklet

1. Whenever materials or equipment not included on the Bid Booklet List of Equipment/Material Manufacturers are indicated in the Contract Documents by referring to a particular Named Manufacturer, the naming is intended to establish the type, function, and quality required. Unless the Contract specifies an item as "Brand Name Only" with no substitution of any "approved equal" allowed, then materials or equipment of other manufacturers may be approved, if sufficient information is submitted to

allow the Engineer to determine that the material or equipment proposed is equivalent or equal to that of the Named Manufacturer.

2. For such materials or equipment, proposed “or equals” may be submitted and reviewed as part of the Contractor’s Shop Drawing approval process. The following shall apply to such determinations:

   a. The Engineer will be the sole judge as to the type, function, and quality of any proposed “or equal” and the Engineer's decision shall be final.

   b. The Engineer may require the Contractor to furnish additional data about the proposed "or equal."

   c. Approval by the Engineer of an “or equal” item shall not relieve the Contractor of the responsibility for full compliance with the Contract Documents.

   d. The Contractor shall pay all costs of implementing approved "or equal(s)”, including any redesign and changes to the Work necessary to accommodate the substitution. These shall include resulting costs incurred by other Contractors (if any) on the project.

D. The following provisions shall apply to all requests to substitute equipment or material manufacturers:

1. The Contractor may be granted approval for one manufacturer per item. However, during the performance of Work, multiple manufacturers may be approved for certain commodity items at the sole discretion of the Engineer, upon written request by the Contractor. The Contractor must include a justification in the written request.

2. The Engineer will evaluate each proposed “or equal” within a reasonable period of time.

3. No substituted item shall be ordered, installed, or utilized without the Engineer's prior written approval of the proposed “or equal.”

4. The bidder’s or Contractor’s substantiating information, 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

NO TEXT ON THIS PAGE

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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1.02 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

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as specified and required, to furnish, install, and test all Temporary Heat and Ventilation, 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. Not Used

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. General:

1. In order to permit construction to continue as scheduled during all seasons of the year, the Work of the Contract shall be protected at all times from the harmful effects of low temperature and from accumulation of harmful gases such as chlorine, methane and hydrogen sulfide.

2. Labor may be required seven days a week and during other than Normal Project Working Hours for the period of time required by seasonal weather conditions.

3. The Contractor shall begin to supply temporary heat only when so directed in writing by the Engineer and shall continue to supply temporary heat until directed in writing by the Engineer to discontinue.

4. In prosecuting the Work of this Contract, the Contractor shall provide all temporary ventilation necessary for the protection of the Contractor's employees, all other persons at or about the Contractor's Work area, Work, and equipment of the Contractor. Temporary ventilation shall be in accordance with all applicable regulations of the Federal Occupational Safety and Health Act of 1970.

B. Temperature Requirements:

1. When directed by the Engineer, the Contractor shall provide sufficient heat to maintain the temperature requirements prescribed herein. Temperatures shall be maintained at a level sufficient to meet construction requirements, but in no event shall the temperature fall below 50 degrees Fahrenheit.

C. Method of Temporary Heat:

1. Temporary heat shall be in conformance with all applicable Federal, State, and Local regulations and shall be subject to the approval of the Engineer.

2. The method of temporary heat shall:

a. Not cause the deposition of dirt or smudge upon any finished Work or any defacement or discoloration.

b. Not be injurious or harmful to personnel or materials.

c. Not interfere with the operation of the facility or with DEP Operations.

3. The following methods of heat shall not be permitted:

a. Open fires.

b. Electric heating.

c. Salamanders or other direct-fired equipment will not be allowed in construction areas.

d. Torpedo blowers and/or propane heaters will not be allowed in construction areas.

4. The method of temporary heat shall not require any unnecessary demolition or penetration through existing or new structures.

D. Temporary Heating System:

1. Systems shall include boilers, pumps, radiators, unit heaters, water and heating piping, insulation, controls, fuel storage and/or any other equipment as necessary, all furnished and installed by the Contractor.

E. Method of Temporary Ventilation:

1. Temporary ventilation shall be in conformance with all applicable Federal, State, and Local regulations and shall be subject to the approval of the Engineer.

F. Temporary Ventilation System:

1. The temporary ventilation system shall be forced or gravity type and shall include, but not limited to fans, motors, inlets, outlets, ductwork, heaters, controls and all appurtenances.

G. Operation and Maintenance:

1. Temporary Heating:

a. The Contractor shall coordinate operations in the Work of providing temporary heat to ensure sufficient and timely performance of the Work under this Contract.

1) The Contractor shall maintain all permanent or temporary enclosures at no additional cost to the City.

b. The Contractor shall maintain the temporary heating system in operating condition at all times during the temporary heating period.

1) Temporary heating system equipment shall be placed so as to comply with the requirements specified hereinbefore, and shall be connected, disconnected and suitably supported and located so as to permit construction Work, including finish Work such as wall plastering and painting, to proceed.

2) The installation of the temporary heating system and the placing of ancillary system equipment and components shall be coordinated with the operations of all Subcontractors so as to ensure sufficient and timely performance of the Work.

2. The Contractor shall remove all portions of the temporary heating system when so directed by the Engineer.

3. Temporary Ventilation:

a. The Contractor shall maintain the temporary ventilation system in operating condition at all times during the performance of Work.

1) Temporary ventilation system equipment shall be placed so as to comply with the requirements specified hereinbefore, and shall be connected, disconnected and suitably supported and located so as to permit construction Work, including finish Work such as wall plastering and painting, to proceed.

2) The installation of the temporary ventilation system and the placing of ancillary system equipment and components shall be coordinated with the operations of the Subcontractors so as to ensure sufficient and timely performance of the Work.

H. Electrical Power for Temporary Heating and Ventilation System:

1. Temporary Heating System:

a. The Contractor shall provide all labor, materials, and equipment necessary to provide and maintain the temporary electrical system and power necessary for the operation of the temporary heating systems.

2. Temporary Ventilation System:

a. The Contractor shall provide all labor, materials, and equipment necessary to provide and maintain the temporary electrical system and power necessary for the operation of the temporary ventilation systems.

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

NO TEXT ON THIS PAGE

SECTION 01 51 30 – TEMPORARY ELECTRICAL SYSTEM
CONTRACT TI-181

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. The 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.

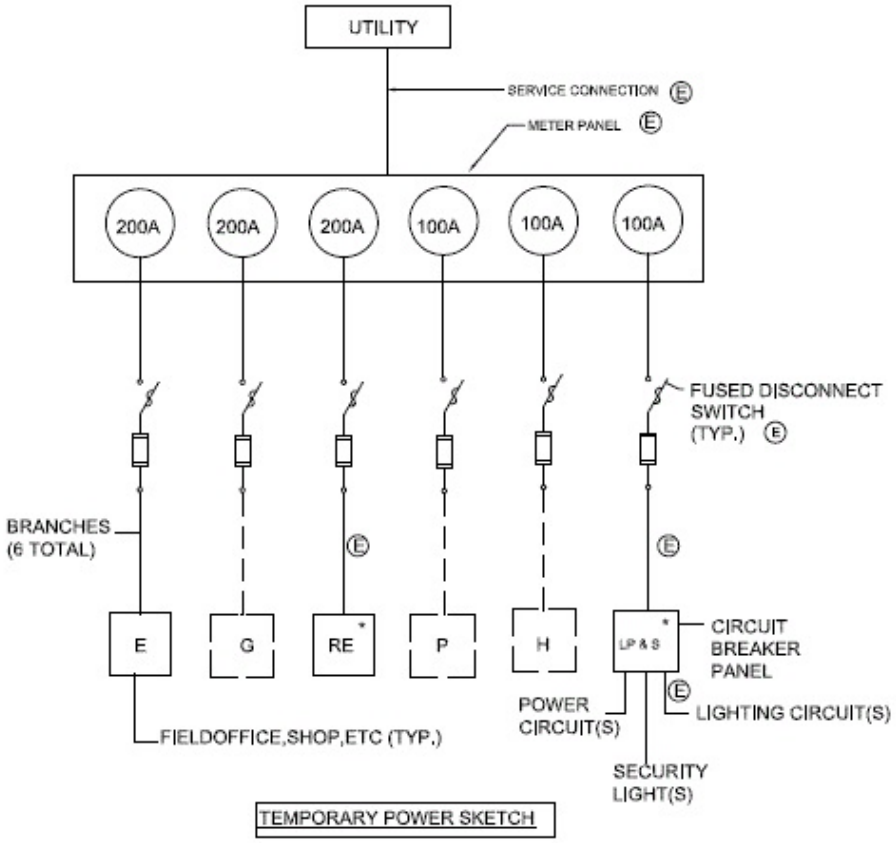
B. Removal

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

NO TEXT ON THIS PAGE

SECTION 01 55 00 – VEHICULAR ACCESS AND PARKING
CONTRACT TI-181

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. Not Used

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 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.

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 plant parking area is limited. The area shall be utilized solely by the Construction Management staff and visitors to the Construction Management Office. Contractor shall coordinate with plant staff for location and quantity of parking.

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

NO TEXT ON THIS PAGE

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

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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 57 16 – Temporary Pest 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. 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. 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 East River.

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. Not Used

END OF SECTION

SECTION 01 57 16 – TEMPORARY PEST CONTROL
CONTRACT TI-181

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

NO TEXT ON THIS PAGE

PART 1 GENERAL

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

N. 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 91 – Low Voltage Electric Motors

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. 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

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

NO TEXT ON THIS PAGE

SECTION 01 66 00 – PROTECTION OF MATERIALS & EQUIPMENT
CONTRACT TI-181

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:

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 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 TI-181

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.

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 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

NO TEXT ON THIS PAGE

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

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. 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 Contract 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 this 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 85% under rated load conditions. Electrical equipment with a power factor less than 85% shall be corrected to at least 85% under rated load conditions. Installed power factor corrective devices shall be switched with utilization equipment.

6. Wire terminals on manufactured assemblies such as switchboards, bench boards, control panels, alarm boards, and motor control equipment shall consist of cup terminals, pronged washers, compression type solderless connectors or pressure type terminals furnished on devices.

7. All control and indication wires within motor control centers and other panels and cabinets shall be terminated on terminal blocks provided with marking strips for wire designation. The manufacturer shall identify all wires on the marking strips. All field wires will be terminated and identified by the Contractor.

8. Provision shall be made for wire and cables installed at the plant site to be terminated by the Contractor with approved solderless copper alloy lugs. Lugs may be of the compression type, clamp type or screw type with internal pressure bar, or may be pressure tool applied solderless connectors. Pressure tool applied solderless connectors for wires 250 MCM or larger shall have long barrels to allow double indentation.

9. The Contractor shall consult with the manufacturer or its representative to ensure that the electrical items will have a shelf life of at least ten (10) years. Polychlorinated 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. 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 73 12 – MAINTENANCE OF OPERATIONS AND CONSTRUCTION STAGING
CONTRACT TI-181

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:

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 32 10 – Progress Scheduling

C. 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 the Engineer.

3. The Contractor shall provide DEP with continuous, unimpeded access to the facility while in operation. The Contractor shall allow for DEP access, both pedestrian and vehicular, throughout the facility at all times.

4. Unless otherwise permitted by the facility/Site representative, no existing valves or equipment shall be operated by the Contractor.

5. The employees of the Contractor and 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. Crane placement: DEP crane(s) will not be available for Contractor's use. Any crane provided and used by Contractor shall be located in a position that is coordinated with plant operations through the construction manager a minimum of two weeks prior to placement and shall not impede the plant staff from accessing any treatment buildings, processes or equipment.

f. All site drainage flows shall not be interrupted.

g. 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.

h. 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.

i. 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.

j. Temporary Partitions and Enclosures:

1) The Contractor shall provide temporary partitions and enclosures as required by the Contract Documents where necessary to maintain dust-free, heated and ventilated spaces in areas adjacent to the Work and which must be kept operational by DEP Site operations personnel.

2) The temporary manual bar screen must be in operation until the new bypass bar screen is fully operational.

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, and

      3) 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 four-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. Maximum fence section removal shall be as determined by the Resident Engineer.

   e. Protect all open excavations 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.

2. The following construction sequence has been developed to minimize impacts to the WRRF operations. Contractor shall:

   a. Install bypass pumping from downstream of screen to bypass the existing splitter box to maintain flow to the thickeners. Pumping to bypass thickener influent existing splitter box will take approximately six weeks. Thickeners to be coordinated with the Resident Engineer prior to the bypass pumping to ensure continuous operation.

   b. Provide temporary ventilation until all new HVAC units are installed, tested and commissioned.

   c. Take splitter box offline. Contractor to interrupt flow to splitter box (e.g., installing a coffer dam or stoplog). Utilize bypass pumping to allow for work to be completed in the thickener splitter box.

   d. Complete splitter box improvements and manual vertical bar rack replacement to the splitter box.

   e. Bring splitter box back online. Coordinate with Tallman Island WRRF operations how and when to bring splitter box back online.

   f. Remove coffer dam upstream of the splitter box to allow flow through the splitter box.

   g. Establish bypass pumping upstream of the existing screening channel to be used during wet weather conditions.

   h. Grout the existing opening for the emergency bypass flow between the main screen channel and the bypass channel.

   i. Construct a new channel floor and construct new outside wall of the bypass channel.

   j. Complete the construction of the bypass channel as shown in the drawings. Install a manual bar rake and sharp-crested weirs to enter into the bypass channel. Contractor shall maintain the manual bar screen from 7am to 3pm, Monday to Friday. Contractor to dispose of residuals in existing screening dumpster.

k. Demolish the wall sections between the main and bypass channel for incoming flow to enter and leave the bypass channel. These wall openings will be created to divert flow to the bypass channel around the main screening channel, controlled by the previously installed sharp-crested weirs.

l. Install the new 12-inch diameter overhead pipe.

m. Connect new piping to the existing 12-in diameter pipe to complete the work while minimizing interruption to the existing flow. A shutdown of the grit system shall be no more than four hours.

n. Remove temporary bypass pumping.

o. Install a stop gate upstream of the main screen and divert all incoming flow to the bypass channel, then install downstream stop gate.

p. Demolish existing screen, removing existing washer compactor, and overhead piping.

q. Install a new screen, washer compactor, screen conveyor and manual screening bypass chute after.

r. Replace existing degritters, one at a time. Maintain operation such that two degritters are continuously in service: the newly installed degritter from 23-TI00-AWLGN-009.00 and one of the two existing degritters.

s. Complete initial testing, remove dams, stoplogs and start final testing and startup procedures.

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 CHOOSE AN ITEM.

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. 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. 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. 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.

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

NO TEXT ON THIS PAGE

SECTION 01 74 17 – CLEANING AND SITE MAINTENANCE
CONTRACT TI-181

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.

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

NO TEXT ON THIS PAGE

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 90 percent 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 03/28/2025 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) Acoustical tile and panels
2) Aluminum
3) Asphalt
4) Bricks
5) Bronze
6) Cardboard
7) Carpet/carpet pads
8) Cast iron
9) Cement
10) Ceramic
11) Clean dimensional wood
12) Concrete
13) Concrete masonry units (CMU)
14) Copper wiring
15) Electronic waste
16) Electrical wires
17) EPDM rubber
18) Equipment
19) Extruded polystyrene
20) Fencing
21) FRP
22) Glass
23) Grout
24) Gypsum
25) HDPE
26) HVAC/Ductwork
27) Land clearing debris
28) Lighting
29) Mercury containing light bulbs
30) Metals from rebar, sheetrock studs, framing, etc.

31) Paints, solvents, and other hazardous fluids
32) Piping
33) Plastics
34) Plumbing fixtures
35) Plywood
36) PVC
37) Recyclable office wastes such as paper and toner and ink cartridges
38) Roofing
39) Sprinklers
40) Steel
41) Stone
42) Stucco
43) Terracotta
44) Valves
45) 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 Section 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 ensure 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.

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

NO TEXT ON THIS PAGE

SECTION 01 75 10 – PRELIMINARY AND FINAL FIELD TESTS
CONTRACT TI-181

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. All equipment or system sequences of operation must be confirmed to operate as per the requirements of the Contract.

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. Contractor shall furnish all labor necessary for supervision, adjustment and tuning of equipment as well as materials, instruments, equipment, etc., and any additional labor for testing not furnished by DEP.

4. All testing shall be performed by the Contractor and witnessed by the Engineer, DEP Operations personnel and, when applicable, representatives of the Electrical Division, Department of Buildings. Preliminary field testing of equipment and systems and final field testing of equipment and systems shall be performed within the time periods designated in the preliminary construction schedule (CPM) during regular weekday daytime working hours.

F. Coordination

1. The Structures and Equipment Contractor shall coordinate the field testing activities with the HVAC, Plumbing and Electrical Contractors in order to ensure the availability of their equipment for field tests required by the Structures and Equipment Contractor. A Contractor furnishing equipment under one Contract that is required for testing in a system furnished by another Contractor shall coordinate with the Other Contractor to ensure that

its equipment is available for testing with the system. All such requirements for coordination shall be indicated in the preliminary and final field activity schedules specified herein.

2. The Contractor for the equipment to be tested (Structures and Equipment, HVAC or Plumbing) shall be responsible for coordinating with the Electrical Contractor for furnishing power required to perform its field tests.

3. Each Contractor shall study the requirements of these Contracts insofar as they affect its work, or insofar as its work may affect that of the related Contractors. Coordination with the Other Contractors will be required in order to perform the field tests. Any Contractor having equipment installed under its Contract and tested as part of a System furnished by another Contractor shall assist in the testing procedure.

1.06 QUALITY ASSURANCE

A. Nothing stated herein shall affect the requirements contained in 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 submit a system startup plan and functional performance testing plan, for each system identified for preliminary and final field testing in Schedule 01 75 10-1 a minimum of thirty days prior to preliminary and final field testing of each system. Each system startup plan shall describe the overall process to complete required preliminary and final field tests and provide DEP with a fully functional system. System startup plans shall:

1. Identify the equipment and related components constituting the system that will be tested.

2. Define roles and responsibilities of parties involved in field testing and startup of equipment including, but not limited to, the Contractor, equipment manufacturers, Construction Manager, Engineer, and the City.

3. Include a schedule of all activities required to complete required preliminary and final field tests and any additional activities related to equipment startup, such as HVAC testing, adjusting, and balancing, functional performance testing, or witness testing.

4. Identify required documentation and approvals needed for successful completion of system field testing

D. 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.

E. Before each test commences, the Contractor shall submit a detailed test procedure and manpower schedule to the Engineer for approval. Detailed test procedure shall include Contractor means and methods for conducting the test and collecting and recording field data and a list of additional equipment required for the test. Before each test commences, the Contractor is required to obtain approval of the test procedure from 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. 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.

3. A successful test for HVAC equipment shall show proof that the equipment and systems operate according to the sequences of operations provided 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, equipment and HVAC systems 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. No more than one unit shall be tested at a time. 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 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 (Substantial Completion). 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. Primary Sludge Pump System including: Primary sludge pumps; degritted primary sludge pumps, degritted primary sludge wetwell; and all valves, piping, accessories, instrumentation and controls.

   b. Automatic screen, conveyor and washer/compacter

   c. Parshall flume level elements

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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3.03	Field Testing / Quality Control	5
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 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.

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.

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.

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

NO TEXT ON THIS PAGE

SECTION 01 78 24 – SPARE PARTS AND MAINTENANCE MATERIALS
CONTRACT TI-181

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 City personnel and the Engineer.

E. All spare parts and maintenance materials shall be turned over to the City 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 the City upon completion of the Work or when the City assumes beneficial occupancy or as directed by the City or Engineer. Contractor shall then place them in permanent storage rooms or areas designated by the City 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 the City.

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 the City.

b) Refer to Schedule 01 78 24-1, Spare Parts and Maintenance Materials Schedule, located after the "End of Section" designation, for the paper and electronic format.

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 the City, and at no additional cost to the City.

c. Upon placement of each item in the storage location, the item bar-code sticker or tag shall be scanned into the City Database along with the shelf bar-code sticker using hand held Radio Frequency Computers.

3. 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 the City.

d. The Contractor shall provide City 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 City 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 City 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 the City 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

NO TEXT ON THIS PAGE

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)

763

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.

c. Name, address and telephone number of the manufacturer and the manufacturer's local representative(s).

d. Installation instructions.

e. Emergency operating instructions and capabilities.

f. Troubleshooting and corrective maintenance (repair) procedures.

g. 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".

h. Parts list with current prices and ordering information.

i. List of recommended spare parts and the recommended number of each.

j. Name, address and telephone number of nearest parts supply house and nearest repair service center.

k. Warranties, guarantees, bonds and service contracts.

l. Long-term and short-term manufacturer's recommended equipment storage procedures.

m. Written explanations of all safety considerations relating to operation and maintenance procedures.

n. Name, address and telephone number of manufacturer, manufacturer's local service representative, and subcontractor or installer.

o. Copy of all approved shop drawings.

p. 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.

q. 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

NO TEXT ON THIS PAGE

SECTION 01 78 39 – FINAL RECORD DOCUMENTS
CONTRACT TI-181

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:

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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 conidtions of the project and be aligned to the established project coordinate system.

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 AutoCAD files upon written request, if such copies are available. The AutoCAD 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:

"These As-Built Drawings for Contract TI-181 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 & AutoCAD)	4 sets (PDF/A & AutoCAD)	2 sets
Final Copy Shop Drawings	1 set (PDF/A & AutoCAD)	4 sets (PDF/A & AutoCAD)	1 set
Conformed Drawings	1 set (PDF/A & AutoCAD	4 sets (PDF/A & AutoCAD)	NA
Bid Set Drawings	1 set (PDF/A & AutoCAD)	4 sets (PDF/A & AutoCAD)	NA
Bid Set Contract (including Addenda)	1 set (PDF/A)	4 sets (PDF/A)	1 set
Conformed Contract	1 set (PDF/A)	4 sets (PDF/A)	NA
Change Orders (Text & Drawings) (Design & Field)	1 set (PDF/A)	4 sets (PDF/A)	NA
O&M Manuals	1 set (PDF/A)	6 sets (PDF/A)* 2 compilation sets*	4 sets *
Key Documents	1 set (PDF/A)	4 sets (PDF/A)	NA
Additional Documents	1 set (PDF/A)	4 sets (PDF/A)	NA
Job Photographs	1 set (TIFF)	2 sets (TIFF)	NA
Job Videos	1 Set (MPEG 2)	2 Sets (MPEG 2)	NA

* Each paper copy of an O&M manual shall have 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.

SECTION 01 78 40 – RECORDS IN PAPER FORMATS
CONTRACT TI-181

PART 1 VGENERAL

1.01 SUMMARY

A. This Section describes the requirements for all Final Record Documents to be produced in paper formats.

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

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

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

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PART 3	EXECUTION	5
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3.02	Application	5
3.03	Field Testing / Quality Control	5
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 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

NO TEXT ON THIS PAGE

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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3.05	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"

NO TEXT ON THIS PAGE

SECTION 01 79 05 – EQUIPMENT START-UP AND TRAINING
CONTRACT TI-181

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

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:

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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. 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. Dust shall be prevented from rising by wetting demolished masonry, concrete, plaster and similar debris. All portions of the existing buildings affected by the operations under this Section shall be protected by dustproof partitions and other adequate means.

6. The Contractor shall monitor the atmosphere inside the aeration tanks, in particular for the presence of hazardous gases, in accordance with the requirements of this Contract and all applicable laws and regulations.

7. The Contractor shall provide adequate fire protection in accordance with local Fire Department requirements.

8. 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.

9. 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.

10. 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.

11. 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.

12. 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.

13. 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.

14. The Contractor shall make such investigations, explorations and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal.

15. 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 Buildings, Structures and Equipment:

1. The City does not assume responsibility for the actual condition of buildings, 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 accor-

dance 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 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 confine cutting of existing roof areas designated to remain to the limits required for the proper installation of the Work. The Contractor shall cut and remove insulation and weather protection, and provide temporary weathertight protection as required until new roofing and flashings are installed.

10. 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.

11. 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.

12. Building Demolition:

    a. Unless otherwise approved by the Engineer the Contractor shall: proceed with demolition from the top of the structure to the ground. Complete demolition work above each floor or tier before disturbing supporting members of lower levels.

    b. Demolish concrete and masonry in small sections.

    c. Remove structural framing members and lower to ground by means of hoists, derricks, or other suitable methods.

    d. Break up and remove foundations and slabs-on-grade, unless otherwise shown to remain.

    e. Locate equipment used for demolition work, and remove demolished materials, so as not to impose excessive loads on supporting walls, floors or framing.

13. 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.

14. 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.

15. 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. The removal of masonry beyond these limits shall be at the Contractor's expense and these excess removals shall be reconstructed to the satisfaction of the Engineer with no additional compensation to the Contractor.

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, masonry, roofing materials, reinforcement, structural or miscellaneous metals, plaster, 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 masonry walls, 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.

5. When conducting demolition activities on masonry materials (i.e., brick and concrete), the Contractor shall perform work area and personal exposure monitoring in accordance with applicable regulations and standard industrial hygiene methods, until sufficient data is generated to demonstrate compliance with permissible exposure limits for crystalline silica, as calculated according to 29 CFR 1926.55 and 1926.57, employing exposure control methods specified in 29 CFR 1926.1153(c)(1). Compliance with permissible exposure levels must be demonstrated with a minimum of three (3) consecutive readings taken seven (7) days apart, for each new work task or change in equipment, process, or control measure.

C. Mechanical Removals

1. Mechanical removals shall consist of dismantling and removing existing pipes, pumps, motors 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. Portions of the potable water system that may have been altered or opened shall be pressure tested and disinfected in accordance with local 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 generators, transformers, distribution switchboards, control panels, motors, 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. Motors shall be disconnected and removed where shown or specified. Motors not marked or designated by the City or the Engineer to be salvaged shall be removed from the site. Motors or other electrical gear designated for reuse shall be stored in enclosed, heated storage.

5. 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.

6. 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 one 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, walls, and roofs, 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 roof, or as otherwise approved by the Engineer. All repairs shall be smoothly finished unless otherwise approved by the Engineer.
3. Openings in existing concrete slabs, ceilings, roofs, masonry walls, floors and partitions which are not to be used in the new work shall be closed and sealed as shown or otherwise directed by the Engineer.
4. 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 and masonry 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.
5. 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 buildings, 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-site dump containers for collection of waste materials, debris and rubbish, and shall wet down dry materials to prevent blowing dust.
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.

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, as shown in the following report, and summarized in Table Nos. 3 and 4, attached to Section 01 35 45 – Hazardous Materials Control, specified herein, or required to complete the Work, including all ACM identified and impacted by the Work.

1. Hazardous Materials Mitigation Report for the Tallman Island WRRF, Contract TI-181, Bidwell Environmental, November 2024.

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. 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.

D. All Independent Third-Party air monitoring shall be outside this Contract and performed by others.

E. The Contractor shall label all known ACM in the field to prevent accidental disturbance by workers.

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

G.

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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 ,, 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 the Engineer 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 collect confirmatory samples of presumed asbestos-containing materials identified in the Hazardous Materials Mitigation Report for the Tallman Island WRRF, Contract TI-181, Bidwell Environmental, November 2024 and Table 5 attached to Section 01 35 45 – Hazardous Materials Control, and 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 NYCDEP Asbestos Investigator, 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.

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, 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, 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 Engineer 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 Engineerimmediately 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 Engineer 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 Engineer 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 Engineer 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 for review at any time during the Asbestos Project, and shall be submitted to the Engineer 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 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 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 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

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 the Engineer 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 installed by a licensed electrician. 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 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 Engineer 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 Engineer.

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 Engineer, 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 Resource Recovery Facility (WRRF) 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 the Engineer 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

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 in the following report and Table 1 as, 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.

1. Hazardous Materials Mitigation Report for the Tallman Island WRRF, Contract TI-181, Bidwell Environmental, November 2024.

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. The Contractor shall perform the removal and recycling/disposal of additional materials and structure coated with or containing lead not included in the report listed in 1.01A. 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 74 20 – Construction Waste Management

G. Section 02 41 10 – Demolition and Removals

H. 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 (µg/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, not otherwise sampled during Design, 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 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

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 installed by a licensed electrician . 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 conducting sampling of presumed PCB-containing materials, and the requirements for construction and demolition activities affecting materials and structures coated with or containing polychlorinated biphenyls (PCBs), or presumed PCB-containing as shown in the following report and in Table Nos 1, 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.

1. Hazardous Materials Mitigation Report for the Tallman Island WRRF, Contract TI-181, Bidwell Environmental, November 2024.

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 Contractor shall perform the removal, demolition, and disposal of additional materials and structures coated with or containing PCBs not included in the report listed in 1.01.A.

F. 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 74 20 – Construction Waste Management

G. Section 02 41 10 – Demolition and Removals

H. Section 02 82 05 – Asbestos Management

I. 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, as shown on Table 5, attached to Section 01 35 45 – Hazardous Materials Control, 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 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

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 installed by a licensed electrician. 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 1100º 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

PART 1 GENERAL

1.01 SUMMARY

A. This Section details the requirements for construction and demolition activities affecting materials containing mercury, as shown, in the following report, specified herein, or required to complete the Work, including all Mercury and Mercury-Containing Equipment and Material identified and impacted by the Work. No mercury-containing equipment was identified.

1. Hazardous Materials Mitigation Report for the Tallman Island WRRF, Contract TI-181, Bidwell Environmental, November 2024.

B. When necessary, the Contractor shall perform the removal and recycling/disposal of additional materials containing mercury not included in the report referenced in 1.01A.

C. All mercury-containing wastes generated during this Contract Work that qualify as Universal Wastes under federal, state, or local regulations, must be recycled (and not disposed of as hazardous wastes) regardless of the quantity of wastes generated.

D. The Contractor shall perform all Work under this Section without damaging or contaminating adjacent areas to where the Work is being performed. Where such areas are damaged or contaminated, as determined by DEP, the Contractor shall restore the areas to their original condition at no additional cost to the City.

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 – Measurements and Payment.

B. Payment for disposal of Mercury-Containing Equipment and Material and Mercury Wastes will not be made until a signed copy of the manifest from the recycling facility/Treatment, Storage, and Disposal Facility (TSDF), certifying the amount of mercury-containing equipment and material and mercury wastes delivered is returned to DEP.

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. Definitions

1. Certified Industrial Hygienist (CIH): Refers to an individual employed by the Contractor or its Subcontractors who is currently certified by the American Board of Industrial Hygiene (ABIH).

2. Competent Person: Defined by OSHA 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, what contaminants are present in the workplace; (b) establishing work 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 (PELs), or Recommended Exposure Limits (RELs) 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

3. 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.

4. 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). Certain types of Work may require 24 or 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.

5. High-Efficiency Particulate Air (HEPA) Filter: A filter designed to remove 99.97% of all particles greater than 0.3 micrometers (μm) in diameter. HEPA vacuum equipment used by the Contractor shall meet the Standard for Safety High-Efficiency, Particulate, Air Filter Units (UL 586) developed by Underwriters Laboratories.

6. Mercury-Containing Equipment and Material: Material or equipment/device that contains a detectable amount of elemental mercury, inorganic mercury compounds, or organic mercury compounds. Mercury-Containing Materials may include, but are limited to, the following: batteries, light bulbs, thermometers, thermostats, barometers, manometers, temperature gauges, pressure gauges, and switches.

7. Mercury Awareness Training: Training for individuals that have the potential to be exposed to mercury-containing materials/equipment or mercury wastes. This training shall include discussions of the following: (a) sources of mercury; (b) current federal, state, and local regulations pertaining to mercury; (c) the health effects of mercury exposure; (d) state-of-the-art work practices, engineering controls, and procedures for removal, materials handling, waste management, housekeeping, and spills that involve mercury; (e) the use and maintenance of PPE and the use and maintenance of respirators in accordance with 29 CFR 1910.134; (f) requirements regarding warning signs, labeling, and Safety Data Sheets (SDSs) in accordance with 29 CFR 1910.1200; (g) responsibilities of the Competent Person.

8. Mercury Waste: Non-specific liquid or solid waste generated during the disturbance, removal, construction/demolition, handling, and cleanup of Mercury-Containing Equipment and Material.

9. P-100 Filter: (See definition of: “High-Efficiency Particulate Air (HEPA) Filter”).

10. Physical Boundary: A physical barrier designated with ropes, red “do not enter tape,” or a partition that surrounds a work area in order to limit the entry of unauthorized personnel.

11. Recommended Exposure Limit (REL): An exposure limit recommended by the NIOSH that can be expressed as a Time-Weighted Average (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. The following REL is pertinent to removal, demolition, and disposal activities associated with Mercury-Containing Equipment and Materials and Mercury Wastes: (a) mercury – 0.05 mg/m^3 as a TWA for up to a ten (10) hour workday and a 40-hour work week, and a ceiling limit of 0.1 mg/m^3, as per DEP EHS Policies and Procedures - Vol. III, Mercury Management.

12. 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.

13. Time Weighted Average (TWA): The average time over a given work period (e.g., an eight (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.

14. Universal Waste: Any Mercury-Containing Material and Equipment that meets the criteria outlined in the Standards for Universal Waste Management (40 CFR 273), the Standards for Universal Wastes (6 NYCRR 374-3), or the Mercury-Added Consumer Products Law (Chapter 145, Laws of New York, 2004). Per 40 CFR 273.4(b)(3), if the mercury is removed from Mercury-Containing Equipment/Material, the material can no longer be considered a Universal Waste and must be managed as a hazardous waste, or a determination must be made to characterize the material as non-hazardous.

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 Mercury-Containing Equipment and Material, and Mercury 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. U.S. Environmental Protection Agency (EPA):

1) 40 CFR 273 – Standards for Universal Waste Management;

2) 40 CFR 302 – Designation, Reportable Quantities, and Notification.

c. New York City Department of Environmental Protection (DEP):

1) Environmental Health and Safety Policies and Procedures – Vol. II, Spill Prevention, Environmental Release Reporting and Investigation;

2) Environmental Health and Safety Policies and Procedures – Vol. III, Mercury Management;

3) Environmental Health and Safety Policies and Procedures – Vol. IV, Hazardous Waste Management;

4) Environmental Health and Safety Policies and Procedures – Vol. IV, Universal Waste Management;

5) 15 RCNY Chapter 19 – Discharges of Wastewater and Other Materials to Public Sewers.

d. New York City Department of Buildings (NYCDOB)

1) New York City Building Code.

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 374 – Management of Specific Hazardous Waste;

6) 6 NYCRR 376 – Land Disposal Restrictions.

f. Chapter 145, Laws of New York, 2004 – Mercury-Added Consumer Products Law.

g. National Institute for Occupational Safety and Health (NIOSH):

1) NIOSH Pocket Guide to Chemical Hazards.

h. 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 1910.1200 - Hazard Communication Standard

5) 29 CFR 1926 – Safety and Health Regulations for Construction.

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 Work 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 Work) and give them estimated periods (including specific dates) of such proposed access restrictions. The Contractor shall not have exclusive rights to the work site and shall fully cooperate and coordinate this Work with the work of Other Contractors who may be on site.

D. Unexpected Entry into a Work Area: In the event that DEP personnel must enter a work 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 Mercury-Containing Equipment and Material or Mercury Wastes shall not proceed until all DEP personnel have exited from the work area.

1.06 QUALITY ASSURANCE

A. 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, removal, construction/demolition, handling, storage, transportation, and recycling/disposal of Mercury-Containing Equipment and Material and Mercury 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.

1. Rejection of Non-Complying Items: The DEP reserves the right to reject items incorporated into the Work which fail to meet the specified minimum requirements. The DEP also reserves the right to reject Contractor submittal items (e.g., proposed TSDFs, vendors or subcontractors with previous regulatory citations/violations) that are deemed 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.

B. Qualifications:

1. Competent Person:

a. The Contractor and/or Mercury Removal Company shall have on staff and assigned to this Contract a Competent Person, who shall be onsite during all mercury-related work activities, and who has successfully completed:

1) DOT Hazardous Materials Transportation Training;

2) HAZWOPER Training if required;

3) Mercury Awareness Training; and

4) RCRA Training courses as defined in this Section.

a) Each training course shall have been completed within the past year in the form of either an initial course or a refresher course.

b. The Competent Person shall have a minimum of two (2) years' experience with work involving mercury, including at least three (3) projects of comparable scope and methodologies.

2. Mercury Worker: Mercury workers shall have Mercury Awareness Training, completed within the past year.

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. Mercury Management Plan: . The Mercury management plan, signed and dated by a CIH, shall include the following elements:

1) Mercury Control:

a) Drawings showing the locations and details of each work area and each waste storage;

b) A detailed discussion regarding the interfacing of trades and the sequencing of Mercury-Related Work;

c) A detailed discussion on the implementation of proper precaution when Mercury-Containing Equipment (gauges, switches, flow meters, manometers, thermometers, flow regulators, laboratory equipment, lamps, etc.,) is removed to prevent release of elemental mercury onto or into connected equipment or appurtenances;

d) A detailed discussion regarding the collection, handling procedures, and recycling/disposal of Mercury-Containing Equipment and Material and Mercury Wastes;

e) A detailed discussion regarding "real-time" air monitoring for mercury vapor (e.g., using a Jerome® meter), including Action Levels, to be implemented during the Work, as applicable. Also, indicate how compliance with the Action Levels and the REL (per the DEP EHS Policy and Procedure for Mercury Management) will be determined, and who will be responsible for ensuring that compliance with the Action Levels and REL is maintained. At a minimum, Action Levels shall be established for the following situations: (a) the removal of broken/leaking Mercury-Containing Equipment and Material; (b) the implementation of engineering controls and safe work practices; (c) upgrades/downgrades in levels of PPE; (d) work stoppage or the emergency evacuation of on-site personnel;

f) A detailed discussion regarding housekeeping procedures to be used for maintaining clean work areas;

g) A detailed task analysis for each work activity including, but is not limited to, the following information: (a) the type of work activity; (b) the tools/equipment/supplies that will be used; (c) the types of Mercury-Containing Equipment and Material that may be disturbed, or Mercury Wastes that may be generated when performing the activity; (d) the engineering controls that will be used to control the spread of contamination 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 that will be used for the removal of both intact and broken (leaking) Mercury-Containing Equipment, and the decontamination protocol when handling removal of broken (leaking) Mercury-Containing Equipment;

h) SDSs: Provide SDSs for all chemical products to be used during the Work.

b. Waste Management:

1) The identification of Mercury-Containing Equipment and Material and Mercury 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 that will be generated and recycled/disposed of as per 40 CFR 302;

3) The name, address, phone number (24-hour), and permit documentation for each recycling facility/TSDF, indicating that the facility is approved by federal (40 CFR 264 and 40 CFR 265), state (6 NYCRR 373), and local regulatory agencies to receive Mercury-Containing Equipment and Material and Mercury Wastes;

4) Current Waste Transporter 6 NYCRR 364 and 40 CFR 263 permit documentation;

5) Spill prevention, containment, and cleanup contingency measures, to be followed during a suspected mercury emissions/bulk material release or emergency situation, in accordance with this Section, including 15 RCNY Chapter 19;

6) A detailed discussion of the on-site handling, storage, removal, and recycling/disposal of waste materials, including but not limited to the following:; (a) the methods of demarcation that will be used to identify the waste storage area; (b) the method of collection and containerization of wastes on a daily basis; (c) the types of containers (d) the posting of weekly regulated waste inspection and inventory records.

c. A detailed schedule for the implementation, start date, and completion date of the Mercury Management Plan elements.

d. The name, qualifications (i.e., experience and training documentation), and resume of the Competent Person.

e. Employee Documentation: 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 Mercury workers.

f. A current (i.e., within the last month) signed and notarized statement disclosing all of the OSHA, EPA, and DOT citations/violations within the past three (3) years.

B. Field Reports and Recordkeeping: During all Work performed under this Section, the Contractor shall maintain and provide the following documentation:

1. Recycled Materials/Waste Documentation: Completed and signed waste manifests from recycling facilities/TSDFs shall be provided to the DEP within ten (10) business days of disposal. In addition, on-site waste storage areas shall be inspected weekly by the Competent Person.

a. Each weekly waste storage area inspection report shall be provided to the DEP within 24-hours of the inspection date. The content of these reports shall include, but is not limited to, the following information: (a) the name of the inspector; (b) descriptions of waste streams; (c) waste container type, quantity, and condition; (d) recycling/disposal time limit (i.e., 365 days or 90 days, respectively; (e) proper label type; (f) secondary containment system; (g) storage area security method to prevent any unauthorized entry.

b. In addition to performing weekly waste storage area inspections, the Competent Person shall maintain an ongoing waste inventory that includes, but is not limited to, the following information: (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.

2. Contractor Project Record: The Contractor Project Record shall be made available to the Engineer or DEP for review at any time during the Work, 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 Mercury-Containing Equipment and Material inventory reports relating to the Work; (c) copies of all daily worker sign-in sheets as required in this Section; (d) copies of all SDSs pertaining to all chemicals being used during the Work; (e) related Drawings; (f) a copy of the Contractor's Mercury Management Plan; (g) copies of all weekly waste storage area inspection records; (h) and a copy of the waste inventory.

3. Daily Sign-In Sheets: The Contractor shall generate daily sign-in sheets for all individuals entering and exiting each work area for the duration of the Work.

4. 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 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. PPE: The Contractor shall provide personnel who have a potential to be exposed to Mercury-Containing Equipment and Material or Mercury Wastes, with appropriate PPE as prescribed by the Contractor's CIH.

B. Waste Containers: Containers for the storage of all recyclable materials and wastes shall be DOT-approved and shall be provided by the Contractor.

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. Utilities: The temporary use of any on-site utilities shall be subject to the approval of DEP. The Contractor shall furnish all water and hoses, water filtration devices, and heating equipment, as well as any temporary hookups. In addition, all temporary lighting and temporary electrical service to a work area shall be provided by the Contractor, and shall be in weatherproof enclosures and be ground fault protected as applicable.

B. Signs: The Contractor shall post conspicuous warning signs at all approaches to work areas and waste storage areas. Signs shall not be removed until all 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
MERCURY WORK AREA
POISON
NO SMOKING, EATING OR DRINKING

C. Physical Boundary Delineation: The Contractor shall clearly delineate each work area and waste storage area with a Physical Boundary as defined in this Section.

D. Removal

1. Work Area Containment Measures: To prevent potential contamination, the Contractor shall place 6-mil polyethylene sheeting on the floor beneath Mercury-Containing Equipment and Material that are being removed. Any containment materials that become contaminated during the Work shall not be reused, and shall be properly containerized and disposed of in accordance with this Section.

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. Cleanup: The Contractor shall maintain all surfaces, including protective coverings (polyethylene sheeting) within each work area, free of accumulations of debris, dusts, and wastes. The Contractor shall perform housekeeping activities, using HEPA-filtered vacuums and wet methods, daily throughout each work shift and at the end of each work shift, to prevent any accumulation of debris, dusts, and wastes in the work areas. Using compressed air to cleanup a work area shall be strictly prohibited.

B. Collection, Separation, and Containerization of Wastes: The Contractor shall collect, separate (by waste stream/waste type), and containerize Mercury Wastes (solid and liquid), debris, PPE, and containment materials on a daily basis.

1. The Contractor shall store all wastes in DOT-approved container systems. All drums/containers shall be sealed and covered immediately after filling,

and each drum/container will have a label affixed to it in accordance with this Article. All labels shall remain intact and legible at all times.

2. No water mixed with or contaminated by mercury 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 mercury 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. Any quantity of Elemental Mercury that is released or spilled must be immediately reported to DEP. Reporting to NYSDEC Spill Hotline is required for a release of one pound (approximately two tablespoons) or more.

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 hazardous waste storage area, including 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 recycling/waste drums and containers. Labels shall comply with the requirements of federal, state, and local regulations, including EPA and DOT requirements. At a minimum, all labels shall bear the following information in English:

[Generator Name, Address, and Telephone Number]
[Specific Contents of Container]
[Accumulation Start Date]
[Accumulation End Date]

1. If necessary (i.e., if waste is to be disposed of as hazardous waste rather than Universal Waste), also include the following information on the label:

HAZARDOUS WASTE
FEDERAL LAW PROHIBITS IMPROPER DISPOSAL
HANDLE WITH CARE
[EPA-Issued Generator Identification Number]
[EPA Waste Identification Number]

E. Characterization of Wastes: Mercury-Containing Equipment and Material to be removed under the Work of this Section shall be recycled in accordance with the

EPA's Standards for Universal Waste Management (40 CFR 273), the NYSDEC's Standards for Universal Wastes (6 NYCRR 374-3), and the NYSDEC's Mercury-Added Consumer Products Law (Chapter 145, Laws of New York, 2004). If a material is not regulated as a Universal Waste, the material shall be considered a hazardous waste, and shall be disposed of in accordance with RCRA requirements.

F. Disposal of Wastes: Hazardous 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". Universal Wastes shall not remain on the job site for more than one (1) year from the initial "accumulation start date". Containers that have reached their storage capacity shall not remain on site and transportation arrangements shall be made for their immediate removal.

G. 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 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

SECTION 03 01 30.71 – REHABILITATION OF CAST-IN-PLACE CONCRETE
CONTRACT TI-181

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.

2. Preparation for repairing, stabilizing and resurfacing exterior and interior cast-in-place concrete floors, walls, ceilings, platforms, steps and the like.

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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 32 00 - Joints in 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 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 firm 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.

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 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. Hydrophilic injection grout shall be:
1. Hydro-Active Flex LV as manufactured by De Neef Construction Chemicals, Houston, TX;
2. Prime Flex 900 LV as manufactured by Prime Resins, Conyers, GA;
3. Scotch Seal 5600 Chemical Grout as manufactured by 3M Construction Markets, St. Paul, MN;
4. Or an approved equal.

F. Hydrophobic injection grout shall be:
1. Hydro-Active Cut as manufactured by De Neef Construction Chemicals, Houston, TX;
2. Prime Flex 920 as manufactured by Prime Resins, Conyers, GA;
3. Sikafix HH as manufactured by Sika Corp., Lyndhurst, NJ;
4. Or approved equal.

G. Spall repair mortar for use in horizontal applications not requiring formwork shall be:
1. Sikatop 122 Plus as manufactured by Sika Corp., Lyndhurst, NJ;
2. CR 700 as manufactured by Sto Concrete Restoration Division, Atlanta, GA;
3. Duraltop Fast Set as manufactured by Tamms Industries, Kirkland, IL;
4. Or an approved equal.

H. Spall repair mortar for use in vertical applications not requiring formwork shall be:
1. Sikatop 123 Plus as manufactured by Sika Corp., Lyndhurst, NJ;
2. CR 702 as manufactured by Sto Concrete Restoration Division, Atlanta, GA;
3. Duraltop Gel as manufactured by Tamms Industries, Kirkland, IL;
4. Or an approved equal.

I. Spall repair mortar requiring formwork shall be:

1. Sikatop 111 Plus as manufactured by Sika Corp., Lyndhurst, NJ;
2. CR 730 as manufactured by Sto Concrete Restoration Division, Atlanta, GA;
3. Duraltop Flowable Grout as manufactured by Tamms Industries, Kirkland, IL;
4. Or an approved equal.

J. Waterproof membrane patch sealing system shall be:

1. Sikadur Combiflex as manufactured by Sika Corp., Lyndhurst, NJ;
2. Or an approved equal.

K. Cement based textured coating shall be:

1. Sikatop 144 as manufactured by Sika Corp., Lyndhurst, NJ;
2. Duraltop Coating as manufactured by Tamms Industries, Kirkland, IL;
3. Thoroseal/Acryl 60 as manufactured by Thoro System Products, Folcroft, PA;
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. Structural Crack Repair Material

1. Structural crack repair material shall be a two-component, polymer-modified cementitious mortar and shall conform to EPA/USPHS standards for surface contact with potable water supplies.

F. 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.

G. Flexible Polyurethane Hydrophilic Injection Grout Crack Repair Material

1. Flexible polyurethane crack repair material shall be a one-component, water-activated polyurethane hydrophilic injection grout capable of 700 percent expansion. Polyurethane grout shall form a tough flexible foam seal that is impenetrable to water.

H. Rigid Polyurethane Hydrophobic Injection Grout Crack Repair Material

1. Rigid polyurethane crack repair material shall be a one-component, water-activated polyurethane hydrophobic injection grout capable of 700 percent expansion. Polyurethane grout shall form a tough rigid foam seal that is impenetrable to water.

I. Spall Repairs Mortar Not Requiring Formwork

1. Spall repairs not requiring formwork shall be repaired using a two-component, polymer-modified cementitious mortar and shall have a minimum 28-day compressive strength of 7,000 psi.

2. All spall repair materials shall conform to EPA/USPHS standards for surface contact with potable water supplies.

J. Spall Repairs Mortar Requiring Formwork

1. All spall repairs requiring formwork shall be repaired using a two-component, polymer-modified cementitious mortar/pea gravel mixture and shall have a minimum 28-day compressive strength of 6000 psi. Each unit of mortar shall be mixed with Saturated Surface Dry (SSD) pea gravel to form the repair material following the manufacturer's recommendations.

2. All spall repair materials shall conform to EPA/USPHS standards for surface contact with potable water supplies.

K. Waterproof Membrane Patch

1. Waterproof membrane patch shall be a hypalon sealing strip secured to the concrete substrate with an epoxy adhesive.

2. Sealing system shall be installed per manufacturer's recommendations.

L. Sealant

1. Sealant shall be a two-component polyurethane sealant as specified in Section 03 32 00 – Joints in Concrete. Primers and bond breakers shall conform to the sealant manufacturer's recommendations.

M. Expansion Joint Filler

1. Expansion joint filler shall be as specified in Section 03 32 00 – Joints in 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. Not Used

3.02 IMPLEMENTATION

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. 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. 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.

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. 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.

   a. Concrete surface shall be routed to form a minimum 1/4 inch wide by 1/4 inch deep V-notch and the crack cleaned 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.

b. As binder penetrates into crack, additional binder shall be applied to the V-notch.

F. Rigid and Flexible Polyurethane Crack Repair

1. As directed by the Engineer, all existing, leaking cracks 1/4 inch and narrower to be repaired shall be pressure injected with a waterproof hydrophilic or hydrophobic injection grout into the prepared crack. Crack surface shall be sealed and injection ports installed per manufacturer's recommendations.

2. Holes drilled for injection ports shall not cut rebar. 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.

3. Once the surface sealing material has cured, inject crack with waterproof hydrophilic or hydrophobic injection grout using pressure injection equipment as directed by the manufacturer.

G. 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.

H. Expansion Joint Repair

1. Remove all sealant and breaker and joint filler.

2. Remove all unsound concrete on the joint faces as directed by the Engineer.

3. Remove all laitance and provide a clean dry surface.

4. Prepare an epoxy mortar by combining epoxy crack repair binder with aggregate following manufacturer's instructions.

5. Restore surface to original dimensions by trowelling epoxy mortar onto the existing substrate in a manner to ensure bonding following manufacturer's instructions.

6. Cure repair following manufacturer's instructions.

7. Replace joint filler and sealant as indicated on the Contract Drawings.

I. Waterproof Membrane Patch

1. As directed by the Engineer, existing concrete areas requiring a textured patch shall be thoroughly cleaned and the waterproof membrane patch applied according to manufacturer's recommendations.

J. Cement Based Textured Coating

1. As directed by the Engineer, existing concrete areas requiring a textured coating shall be thoroughly cleaned and the cement based textured coating applied according to manufacturer's recommendations.

2. All other concrete rehabilitation work as directed by the Engineer shall be completed prior to applying coating.

K. Curing

1. All repair materials utilized shall be cured in strict accordance with manufacturer recommendations.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

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. The uncured polyurethane chemical grout shall be cleaned from tools with an approved solvent. The cured polyurethane chemical grout can only be removed mechanically.

C. The uncured polymer-modified Portland cement mortar shall be cleaned from tools with water. The cured polymer-modified Portland cement mortar can only be removed mechanically.

D. Excess materials caused by work under this Section shall be cleaned from existing surfaces by the use of power sanders and the surfaces shall be vacuumed clean and readied to receive final cleaning and finishing specified in other Sections. All cracks shall be sanded and shall lie in the same plane as adjacent surfaces.

E. Misplaced sealants 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.

END OF SECTION

NO TEXT ON THIS PAGE

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 30 00 - Cast-in-Place Concrete

B. Section 03 35 00 - Concrete Finishing

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 SP-4 - Formwork for Concrete
5. American Plywood Association (APA): APA Grade - Trademark
6. ISO 14025 - Environmental labels and declarations - Type III environmental declarations
7. New York City Building Code
8. 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 30 00- Cast-in-Place 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.

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. Design formwork for vertical loads and lateral pressures per ACI 347.

8. Design formwork system, which is adequately braced and has adequate strength and stability to ensure, finished concrete within specified tolerances.

9. 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, Miamisburg, OH.

2. Williams Form Engineering Corp., Belmont, MI.
3. Symons Corp., Des Plains, IL
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.

D. Form film shall be as manufactured by:
1. Symons Corporation, Des Plaines, IL.
2. Or approved equal.

E. Form liners shall be as manufactured by:
1. Dura-Tex; Symons Corporation, Des Plaines, IL.
2. Or approved equal.

F. Rustications shall be as manufactured by:
1. Symons Corporation, Des Plaines, IL.
2. 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 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. Chamfer exposed external corners ¾-inch.

9. Forms shall be set sufficiently to prevent joints in wood forms from opening prior to concrete pour.

10. Cutting form ties back from the face of the concrete shall not be permitted.

11. 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.

12. 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.

13. Excess form coating material shall not be allowed to accumulate in the forms.

14. Form coatings shall not be allowed to come in contact with construction joints or reinforcing steel.

15. 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.

16. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.

17. All sleeves, inserts, anchors, and embedded items required for adjoining work or for support of joining work shall be placed prior to concreting.

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 30 00 - Cast-In-Place Concrete

B. Section 03 41 00 - Precast Structural Concrete

C. Section 03 45 00 - Precast Architectural 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 SP66	-	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. Placing drawings showing all dimensions necessary for fabrication and placing of the reinforcing steel and accessories without reference to the project drawings 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

A. 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 placing drawings, 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 SP66 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 30 00 – Cast-in-Place Concrete and the New York City Building Code.

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	-1/4
b. To other formed surfaces	±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	±1/4
b. Members more than 8 inches deep but less than 24 inches deep	-1/4, +1/2
c. Members 24 inches deep or greater	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:	

Item	Tolerances, Inches
a. General	±2
b. Discontinuous ends of members	±1/2
7. Length of bar laps:	1-1/2
8. Embedded length:	
a. For bar sizes No. 3 through 11	-1
b. For bar sizes No. 14 and 18	-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 for reinforcement, except for extremely corrosive atmosphere, other severe exposures or fire protection shall be as follows unless indicated otherwise on the Contract Documents.

2. Minimum Concrete Cover for Reinforcement:

Item	Minimum Cover, Inches
1. Slabs and Joists:	
a. Top and bottom bars for dry conditions:	
1) No. 11 bars and smaller	3/4
2) No. 14 and No. 18 bars	1-1/2
b. Bars in formed concrete surfaces exposed to water or weather, and over or in contact with sewage and for bottoms bearing on work mat, or slabs supporting earth cover:	
1) No. 5 bars and smaller	1-1/2
2) No. 6 through No. 18 bars	2
2. Beams and Columns:	
a. For dry conditions:	
1) Stirrups, spirals and ties	1-1/2
2) Principal reinforcement	2
b. Exposed to earth, water, sewage or weather:	2
1) Stirrups and ties	2-1/2
2) Principal reinforcement	
3. Walls:	
a. For dry conditions:	
1) No. 11 bars and smaller	3/4
2) No. 14 and No. 18 bars	1-1/2
b. Formed concrete surfaces exposed to earth, water, sewage, weather or in contact with ground	2
4. Footings and Base Slabs:	
a. At formed sides and ends and bottoms bearing on concrete work mat	2
b. At unformed surfaces and bottoms in contact with earth	3
c. Top of footings	Same as slabs
d. Over top of piles	2

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. Zinc-coated (galvanized) reinforcing bars shall be fastened with zinc-coated tie wire or non-metallic-coated tie wire or other acceptable materials.

9. Epoxy-coated reinforcing bars shall be fastened with nylon-epoxy or plastic-coated tie wire; or other acceptable materials.

10. 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.

11. 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
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, 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 Supervising Engineer for Concrete Construction or his approved representative 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

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 cast-in-place concrete as indicated on the Contract Drawings and as specified herein.

B. Work includes producing concrete consisting of Portland cement, fine and coarse aggregate, water and approved admixtures; proportioned, mixed, transported, placed, finished and cured as specified. Work shall also include:

1. Providing openings in concrete as required to accommodate Work under this and other Sections.

2. Building into the concrete all items such as sleeves, frames, anchor bolts and inserts required to accommodate the Work.

C. This Section covers cast-in-place structural concrete for use in buildings and structures and miscellaneous cast-in-place concrete.

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 21 00 - Reinforcing Steel

C. Section 03 32 00 - Joints in Concrete

D. Section 03 35 00 - Concrete Finishing

E. Section 03 60 00 - Grouting

1.04 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M 182 Specification for Burlap Cloth Made From Jute or Kenaf and Cotton Mats

2. AASHTO TP 23 Proposed Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying

3. AASHTO T 318 Proposed Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying

B. American Concrete Institute (ACI):

1. ACI CT-18 ACI Concrete Terminology

2. ACI 117 Specification for Tolerances for Concrete Construction and Materials and Commentary

3. ACI 207.1R Guide to Mass Concrete

4. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete

5. ACI 213R Guide for Structural Lightweight-Aggregate Concrete

6. ACI 214R Guide to Evaluation of Strength Test Results of Concrete

7. ACI 301 Specifications for Concrete Construction

8. ACI 302.1R Guide to Concrete Floor and Slab Construction

9. ACI 304R Guide for Measuring, Mixing, Transporting and Placing Concrete

10. ACI 305R Guide to Hot Weather Concreting

11. ACI 306R Guide to Cold Weather Concreting

12. ACI 308.1 Specification for Curing Concrete

13. ACI 309R Guide for Consolidation of Concrete
14. ACI 311.4R Guide for Concrete Inspection
15. ACI 318 Building Code Requirements for Structural Concrete and Commentary on Building Code Requirements for Structural Concrete
16. ACI 350 Code Requirements for Environmental Engineering Concrete Structures and Commentary
17. ACI 347R Guide to Formwork for Concrete
18. ACI 506R Guide to Shotcrete
19. ACI 506.2 Specification for Shotcrete
20. ACI MNL-2 ACI Manual of Concrete Inspection
21. ACI MNL-15 Field Reference Manual: Standard Specifications for Structural Concrete ACI 301 with selected ACI references.

C. American National Standards Institute/National Science Foundation (ANSI/NSF) Standard 61 - "Drinking Water System Components - Health Effect"

D. American Society for Testing and Materials (ASTM)

1. ASTM C 31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C 33 Standard Specification for Concrete Aggregates
3. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C40 Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
5. ASTM C 42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
6. ASTM C 88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
7. ASTM C 94 Standard Specification for Ready-Mixed Concrete
8. ASTM C 109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
9. ASTM C 138 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
10. ASTM C 143 Standard Test Method for Slump of Hydraulic Cement Concrete
11. ASTM C 150 Standard Specification for Portland Cement
12. ASTM C 157 Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete

13. ASTM C 171 Standard Specification for Sheet Materials for Curing Concrete
14. ASTM C 172 Standard Practice for Sampling Freshly Mixed Concrete
15. ASTM C 173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
16. ASTM C 227 Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations
17. ASTM C 231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
18. ASTM C 260 Standard Specification for Air-Entraining Admixtures for Concrete
19. ASTM C 295 Standard Guide for Petrographic Examination of Aggregates for Concrete
20. ASTM C 309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
21. ASTM C 311 Test Method for Sampling & Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
22. ASTM C 330 Standard Specification for Lightweight Aggregates for Structural Concrete
23. ASTM C 387 Standard Specification for Packaged, Dry Combined Materials for Mortar and Concrete and High Strength Mortar
24. ASTM C 470 Standard Specification for Molds for Forming Concrete Test Cylinders Vertically
25. ASTM C 494 Standard Specification for Chemical Admixtures for Concrete
26. ASTM C 567 Standard Test Method for Density Structural Lightweight Concrete
27. ASTM C 595 Standard Specification for Blended Hydraulic Cements
28. ASTM C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
29. ASTM C845 Standard Specification for Expansive Hydraulic Cement
30. ASTM C 881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
31. ASTM C 882 Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear
32. ASTM C 979 Standard Specification for Pigments for Integrally Colored Concrete

33. ASTM C 989 Standard Specification for Slag Cement for Use in Concrete and Mortars
34. ASTM C 1064 Standard Test Method for Temperature of Freshly Hydraulic-Cement Concrete
35. ASTM C 1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
36. ASTM C 1141 Specification for Admixtures for Shotcrete
37. ASTM C 1157 Standard Performance Specification for Hydraulic Cement
38. ASTM C 1240 Standard Specification for Silica Fume Used in Cementitious Mixtures
39. ASTM C 1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
40. ASTM C1293 Standard Test Method for Determination of Length Change of Concrete due to Alkali-Silica Reaction
41. ASTM C 1398 Test Method for Laboratory Determination of time of Setting of Hydraulic-Cement Mortars Containing Additives for Shotcrete by the Use of Gillmore Needles
42. ASTM C 1480 Packaged, Pre-Blended, Dry, Combined Materials for Use in Wet or Dry Shotcrete Application
43. ASTM C 1567 Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
44. ASTM C1602 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
45. ASTM E 329 Standard Specification for Agencies Engaged in the Construction Inspection Testing of Special Inspection

E. The Building Code of the City of New York (NYCBC)

F. Concrete Plant Manufacturer's Bureau (CPMB) - "Concrete Plant Standards."

G. Concrete Reinforcing Steel Institute (CRSI):

1. CRSI – "Manual of Standard Practice"
2. CRSI – "Placing Reinforcing Bars"

H. National Ready Mixed Concrete Association (NRMCA)

I. New York State Department of Transportation (NYS DOT) - Standard Specifications

J. Portland Cement Association (PCA) – "The Design and Control of Concrete Mixtures"

K. Definitions

1. Inspection Requirements – Special Inspections requirements of the New York City Building Code as defined in NYCBC 1704.4 shall apply to all applicable materials and construction.

2. Lightweight Concrete - Concrete intentionally made to have low density by use of lightweight aggregate and usually required to have an air-dry unit weight less than 115 lbs. per cubic foot.

3. Normal Weight Concrete - Concrete for which density is not a controlling attribute, made with aggregates of types covered by ASTM C 33, and usually having unit weights in the range of 135 to 160 lbs. per cubic foot.

4. Supervising Engineer for Concrete Construction - Professional Engineer designated by the Commissioner, who will be responsible for coordination of Special Inspections and Buildings Form TR1: Technical Report Statement of Responsibility. The Supervising Engineer for Concrete Construction may or may not be the Resident Engineer. The Supervising Engineer for Concrete Construction shall undertake all responsibilities outlined in Article 28 and NYCBC 1704.4 Special Inspections of the New York Building Code.

5. Other technical words and terms used in this Section are defined in ACI CT-18.

1.05 DESCRIPTION

A. Classes of Concrete:

1. Class 25 - use for lean concrete.

   a. Class of concrete as recommended by NYCDOT specification for sidewalks, headers and curb.

2. Class 40LW - use for structural Lightweight Concrete

3. Class 45 - use for all concrete unless indicated otherwise.

   a. Class 45 concrete with a corrosion inhibitor and crystalline waterproofing in the mix design.

4. Class 45F - use as an alternate to Class 45 for:

   a. Foundations

   b. Walls greater than or equal to 18inches in thickness

5. Class 45PG – use for non-structural applications.

6. Class 45M - use for mass concrete.

7. Class 45HES- use for High Early Strength concrete, minimum 4,500 psi at 7 days with corrosion inhibitor and crystalline waterproofing.

8. Class 50 - use for precast concrete with corrosion inhibitor and crystalline waterproofing in the mix design. This mix shall be used for all precast concrete, unless indicated on the Contract Documents.

B. Work in Connection with other disciplines:

1. All sleeves, inserts, anchors and embedded items required for adjoining work or for its support shall be placed prior to concreting. No concrete shall be deposited until the Resident Engineer or his authorized representative has inspected the placement of the embedded items and the reinforcing bars and has given his permission to place the concrete.

2. All Work related to the concrete or must be supported by it, shall be coordinated with the work of this Section, including but not limited to the introduction or furnishing of embedded items prior to concrete placement.

3. Electrical conduits, junction boxes or pipes shall be placed prior to concreting. The Contractor shall coordinate the placement of such items of work in order that they are installed in accordance with all requirements of the New York City Building Code. The Contractor shall protect such installations to the extent that they are not displaced or damaged during concrete placement.

4. Openings in slabs shall be provided for pipes, conduits and the like required for the work of others where indicated on the Contract Drawings or for which directions are given prior to placing concrete. When work of others is completed, the excess part of the respective openings shall be completely closed up to the pipe sleeve and/or inserts to match the adjoining work.

5. Sleeves for miscellaneous metalwork, castings, pipes and anchors furnished shall be set true and to proper alignment in the concrete as indicated on the Contract Drawings or required by the manufacturer’s templates.

6. Voids in embedments shall be filled temporarily with readily removable material to prevent entry of concrete into the void.

1.06 QUALITY ASSURANCE

A. General:

1. Work performed under this Section shall comply with the applicable provisions and recommendations in Article 1.04 - References of this Section.

2. The Contractor shall employ, at its own expense, a testing laboratory experienced in the design and testing of concrete materials and mixes. This laboratory shall be responsible for all concrete mix design and trial batch testing.

a. Unless otherwise approved, all mix designs shall be run in the presence of DEP designated personnel.

3. Testing agencies that perform testing services on concrete shall meet the requirements of ASTM E 329 and be licensed by the New York City Department of Buildings.

4. 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.

5. Testing and inspection shall be conducted in accordance with the requirements of ASTM C 1077 and other applicable standards.

6. Prior to performing any Work, the qualifications of the proposed testing agency shall be submitted for review and acceptance by the DEP.

7. Tests of concrete required by this Section shall be made by an ACI Concrete Field Testing Technician Grade 1 or equivalent. Equivalent certification programs shall include requirements for written and performance examinations as stipulated in ACI publication CP1.

8. Prior to approval, all testing of proposed materials and mix designs including trial batch and shrinkage testing shall be at the Contractor's expense.

9. Concrete materials and operations will be tested and inspected by the Supervising Engineer for Concrete Construction or his authorized representative as the work progresses. Failure to detect defective work or material shall not in any way prevent later rejection when a defect is discovered nor shall it obligate the Engineer for final acceptance.

10. Materials and installed Work may require testing and retesting, as directed by Engineer, at any time during the progress of the Work. Contractor shall allow free access to material stockpiles and facilities at all times. Tests not specifically indicated to be done at Owner's expense, including the retesting of rejected materials and installed Work, shall be done at Contractor's expense.

B. Laboratory Trial Batch:

1. Each concrete mix specified shall be verified by a laboratory trial batch, unless indicated otherwise. Each trial batch shall also be witnessed by a DEP representative.

2. Each trial batch shall be reported on DEP's Mix Design Submittal (MDS) forms and shall include the following testing:

   a. Aggregate gradation for fine and coarse aggregates.

   b. Combined aggregate gradation including total percentage of each aggregate size retained on each sieve.

c. Fly ash testing to verify meeting specified properties, unless certification by an independent testing laboratory is provided by the fly ash supplier.

d. Slump.

e. Air content.

f. Compressive strength based on 3 cylinders tested at 7 days and 3 cylinders tested at 28 days (6 cylinders minimum.)

g. Shrinkage test, as specified herein, for Class 45 concrete except Class 45M.

3. Each trial batch shall provide the following information:

a. Project identification name and number.

1) Specified strength f'c.

2) Name of the concrete producer supplying materials.

3) Name of the Design Trial Lab.

b. Date of trial.

c. Complete identification of aggregate source of supply.

d. Tests of aggregates for compliance with specified requirements.

e. Scale weight of each aggregate.

f. Absorbed water in each aggregate.

g. Brand, type and composition of cement.

h. Brand, type and amount of each admixture.

i. Amounts of water used in trial mixes.

j. Proportions of each material per cubic yard.

k. Gross weight and yield per cubic yard of trial mixtures.

l. Measured slump.

m. Measured air content.

n. Shrinkage test results where required and as specified herein.

o. A minimum of three (3) trial runs with different water/cement ratios shall be performed for each mix design proposed.

p. Compressive strength developed at 7 days and 28 days, and if required, 56 days or longer. A minimum of three (3) test cylinders shall be cast for each 7-day, 28-day and/or 56-day test for each trial run.

4. The requirement for a trial batch may be waived if the required test information has been provided in a previous laboratory trial batch run on

the identical mix design within the previous twelve (12) months and the history of the concrete mix field results are acceptable to the Supervising Engineer for Construction. The same brand, type, source and supplier of all materials must have been used.

5. On the day of the trial test, the laboratory shall provide to the DEP witness a 1-2 lb. neat cement sample for delivery to the DEP Laboratory for chemical composition analysis, for fly ash and slag and cement.

C. Shrinkage Test:

1. Drying shrinkage tests, as specified herein, shall be performed with every trial batch test.

2. Drying shrinkage specimens shall be 4-inch by 4-inch by 11-inch prisms with an effective gage length of 10 inches, fabricated, cured, dried and measured in accordance with ASTM C 157 modified as follows: Specimens shall be removed from molds at an age of 23 +1 hours after trial batching, shall be placed immediately in water at 70 degrees F +3 degrees F for at least 30 minutes, and shall be measured within 30 minutes thereafter to determine original length and then submerged in saturated lime water at 73 degrees F +3 degrees F. Measurement to determine expansion expressed as a percentage of original length shall be made at age 7 days. This length at age 7 days shall be the base length for drying shrinkage calculations ("0" days drying age). Specimens then shall be stored immediately in a humidity control room maintained at 73 degrees F +3 degrees F and 50 percent +4 percent relative humidity for the remainder of the test. Measurements to determine shrinkage expressed as percentage of base length shall be made and reported separately for 7, 14, 21, and 28 days of drying after initial 7 days of moist curing.

3. The drying shrinkage deformation of each specimen shall be computed as the difference between the base length (at "0" days drying age) and the length after drying at each test age. The average drying shrinkage deformation of the specimens shall be computed to the nearest 0.0001 inch at each test age. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004-inch, the results obtained from that specimen shall be disregarded. Results of the shrinkage test shall be reported to the nearest 0.001 percent of shrinkage. Compression test specimens shall be taken in each case from the same concrete used for preparing drying shrinkage specimens. These tests shall be considered a part of the normal compression tests for the project. Allowable shrinkage limitations shall be as specified in Part 2, herein.

1.07 SUBMITTALS

A. General:

1. A new mix design shall be submitted to the Engineer for approval. Prior to changing the brand, type, size or source of cementitious materials,

aggregates, water, ice or admixtures, new historical field strength test data, data from new trial mixtures or evidence which indicates that the change will not adversely affect the relevant properties of the concrete shall be submitted. Proposed mix proportions and all related data, in a format acceptable to the Engineer, shall be submitted to the Engineer for review six (6) weeks before the start of any concreting operations. The complete mix design shall include all components of concrete, including admixtures. Mix designs shall be prepared, signed and sealed by a Professional Engineer licensed in the State of New York.

2. Materials, equipment and aggregates approved by the Materials Bureau of the New York State Department of Transportation (NYSDOT), in the most recent NYSDOT approved lists mentioned below, are acceptable for use without a detailed submission. Submittal is required stating the particular material, equipment or aggregate source to be used with approval identification number, and/or page number.

   a. Materials and Equipment NYSDOT Approved Materials List

   b. Approved List Sources of Fine and Coarse Aggregates

B. Certifications:

1. All materials used in the manufacture of concrete shall be accompanied by a certificate from the manufacturer or fabricator or supplier indicating test results of current production stockpiles or shipments.

2. Submit notarized certification of conformance to referenced standards when requested by Engineer.

C. Delivery Tickets:

1. The Contractor shall submit to the Engineer a copy of the delivery ticket for each load of concrete delivered to the Site. Delivery tickets shall contain all information specified in ASTM C94 Section 14.1.

2. Provide batch tickets for each batch of job-site mixed concrete as specified.

D. Submit samples of materials as specified and as otherwise may be requested by the Engineer, including names, sources, and descriptions.

E. Shop Drawings:

1. Manufacturer’s specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.

2. All information pertinent to a concrete plant to be erected at the site as required by the CPMB Publication “Concrete Plant Standards of the Concrete Plant Manufacturers Bureau.”

3. Detailed description of conveying equipment.

4. Detailed description of concrete placement methods.

5. Proposed procedures for bonding new concrete work to existing including manufacturer's information on proposed bonding agents.
6. Proposed normal procedures for protection and curing of concrete including manufacturer's literature for proposed curing compounds.
7. Proposed special procedures for protection of concrete under wet weather placement conditions.
8. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.
9. Proposed method for underwater placement.
10. Proposed method of measuring concrete surface temperature changes.
11. Detailed procedures and materials for repair of defective concrete.
12. Detailed procedures for removing stains, rust, efflorescence, and surface deposits.
13. Materials and procedures to be used to plug tie holes, other than for Portland cement mortar.
14. Proposed methods to measure concrete compressive strength by means other than field cured cylinders for termination of curing, such as maturity, penetration resistance, pulse velocity, rebound hammer, or pullout strength.
15. The following information, if ready-mixed concrete is used.
    a. Identification of Ready-Mixed Concrete Supplier including the plant location and all pertinent information required by the CPMB Publication "Concrete Plant Standards of the Plant Manufacturers Bureau."
    b. Locations of sources of materials for cement, fine and coarse aggregates, and water, and the brands and types of admixtures to be used.
    c. Physical capacity of mixing plant.
    d. Trucking facilities available.
    e. Estimated average amount which can be produced and delivered to the site during a normal 8-hour day, excluding the output to other customers.
16. Requests and Notifications:
    a. Request to use the volumetric batching method.
    b. Request for acceptance of preplacement activities: This request is to ensure that the pre-placement activities are complete and have been properly inspected. The Contractor shall sign-off on a Concrete Placement Card indicating that the Work is complete and is ready for placement. A sample of the required Concrete Placement Card

is attached at the end of this Section. The Supervising Engineer for Concrete Construction will sign-off on the items to be inspected but this does not relieve the Contractor from coordinating the concrete placement properly and meeting all requirements of the Contract. The Contractor shall submit the completed Concrete Placement Card to the Supervising Engineer for Concrete Construction in accordance with Article 3.01, Paragraph B - Preparation for Concrete of this Section, and with sufficient time to obtain receipt of authorization from DEP to place concrete in conformance with the latest DEP concrete placing guidelines.

c. Advance notification of forthcoming placement including arrangements to coordinate tests and inspection.

d. Requests to exceed the ASTM C 94 required time of discharge.

F. Test and Inspection Reports:

1. Information on types, classes, procedures, names and plant locations for cementitious materials; types, pit or quarry locations, producers' names, gradations and properties required by ASTM C 33 for aggregates; types, brand names, producers' names for admixtures; and source of supply for water and ice.

2. Except for admixtures and water, test results not more than 90 days old confirming the conformance of all concrete materials with applicable specifications.

3. Testing agencies shall submit the results of all tests and inspections performed during the course of the work to the Supervising Engineer for Concrete Construction. Reports from the Testing Agency shall be on forms acceptable to the Supervising Engineer for Concrete Inspection.

4. Submit copies of laboratory test reports for concrete cylinders, materials and mix design tests. Engineer's review will be for information only. Production of concrete to comply with the specified requirements is the responsibility of the Contractor.

5. A complete record of the date and details of each concrete placement including the exact location thereof and the date of removal of forms. This record shall be coordinated with and in addition to that maintained by the Supervising Engineer for concrete inspection.

6. Mixture Proportions:

a. Mixture proportions conforming to the requirements of the New York City Administrative Building Code and this Section for water/cement ratio, cement content, slump, maximum size of coarse aggregate, air content, admixtures, and chloride concentration, as well as compressive strength.

b. Method and test data used to establish proportions.

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. Cementitious Materials

1. Silica fume shall be one of the following:

a. MasterLife SF100 as manufactured by Master Builders Solutions, Beachwood, OH;

b. Force 10,000 D as manufactured by GCP Applied Technologies, Cambridge, MA.;

c. Sikacrete 950 DP as manufactured by Sika Corp., Lyndhurst, NJ;

d. Eucon MSA as manufactured by the Euclid Chemical Company, Cleveland, OH;

e. Or approved equal.

B. Concrete Admixtures:

1. Shrinkage reducing admixtures shall be one of the following:

a. Eclipse as manufactured by GCP Applied Technologies, Cambridge, MA;

b. MasterLife SRA 035 and MasterLife CRA 007, as manufactured by Master Builders Solutions, Beachwood, OH;

c. Or approved equal.

2. Corrosion inhibiting admixture shall be one of the following:

a. DCI or DCI-S, as manufactured by GCP Applied Technologies, Cambridge, MA;

b. MasterLife CI 30 as manufactured by Master Builders Solutions, Beachwood, OH;

c. Eucon CIA, as manufactured by Euclid Chemical Company, Cleveland, OH;

d. Or approved equal.

3. Crystalline waterproofing shall be one of the following:
    a. ADMIX as manufactured by Penetron International, East Setauket, NY;
    b. Sika WT-215P as manufactured by Sika Corp., Lyndhurst, NJ;
    c. MasterLife 300 C or 300D or 300L as manufactured by Master Builders Solutions, MBCC Group, Beachwood, OH;
    d. Krystol Internal Membrane (KIM) as manufactured by Kryton, Vancouver, British Columbia, Canada;
    e. Xypex C-Series as manufactured by Xypex, Richmond, British Columbia, Canada;
    f. Or approved equal.

C. Concrete bonding agent
1. Two component epoxy-resin bonding agent shall be one of the following:
    a. Sikadur 32, Hi Mod LPL, as manufactured Sika Corp., Lyndhurst, NJ;
    b. Dural LPL MV as manufactured by the Euclid Chemical Company, Cleveland, OH;
    c. Pro-Poxy 200 as manufactured by Dayton-Superior, Miamisburg, OH;
    d. FX-752 as manufactured by Simpson Strong-Tie, Pleasanton, CA;
    e. Or approved equal.
2. Three component epoxy modified cementitious bonding agent shall be one of the following:
    a. Sika Armatec 110 EpoCem, as manufactured by Sika Corporation.
    b. Or approved equal.

D. Finishing Aids:
1. Evaporation retardant shall be one of the following:
    a. MasterKure ER 50, as manufactured by Master Builders Solutions, Beachwood, OH;
    b. Eucobar, as manufactured by Euclid Chemical Company, Cleveland, OH;
    c. SikaFilm, as manufactured by Sika Corp., Lyndhurst, NJ;
    d. Or approved equal.

E. Curing and Protection Materials:
1. Curing compounds shall be one of the following:

a. Super Aqua Cure VOX, as manufactured by Euclid Chemical Company, Cleveland, OH;

b. Sealtight 1100, as manufactured by W.R. Meadows, Inc., Hampshire, IL;

c. MasterKure, as manufactured by Master Builders Solutions, Shakopee, MN;

d. Or approved equal.

2. Temperature Monitoring Equipment:

a. IQT-Meter or IQM-Meter as manufactured by James Instruments Inc., Chicago, IL;

b. Or approved equal.

F. Crack Injection Materials:

1. Epoxy:

a. Epoxies for injection shall be one of the following:

1) Sikadur 35, Hi Mod L.V. and Sikadur 31, Hi-Mod Gel, as manufactured by Sika Corp., Lyndhurst, NJ;

2) Dural Injection Gel, as manufactured by Euclid Chemical Company, Cleveland, OH;

3) Or approved equal.

2. Hydrophilic Resin:

a. Hydrophilic resins shall be one of the following:

1) Sika Inject 215, as manufactured by Sika Corp., Lyndhurst, NJ;

2) Or approved equal.

G. Concrete Repair Materials:

1. Concrete repair mortar shall be one of the following:

a. Five Star Structural Concrete, as manufactured by Five Star Products, Inc., Shelton, CT;

b. SikaTop 122 Plus, SikaTop 123 Plus, SikaTop 111 Plus, or Sikacem 133, as manufactured by Sika Corp., Lyndhurst, NJ;

c. MasterEmaco S 488CI or S 466-CI, as manufactured by Master Builders Solutions, Shakopee, MN;

d. Verticoat or Verticoat Supreme, as manufactured by the Euclid Chemical Company, Cleveland, OH;

e. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. All materials used in concrete or the curing and repair of concrete, which can contact potable water, shall be certified as meeting the requirements of ANSI/NSF 61 for contact with potable water when in the finished concrete.

B. Materials listed in this Section apply to all concrete unless specified otherwise in the Contract.

C. Cementitious Materials

1. Cement:

a. Portland cement, ASTM C 150, Type II; or blended hydraulic cement, ASTM C595 Type IP (MS). Cement type used shall be appropriate for site exposures.

1) NYCBC 1904.4

b. Portland cement shall be produced by an acceptable, recognized manufacturer. The cement shall be produced by one plant only per mix design. Alternate cement sources may be used provided that a mix design has been accepted and a trial batch verifying performance has been made.

c. Cement which has deteriorated because of improper storage or handling shall be rejected.

2. Fly Ash and Natural Pozzolans:

a. Fly ash mineral admixture, when used, shall meet the requirements of ASTM C 618 Class F, except as follows:

1) The loss on ignition shall be a maximum of 4%.

2) The maximum percent of sulfur trioxide (SO_3) shall be 4.0.

b. Natural pozzolan mineral admixture, when used, shall meet the requirements of ASTM C 618 Class N.

c. Fly ash and natural pozzolans used in concrete that contacts potable water shall be certified as meeting the requirements of ANSI/NSF 61.

3. Ground Granulated Blast Furnace Slag:

a. Ground granulated blast furnace slag (GGBF) mineral admixture, when used, shall meet the requirements of ASTM C 989, Grade 100 or better.

b. GGBF slag will be permitted as a substitute for fly ash or natural pozzolans, at no additional cost to the City, in the event that Class F Fly Ash or Class N natural pozzolans are not available. The slag substitution shall be in the same proportions and percentages of the total cementitious material as indicated for Fly Ash. A higher

percentage of GGBF slag of the total cementitious material in concrete shall be permitted as approved by the Engineer to suit the project needs.

c. Laboratory trial batches will be tested to determine compliance with strength requirements, times of setting, slump, slump loss, and shrinkage characteristics.

d. GGBF slag used in concrete that contacts potable water shall be certified as meeting the requirements of ANSI/NSF 61.

4. Silica Fume:

a. Silica fume mineral admixture shall be the dry compacted or slurry form and shall meet the requirements of ASTM C 1240. Silica Fume shall be considered to be a cementitious material. Application rate shall be 7 percent by weight of cement, unless indicated otherwise.

D. Aggregate

1. Coarse and fine aggregates shall meet the requirements of ASTM C 33 with the requirements of Table 3, Class 4S. Soundness shall be tested using magnesium sulfate. Abrasion resistance shall be tested using the Los Angeles Abrasion Test. For testing requirements, concrete shall be assumed to be subject to abrasion.

2. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces. Marine dredged aggregates shall not be used.

3. The loading, storing, unloading, and batching of aggregates shall be done in such a manner as to prevent segregation, intermingling, or the inclusion of foreign materials. All aggregates shall remain in free drainage storage until a stable moisture content is attained prior to placement in the batching plant bins. Each size of coarse aggregate and the fine aggregate shall be kept in separate hoppers or bins. All aggregates shall be delivered to the batching plant bins by a belt conveyor or other approved means; and the operation thereof shall be controlled so as to prevent the mixing of the sizes and kinds of aggregates with each other. Any mixture of fine and coarse aggregates or of the two sizes of coarse aggregate in the batching plant bins or prior thereto shall be cause for rejection of such materials, and the affected bin or bins shall be emptied and inspected prior to refilling with the correctly graded aggregate.

4. Fine Aggregates:

a. Fine aggregate shall be composed of clean, sharp, hard, strong, durable, insoluble, uncoated, natural sand free from loam, clay lumps or other deleterious substances.

b. Dune sand, bank run sand and manufactured sand are not acceptable.

c. Sand having FM less than 2.40 or greater than 3.00 shall not be allowed.

d. Fine aggregate shall meet the requirements of ASTM C 33 except that loss when tested for soundness using magnesium sulfate shall not exceed 12 percent.

5. Coarse Aggregates:

a. Coarse aggregate shall be crushed stone processed from natural rock or stone and shall consist of clean, hard, strong, durable, insoluble, unweathered, and uncoated pieces of uniform quality throughout; and shall be free from such alkali, decomposed minerals, organic material, clay, mica, schist, or other foreign matter that will render it unsuitable.

b. Use of slag and pit or bank run gravel is not permitted.

c. Coarse aggregate gradations shall be as specified in Table 1 - Concrete Mix Requirements and shall meet the requirements of ASTM C 33. All aggregate gradations listed for each concrete class shall be used.

d. Coarse aggregate shall meet the requirements of ASTM C 33, Table 3, Class 4S, with the following additional requirements.

1) Clay lumps shall not exceed 1.0 percent by weight of coarse aggregate.

2) Shale and other soft particles shall not exceed 3.0 percent by weight of coarse aggregate.

3) Thin, elongated, or laminated particles shall not exceed 3.0 percent by weight of coarse aggregate.

4) Loss when tested for soundness using magnesium sulfate shall not exceed 12 percent.

e. Coarse aggregate for Lightweight Concrete shall conform to ASTM C 330 and shall meet the gradation requirements for ¾” to No. 4.

f. Nominal maximum size of coarse aggregate shall be not larger than:

1) 1/5 the narrowest dimension between sides of forms, nor

2) 1/3 the depth of slabs, nor

3) 3/4 the maximum clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, bundled tendons or ducts.

g. The requirements of Article 2.02, Paragraph D.5.f, shall not apply if, in the judgment of the Engineer, workability and methods of construction are such that concrete can be placed without honeycombs or voids.

6. Combined Aggregate:

   a. Aggregate gradations shall be determined during trial batch testing and shall be based upon the combined gradation and particle distribution in the mixture of coarse and fine aggregates.

   b. Fine aggregate and coarse aggregate sizes specified shall be combined to produce a workable and cohesive concrete mix that is appropriate for its specific application. Coarse aggregate contents shall be based on Table 6.3.3 of ACI 211.1. Adjust the content required for pumping applications as specified in ACI 211.1.

   c. The total quantity of fine aggregate shall be not more than 45 percent nor less than 32.5 percent by weight of the total aggregate for Normal Weight Concrete. Using a total quantity of fine aggregate which does not meet this specified range shall only be acceptable when approved by the Engineer. The total quantity of fine aggregate shall be not more than 45 percent nor less than 32.5 percent by weight of the total aggregate for Normal Weight Concrete. Using a total quantity of fine aggregate which does not meet this specified range shall only be acceptable when approved by the Engineer

   d. Gradations of combined aggregate shall be plotted and submitted on:

      1) A combined grading chart (percent passing versus sieve size).

      2) An aggregate Particle Distribution Chart (percent retained versus sieve size).

7. Fine and coarse lightweight aggregates for Lightweight Concrete shall conform to ASTM C 330. From 20 to 35 percent shall pass the No. 50 sieve and 10 to 20 percent shall pass the No. 100 sieve in the sand fraction gradation. Normal weight aggregate for Lightweight Concrete shall conform to ASTM C 33.

E. Concrete Admixtures

1. Provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instructions. All admixtures shall be compatible and by a single manufacturer capable of providing qualified field service representation. Do not use admixtures which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by Engineer.

2. Air entraining admixtures shall conform to the NYS DOT Materials Bureau approved list and ASTM C 260.

3. Normal range or midrange water reducing admixture shall be in conformance with ASTM C 494 Type A, and comply with the NYS DOT Materials Bureau approved list.

4. High-Range Water Reducing Admixture:

   a. High range water reducer shall conform to ASTM C 494, Type F or G and comply with the NYS DOT Materials Bureau approved list.

   b. The high range water-reducing admixture shall be accurately measured and added at the batch plant facility. The Contractor may redose the concrete no more than 2 times with the high range water reducer at the site, provided that a calibrated dispenser system and containers of high range water reducer sealed and labeled by the manufacturer are used.

5. Set Controlling Admixture:

   a. Set controlling admixture shall be either with or without water-reducing properties.

   b. Where the air temperature at the time of placement is expected to be consistently over 90 degrees Fahrenheit, a water-reducing set controlled admixture conforming to ASTM C 494, Type D and the NYS DOT Materials Bureau approved list.

   c. Where the air temperature at the time of placement is expected to be consistently under 40 degrees Fahrenheit, except for mass concrete placement, a non-corrosive, non-chloride accelerator conforming to ASTM C 494, Type C and the NYS DOT Materials Bureau approved list shall be used.

6. Shrinkage Reducing Admixture:

   a. A shrinkage-reducing admixture is permitted to be used in the mix design where necessary to meet specified shrinkage limitations provided that specified strength requirements are met and there is no reduction in sulfate resistance and no increase in permeability.

7. Corrosion Inhibiting Admixture:

   a. Corrosion inhibiting admixture shall be a calcium nitrite solution containing a minimum of 30 percent calcium nitrite.

   b. The quantity of mix water shall be adjusted to account for the water portion of the calcium nitrite solution.

   c. As the calcium nitrite solution accelerates setting time, retarding admixtures shall be provided as needed, unless the admixture has been formulated to not accelerate setting.

8. Calcium chloride, admixtures containing thiocyanate, or admixtures containing more than 0.05 percent chloride ions shall not be used.

9. Crystalline Waterproofing, added crystalline based permeability reducing admixture. Crystalline waterproofing admixture use appropriate manufacturer's product for specific contract work.

F. Water

1. Water for concrete, mortar, and grout shall be clean and free from objectionable mineral salts and from injurious amounts of oils, acids, alkalis, organic materials, or other substances that may be deleterious to concrete or steel. Water shall meet the requirements of ASTM C 94.

G. Bonding Agent

1. Provide a two component epoxy-resin bonding agent conforming to ASTM C 881.

2. Provide three component epoxy modified cementitious bonding agent where two component bonding agent does not provide sufficient open time.

H. Finishing Aids

1. Evaporation Retardant:

a. Evaporation retardant shall be a material which seals the surface of plastic concrete to prevent moisture loss. The material shall be able to be worked into the concrete surface by subsequent finishing operations with no adverse effect on finishing effort and no discoloration of the finished concrete.

I. Curing and Protection Materials

1. Absorptive covers shall consist of burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M 182, Class 3.

2. Curing mats shall be heavy carpets or cotton mats, quilted at 4 inches on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.

3. Moisture retaining covers shall conform to ASTM C 171 and consist of one of the following materials.

a. Waterproof paper.

b. Polyethylene film.

c. White burlap-polyethylene sheet.

4. Curing compounds shall conform to the requirements of ASTM C 309 Type 1-D (water retention requirements):

a. Provide fugitive dye when requested by Engineer.

5. Insulation Blankets:

a. Closed cell flexible foam sheet material such as polystyrene or urethane. Foam sheet material which is capable of being bent 90

degrees without breaking or tearing shall be provided at corners. The foam insulation blankets shall be 1/2-inch thick.

b. Quilted, flexible insulation blankets that retain their insulating value when wet and which retard the evaporation of water.

6. Temperature Monitoring Equipment:

a. Thermocouples or thermistors shall be as manufactured by James Instruments Inc. or equal. They shall be suitable for embedment in concrete and capable of registering temperatures within the accuracy of 0.5 degrees Fahrenheit over a minimum temperature range of 20 to 200 degrees Fahrenheit.

b. Temperature monitoring and recording equipment shall consist of rechargeable battery-powered recording thermometers with microprocessors The equipment shall be capable of taking and recording temperature readings at each temperature sensor at preset time intervals. The thermometer units shall be compatible with the temperature sensors used, shall have a non-volatile memory capacity of at least 120 readings per sensor, and shall be designed to be connected to a battery-powered compatible printer unit. Time periods shall be able to be set over a minimum range of 10 to 60 minutes. The thermometer unit shall be designed and constructed for construction conditions. Sufficient thermometer units shall be provided to take readings from all temperature sensors plus one additional backup unit for every ten units in service. One printer unit shall be provided for every 20 thermometer units with sufficient paper supply to record all readings taken.

J. Crack Injection Materials

1. Epoxy:

a. Epoxy for injection shall be a low viscosity, high modulus moisture insensitive type.

2. Hydrophilic Resin:

a. Hydrophilic resin shall be an acrylic-ester based resin with a maximum viscosity of 50 cps. It shall cure into a flexible rubber-like material which has the potential for unrestrained increase in volume in excess of 100 percent in the presence of water.

K. Concrete Repair Materials

1. Concrete repair mortar shall be a prepackaged polymer-modified cementitious repair mortar with the following minimum properties:

a. Compressive strength at one day: 2000 psi (ASTM C 109).

b. Compressive strength at 28 days: 6000 psi (ASTM C 109).

c. Bond strength at 28 days: 1800 psi (ASTM C 882 modified).

2. Cement mortar shall consist of a mix of 1 part cement to 1 1/2 parts sand with sufficient water to form a trowelable consistency. Minimum compressive strength at 28 days shall be 4000 psi. Where required to match the color of adjacent concrete surfaces, white portland cement shall be blended with standard portland cement so that, when dry, the patching mortar shall match the color of the surrounding concrete.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Proportioning and Mixing

1. Prepare concrete design mixes subject to the limitations listed in Table 1 and specified herein so as to create a homogeneous mix and a concrete which meets the specified strength requirements and, of equal importance, provides a concrete which is water tight and durable against deterioration and abrasion. The mix design shall produce a concrete of a consistency which can be placed so as to meet the required finished appearance. The minimum cement necessary to produce the required strength shall be used. This Section applies to concrete mixes using ½ inch and larger nominal maximum aggregate. For mixes using smaller aggregate sizes, see Section 03 60 00 - Grouting. The mix design shall be submitted using the Mix Design Submittal Form at the end of this Section.

2. Air Content:

a. All concrete shall be air entrained unless indicated otherwise.

b. Air content for Normal Weight Concrete shall be as follows:

Nominal Maximum Aggregate Size (in.)	Total Air Content, percent by Volume (+/- 1.5%)
1/2	7
3/4	6
1	6
1-1/2	5.5

3. Lightweight Concrete shall contain 6 percent ±2 percent total air when the nominal maximum size of coarse aggregate is greater than 3/8 in., or 7 percent ± 2 percent when the nominal maximum size is 3/8 in. or less as determined in accordance with ASTM C173.

4. Slump:

a. Slump for all concrete shall be 3 +/- 1 inches, unless indicated otherwise.

b. Where high range water reducing admixture is used, the specified water-cementitious material ratio shall be reduced by 0.02 and

concrete shall be proportioned for no higher than 3-inch slump. The slump after addition of the high range water reducing admixture shall not exceed 8 inches when measured at the point of placement.

c. A tolerance of up to 2 inch above the maximum indicated slump shall be allowed for one batch in any five consecutive batches tested provided that it can be demonstrated that the specified water-cementitious material ratio is not exceeded.

d. The slump of Lightweight Concrete for floors shall not exceed 4 in. at the point of placement.

e. For troweled floors, the slump of structural Lightweight Concrete with 100 percent normal weight sand discharged by pump shall not exceed 4 in. at the point of placement.

5. Shrinkage Limitation:

a. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21-day drying age or at 28-day drying age shall be 0.039 percent or 0.045 percent, respectively. The Contractor shall only use a mix design for construction that has first met the trial batch shrinkage requirements. Shrinkage limitations shall not apply to Class 25 and 40LW concrete, unless indicated otherwise.

b. If the trial batch results fail to meet the shrinkage limitation, the mix shall be redesigned to reduce shrinkage. Alternately, the Contractor may use a higher shrinkage mix when acceptable to the Engineer, provided that the amount of shrinkage reinforcement in the structures is increased as determined by the Engineer to resist the higher levels of shrinkage stresses. The additional reinforcing shall be provided at the Contractor's expense.

6. The percentage of mortar in the concrete mix shall not exceed 60 percent for Class 50, 45 and 45F concrete. Exceeding this specified mortar percentage shall only be acceptable when approved by the Engineer.

7. The unit weight limitations for Lightweight Concrete shall be as shown on the Contract Drawings.

8. Proportioning: Concrete proportions shall be determined in accordance with the provisions of Sections 1905.2.1 through 1905.2.3 of the NYCBC.

a. Proportions of materials for concrete shall be established to provide

1) The proportioning of ingredients shall produce a mixture that will provide workability and consistency to permit concrete to be worked readily into the corners and angles of the forms and around reinforcement by the methods of placing and consolidation employed on the work, but without permitting

the materials to segregate or excessive bleeding. Yield of all mixes as designed shall not exceed 27.2 cu.ft./cu.yd.

2) Resistance to special exposures are required by NYCBC Section 1904.

3) Conformance with the strength test requirements of Sections 1905.6

b. Concrete is to meet the durability requirements of Section 1904 of NYCBC.

c. Where different materials are to be used for different portions of proposed work, each combination shall be evaluated.

d. Concrete proportions shall be established in accordance with NYCBC Section 1905.3 or Section 1905.4, and shall comply with the applicable requirements of Section 1904.

1) NYCBC Section 1905.3 - Proportioning on the basis of field experience/or trial mixtures. Concrete proportioning determined on the basis of field experience or trial mixtures shall be done in accordance with ACI 318, Section 5.3. If the required f'_c is obtained for trial batch mixed prior to the date specified, the trial mix design may be approved. All mixes shall be approved by the Engineer prior to construction.

2) NYCBC Section 1905.4 - Proportioning without field experience. Concrete proportioning determined without field experience or trial mixtures shall be done in accordance with ACI 318, Section 5.4. This method of proportioning shall not be permitted for load-carrying structural concrete or concrete mix proportions that are required to conform to NYCBC Section 1904.

e. Proportioning on the basis of field experience and/or trial mixtures using a mix design employing the same ingredients proposed for use, and used successfully on a previous project, or projects, may be used provided the following are submitted by a licensed concrete testing laboratory and approved by the Design Engineer of record in conformance with NYCBC 1905.3 and ACI 318 Section 5.3..

1) The name and location of the plant from which the concrete will be batched.

2) The concrete mix design including detailed data and analysis of the ingredients proposed for use as specified herein.

3) Reports for at least 30 (thirty) consecutive tests of 7 day and 28 day concrete strength tests of the proposed mix made during the previous twelve months of concrete batched and delivered from the same plant that is to furnish this job.

These data shall include an evaluation in accordance with ACI 214R to determine the average strengths, moving averages and the coefficients of variation. In addition, the results of a minimum of 3 shrinkage tests for this mix made during the previous twelve months and using the same materials to be used on this project.

4) Reports of compliance tests of fine and coarse aggregates made during the above tests.

f. Average strength reduction. As data becomes available during construction, it is permissible to reduce the amount by which the average compressive strength (f'_c) is required to exceed the specified value of f'_c in accordance with ACI 318, Section 5.5

g. Evaluation and acceptance of concrete. The criteria for evaluation and acceptance of concrete shall be as specified in NYCBC Sections 1905.6.3.3 through 1905.6.5.5.

h. Qualified technicians. Concrete frequency and testing shall be tested in accordance with the requirements of NYCBC Section 1905.6.2 thru 1905.6.5.5. An agency shall performs tests on fresh concrete at the job site, prepare specimens required for curing under field conditions, prepare specimens required for testing in the laboratory and record the temperature of the fresh concrete when preparing specimens for strength tests. All field sampling and testing, including the testing of aggregates, concrete mixes, and strength testing of specimens, shall be subject to special inspection by an approved agency. All testing laboratories shall be approved testing agencies and shall employ qualified special inspectors to perform all required laboratory tests. Test results from the testing laboratory shall be promptly distributed by the Contractor to the concrete producer and the Engineer.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Inspection

1. The Contractor and its installer shall examine the substrate and the conditions under which Work is to be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.

B. Preparation for Concrete

1. All reinforcement, installation of waterstop, positioning of embedded items, and condition of formwork shall be inspected and approved by the Supervising Engineer for Concrete Construction prior to concrete placement. Contractor shall provide written notice of intention to place concrete a minimum of one (1) working day prior to placement.

2. The Contractor shall provide the following preparation before placing of concrete.

a. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.

b. Formwork shall have been completed in conformance with Section 03 10 00 - Concrete Forming and Accessories; ice and standing water shall have been removed; reinforcement shall have been secured in place in conformance with Section 03 21 00 - Reinforcing Steel; expansion joint material, anchors and other embedded items shall have been positioned. Concrete shall not be placed on frozen ground.

c. Subgrade shall be watered sufficiently to achieve surface saturated density of subgrade materials.

d. Soft spots in subgrade shall be removed and replaced with approved backfill materials.

e. No concrete shall be placed until the entire preparation has been approved by the Supervising Engineer for Concrete Construction or his authorized representative.

f. When high ambient temperatures necessitate protection of concrete immediately after placing or finishing, make provisions in advance of concrete placement for windbreaks, shading, fogging, sprinkling, ponding, or wet covering with a light colored material.

g. During cold weather, make provisions in advance of concrete placement to maintain the temperature of the concrete above 55ºF. Use heating, covering or other means adequate to maintain the required temperature without injury to concrete due to concentration of heat. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases containing carbon dioxide.

3.02 IMPLEMENTATION

A. Mixing and Transporting Concrete

1. General:

a. The Contractor shall provide the production of concrete which includes batching, mixing, delivering, and discharging of concrete according to the following requirements.

2. Ready-Mixed Concrete:

a. Ready-Mixed concrete shall be batched, mixed and transported in accordance with the appropriate sections of "Specifications for Ready-Mixed Concrete" (ASTM C 94 or ASTM C685). Follow the detailed recommendations given in Guide for Measuring, Mixing, Transporting, and Placing Concrete (ACI 304R), where applicable.

b. Each truck mixer or agitator shall have attached thereto in a prominent place a metal plate issued by the Truck Mixer's Manufacturer's Bureau by the manufacturer complying with Section 11.1.2 of ASTM C 94 for that truck mixer and the limitations thereon shall be strictly adhered to.

c. Ready-mixed concrete shall only be batched in plants which meet the following:

1) Concrete plants shall be certified by the National Ready Mixed Concrete Association (NRMCA) and shall comply with the rules of the department.

2) Upon written application by the producer, accompanied by a detailed report on how the facilities compare with the standards of the NRMCA, the above requirements may be waived, in writing by the Engineer.

3) If the detailed report mentioned above is issued by the testing agency which will perform the inspection of the batching and mixing of the concrete and indicates that satisfactory quality concrete can be produced by the plant in question, based on prior job performance records, then the above requirement will be waived, in writing, by the Supervising Engineer for Concrete Construction.

d. Approval of plants as outlined above is subject to the continuous checking and acceptance by the Commissioner or his duly authorized representative.

e. Only plants meeting the requirements for certification of the NRMCA for automatic batching and automatic recording will be permitted.

1) If at any time automatic proportioning or recording instruments become inoperative, the plant may be allowed to batch concrete manually or operate with manual recording for a period of not more than 48 working hours from the time of breakdown.

2) If at the end of 48 working hours, the plant is still not in operating order, the following shall be complied with:

a) DEP shall be contacted and an independent inspector, other than the regular plant inspector shall be assigned to each batching operation at the plant, at no additional cost to the City.

b) Additional inspectors shall observe and record the weight of each component of the batch.

c) The manually recorded batch weights shall appear on a ticket presented to inspection personnel at the project site.

f. Concrete producers shall have their plants inspected quarterly by NYSDOT.

g. Concrete producers shall have their scales and trucks certified quarterly by NYSDOT.

3. Batch Mixing at Site:

a. The concrete shall be produced in a plant conforming to the requirements of the "Concrete Plant Standards" of the Concrete Plant Manufacturer's Bureau and ACI 318, Section 5.8.3. Prior to erection of such plant at the site, the Contractor shall submit to the Supervising Engineer for Concrete Construction, for approval, all pertinent data relative to the plant.

b. All components of the plant must bear the proper rating plates issued by the Concrete Plant Manufacturers Bureau and the limitations thereon shall be strictly adhered to.

c. On job site plants for jobs requiring less than 1000 cubic yards of structural concrete or a job site plant that would operate for less than 30 working days duration, the requirements of Article 3.02 Paragraph A.2.e. for automatic batching and automatic recording will be waived. If at any time automatic proportioning devices or recording instruments become inoperative, follow the provisions of Article 3.02, Paragraphs A.2.e.1 and A.2.e.2.

d. The batch shall be so charged into mixer that some water will enter in advance of the cement and aggregates. Water shall continue to flow for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to insure that the batch cannot be discharged until the required mixing time has elapsed. When concrete of normal weight is specified, controls shall be provided to insure that no additional water may be added during mixing. The entire batch shall be discharged before the mixer is recharged.

e. Each batch of 2 cu.yd. or less shall be mixed for not less than 1 1/2 minutes. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof. Shorter mixing time may be permitted provided performance tests made in accordance with ASTM C 94 indicate that the time is sufficient to produce uniform concrete. At least three quarters of the required mixing time shall take place after the last of the mixing water has been added. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Replace mixer blades when they have lost 10 percent of their original weight.

f. When small quantities of concrete are produced on the site, measure solid materials by weight, and liquid or paste materials by weight or by volume. Mix all materials in a mechanical mixer. If packaged dry combined materials are used, they shall conform to the requirements of ASTM C 387, and shall be capable of satisfying the requirements of this Standard Specification.

4. Control of Admixtures:

a. Air entraining and chemical admixtures shall be charged into the mixture as a solution and shall be dispensed by an automatic dispenser or similar measuring device. The accuracy of measurement of any admixture shall be within ±3 percent. Admixtures shall be charged into the mixer in such manner as not to come into direct contact with the cement.

b. Two or more admixtures may be used in the same concrete provided such admixtures are added separately during the batching sequence and provided further that evidence is submitted to show that the admixtures used in that combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.

c. All admixtures shall be added prior to mixing.

5. Structural Lightweight Concrete:

a. This section covers the requirements for production of structural Lightweight Concrete and appurtenances in structures. Portions of the structure to be treated as Lightweight Concrete under the provisions of this Section are so designated on the Contract Drawings. Lightweight Concrete shall comply with all requirements of this Section unless otherwise specified in the Contract.

b. Performance and Design Requirements:

1) Entrain air in Lightweight Concrete that will be exposed to freezing and thawing conditions. Use 6 ±2 percent total air content when the nominal maximum size of aggregate is greater than 3/8 in. Use 7 ±2 percent total air content when

the nominal maximum size is 3/8 or less. Determine the air content by the volumetric methods of ASTM C 173. Select concrete mixture proportions for concrete to provide a compressive strength as required by the Contract Drawings.

2) Use ASTM C 150 Type II or Type V cement for Lightweight Concrete required to be chemical-resistant. Select concrete mixture proportions to provide a specified minimum compressive strength 4000 psi, unless otherwise specified on the Contract Drawings.

c. Mixtures:

1) Proportion Lightweight Concrete mixtures to meet the specified limit on maximum air-dry unit weight as determined by the method of ASTM C 567. Correlate the air-dry unit weight with the fresh unit weight of the same concrete to permit use of the latter as the basis for acceptance during construction.

2) Determine the cement factor needed to attain the required strength for Lightweight Concrete in accordance with the N.Y. City Administrative Building Code and relate strength to cement content of the concrete.

d. Batching and Mixing:

1) Batch and mix lightweight aggregate concrete as recommended by the aggregate producer and the concrete producer, and in accordance with this Section. If the procedure recommended by the aggregate producer and the concrete producer is at variance with this Section, submit the producers' recommendations to the Engineer for acceptance.

2) For low absorption aggregate, batch and mix aggregate that has been shown to absorb less than 2 percent water by weight during the first hour after inundation. Test aggregate for water absorption with the minimum moisture content likely to occur on the job. Pre-dampening may be used to achieve this condition.

3) For high absorption aggregate, batch and mix concrete made with lightweight aggregates absorbing 2 percent water by weight or more by:

a) First, add the aggregate to approximate 80 percent of the mixing water and mix for a minimum of 1 1/2 minutes in a stationary mixer or 15 revolutions at mixing speed in a truck mixer.

b) Then add any admixtures, the cement, and the withheld portion of mixing water and complete the mixing.

4) Additional water may be added to the mixture, if needed, to bring the mixture to the specified slump after truck transport. Increase the slump of concrete entering the pump as required to maintain the specified slump at the point of placement.

5) The lightweight aggregate shall be presoaked by vacuuming, ponding, or sprinkling continuously with water until the aggregate moisture content is sufficient to minimize slump loss through the pump line. Slump loss through the pump line shall not exceed 4 inches. The presoaking period shall be up to 30 days or as required by the Engineer after determination at the batch plant.

6. Tempering and Control of Mixing Water:

a. Concrete shall be mixed only at the mix plants or at the job site. Concrete shall be mixed in quantities not to exceed immediate job placement requirements.

b. The addition of any water to the mix while the truck is en route from plant to job site is strictly prohibited. Mixing in transit is strictly prohibited. Agitating in transit is permitted, but shall be kept to a minimum.

c. When concrete arrives at the point of delivery with a slump below that which will result in the specified slump at the point of placement and is unsuitable for placing at that slump, the slump may be adjusted to the specified value by adding water if all the water required in the accepted mixture proportions has not been added at the start of mixing and if permitted by the Engineer. Addition of water shall be in accordance with ASTM C 94. Neither the specified water-cement ratio nor slump shall be exceeded. Do not make slump adjustments after 15 percent of the batch has been unloaded. Do not add water to concrete containing a plasticizing or a high range water reducing admixture. Do not add water to concrete in delivery equipment not acceptable for mixing. Measure air content of air-entrained concrete, after slump adjustment, to verify compliance to specified requirements.

d. Each increment of water added at the job site must be incorporated by additional mixing by turning the drum not less than 30 revolutions. The addition of the increments of water and the start of the mixing procedures shall not be commenced earlier than one-half hour prior to the beginning of discharge. From the time the batch or load has been mixed to the specified slump, no further water shall be added to the concrete.

e. Discharge of the concrete shall be completed within the limits set out in the following table. Time and drum revolution limits shall be measured from the introduction of any mixing water to the cement and aggregates or the introduction of the cement to the aggregates (ribbon loading).

CONCRETE DISCHARGE REQUIREMENTS	
Concrete Temperature	**Limit**
Over 90 degrees F	Concrete shall be removed from site and discarded
85° to 90 degrees F	1 hour or 300 revolutions, whichever comes first
80° to 85 degrees F	1 hour 15 minutes or 300 revolutions, whichever comes first
70° to 80 degrees F	1 hour 30 minutes or 300 revolutions, whichever comes first
Below 70 degrees F	2 hours or 300 revolutions, whichever comes first

7. Weather Conditions:

a. Cold Weather:

1) To maintain the temperature of the concrete above the minimum placing temperature required by Article 3.02, Paragraph B.4.c, the as-mixed temperature shall not be less than 55 degrees F when the mean temperature falls below 40 degrees F. Follow the detailed recommendations given in "Cold Weather Concreting" (ACI 306R), where applicable.

2) If water or aggregate has been heated above 100 degrees F, the water shall be combined with the aggregate in the mixer before cement is added. Cement shall not be added to mixtures of water and aggregate when the temperature of the mixture is greater than 90 degrees F.

b. Hot Weather:

1) The ingredients shall be cooled before mixing if necessary to maintain the temperature of the concrete below the maximum placing temperature required by Article 3.02, Paragraph B.4.c. The temperature of the concrete at initial discharge shall not exceed 85 degrees F. Follow the detailed recommendations given in "Hot Weather Concreting" (ACI 305R), where applicable.

c. Under special circumstances, and with written approval of the Supervising Engineer for Concrete Construction, the above provisions as to the initial discharge temperature of the concrete may be modified.

d. Accelerators or retarders may be used with the approval of the Supervising Engineer for Concrete Construction. When permitted, they shall be used in accordance with "Hot Weather Concreting" (ACI 305R).

8. Mixing Small Quantities of Concrete:

a. Only when permitted by the Supervising Engineer for Concrete Construction, small quantities of concrete may be mixed either by a small manually controlled portable mixer or by hand. In such cases, volumetric measurement of aggregates will be permitted.

b. Concrete shall be hand mixed on a watertight platform. Cement and aggregates shall first be mixed dry until a uniform color is obtained. Water shall then be added and the entire mass turned over at least six times, or until the mixture is uniform and of the required consistency. Not more than one-half cubic yard of concrete shall be hand mixed in any batch.

B. Concrete Placement

1. General:

a. The Contractor shall provide concrete placement including preparation before placing, conveying, depositing, consolidation, weather protection, bonding, underwater concreting, and placing of grout and mortar according to the following requirements.

2. Conveying:

a. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients and in a manner which will assure that the required quality of the concrete is obtained. Follow the detailed recommendations given in ACI 304R, where applicable.

b. Conveying equipment shall be of size and design to insure a continuous flow of concrete at the delivery end and shall be approved. Conveying equipment and operations shall conform to the following requirements:

1) Conveying equipment shall contain no aluminum components.

2) Truck mixers, agitators, and non-agitating units and their manner of operation shall conform to the applicable requirements of Article 3.02.A.

3) Belt conveyors shall be horizontal or at a slope which will not cause segregation or loss. Protect concrete to minimize drying and effects of temperature rise. Use an acceptable discharge hopper at the discharge end to prevent segregation. Do not allow mortar to adhere to the return length of the belt.

4) Chutes shall be metal or metal-lined having rounded bottoms and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

5) Pump equipment shall be of suitable kind and adequate pumping capacity and shall be subject to approval by the Supervising Engineer for Concrete Construction. Placement shall be controlled so that segregation does not occur in the discharged concrete. Test cylinders for strength and tests for slump, temperature, and air content shall be made on samples of concrete taken at point of discharge from the pump line.

6) The provisions of Article 3.02, Paragraph B.2.b.4 shall apply to placement methods delivering concrete through lines using pneumatic air pressure.

7) The provisions of Article 3.02, Paragraphs B.2.b.4 and B.2.b.5 are not applicable to gunned mortar applications.

3. Depositing:

a. Concrete shall be deposited continuously, or in lifts not to exceed 18 inches in thickness such that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located at points as provided for in the drawings or as approved. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior approval has been obtained. Detailed recommendations are given in ACI 304R, where applicable.

b. Placing of concrete in supported elements shall not be started until the concrete previously placed in columns and walls is no longer plastic and has been in place at least two hours.

c. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any procedure which will cause segregation.

d. Place concrete for beams, girders, brackets, column capitals, haunches, and drop panels at the same time as concrete for slabs.

e. When underwater placement is required or permitted, place concrete by a method acceptable to the Engineer. Deposit the fresh concrete so the concrete enters the mass of the previously placed concrete from within, displacing water with a minimum disturbance to the surface of the concrete.

f. Where a surface mortar is to be the basis of the finish, the coarse aggregate shall be worked back from the forms with a suitable tool so as to bring a full surface of mortar against the form, without the formation of excessive surface voids. All concrete shall be consolidated by internal vibration, spading, rodding, or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting or planes of weakness. Use internal vibrators of the largest size and power that can properly be used in the Work. Over-vibrating and use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at many points, approximately 18 in. apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 sec. duration. A spare vibrator shall be kept on the job site during all concrete placing operations. Follow the detailed recommendations given in of ACI 309R, where applicable. Workers shall be experienced in use of the vibrators.

    1) External vibration shall only be used when explicitly permitted by the Supervising Engineer for Concrete Construction. Vibrating operations shall be continuous throughout the entire section where concrete is being deposited. Vibrators shall be clamped to the studs or wales or in pairs so that while one is vibrating the other can be shifted to insure constant vibration. External vibration shall conform to the requirements of ACI 309R.

g. Execution:

    1) Do not vibrate Lightweight Concrete to the point that large particles of aggregate float to the surface.

    2) Do not work Lightweight Concrete to the point that mortar is driven down and an excess of the lightweight aggregate appears at the surface.

h. Self-Supporting Floors and Roofs:

1) Reinforced Concrete Beams and Girders shall be cast monolithically with adjoining arches.

2) Canopies, Cornices and Marquees shall be monolithically cast with floor arches, with profiles true to indicated contours. Top surfaces of canopies and marquees shall be pitched to drain. Exposed soffits and edges shall be rubbed with carborundum stone and left clean and true.

4. Protection, Weather, Placing and Preparation of Forms:

a. Concrete placed during rain, sleet or snow, or when the mean daily temperature falls below 40 degrees F or is expected to be below 40 degrees F during placing or within 24 hours thereafter or rises above 90 degrees F shall be adequately protected as provided in Article 3.02, Paragraph C. and approval for placement shall be obtained from the Supervising Engineer for Concrete Construction.

b. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.

c. Placing temperature:

1) When the mean daily temperature falls below 40 degrees F, the minimum temperature of concrete as placed shall be 50 degrees F. Follow the detailed recommendations given in "Cold Weather Concreting" (ACI 306R), and in accordance with NYCBC Section 1905.12, where applicable.

2) Concrete deposited in hot weather shall have a placing temperature which will not cause difficulty from loss of slump, flash set, or cold joints. The temperature of the concrete preferably should be less than 80 degrees F and shall not exceed 90 degrees F unless permitted by the Supervising Engineer for Concrete Construction. Loss of slump, flash set, or cold joints due to the temperature of the concrete as placed will not be acceptable. When the temperature of the steel is greater than 120 degrees F, fog the steel forms and the reinforcement with water just prior to placing the concrete. Follow the detailed recommendations given in "Hot Weather Concreting" (ACI 305R) and in accordance with NYCBC Section 1905.13, where applicable.

d. Placing:

1) Adequate skilled personnel and equipment shall be available to handle and place the concrete immediately upon delivery.

2) Dry surfaces shall be wet down before commencing placement of concrete.

3) Temperature of surfaces to receive concrete (earth, forms, reinforcing steel, etc.), should approximate the temperature of the concrete being placed.

4) Evaporation rate of water from freshly placed concrete should be held to a minimum by:

a) Shading of operations.

b) Reducing air circulation in area of operations.

c) Maintaining fog spray during operations.

5) Cold Joints shall be avoided. This can be accomplished by:

a) Providing adequate skilled personnel to handle and place the concrete immediately after its delivery to the forms at an acceptable temperature.

b) Placing in layers thin enough and areas small enough so that vibration or working of the concrete will insure complete union of adjacent layers.

c) Lengthening of setting time by use of approved water reducing retarders.

d) Placing a bulkhead at a suitable point where placement is stopped temporarily.

6) Loss of slump shall be kept at a minimum. This can be accomplished by:

a) Minimum lapse of time between mixing and placing.

b) Avoiding delays in batch mixing and truck dispatching.

c) Job conditions and equipment (chutes, access runs, etc.) being organized to prevent additional mixing.

d) Use of approved water reducing retarders.

e. Preparation of forms:

1) All forms or surfaces (subgrades, reinforcing steel) to receive concrete, in addition to the normal requirements of tightness, soundness, being free of debris, etc., shall be:

a) Protected against excessive air currents.

b) Sprinkled systematically with cool water.

2) Note: Wetting down around the work will cool the surrounding air and increase the humidity, thus reducing temperatures and evaporation from the concrete.

5. Bonding:

a. When specified, the surface of joints shall be prepared in accordance with Section 03 32 00 - Joints in Concrete.

b. The hardened concrete of joints between footings and walls or columns, between walls or columns and beams or floors they support, joints in unexposed walls and all other not mentioned below shall be dampened (but not saturated) immediately prior to placing of fresh concrete.

c. The hardened concrete of horizontal construction joints in exposed work; horizontal construction joints in the middle of beams, girders or joints, and slabs; and horizontal construction joints in work designed to contain liquids shall be dampened (but not saturated) then thoroughly covered with a coat of neat cement mortar of similar proportions on vertical surfaces and at least 1/2 in. thick on horizontal surfaces. The fresh concrete shall be placed before the mortar has attained its initial set.

d. Joints receiving an adhesive shall have been prepared and adhesive applied in accordance with the manufacturer's recommendations prior to placing of fresh concrete.

e. Surfaces of joints which have been obtained by the use of a chemical retarder shall have been prepared in accordance with the manufacturer's recommendations prior to placing of fresh concrete.

6. Concreting Under Water:

a. Placing concrete in water will be permitted only when approved by the Supervising Engineer for Concrete Construction. Concrete deposited under water shall be carefully placed in a compacted mass in final position by means of a tremie, a closed bottom dump bucket or other approved means, and shall not be disturbed after being deposited. Special care must be exercised to maintain still water at the point of deposit. Concrete shall not be placed in running water. Underwater formwork shall be reasonably watertight. The consistency of the concrete shall be carefully regulated and special care shall be exercised to prevent segregation of materials. The method of depositing concrete shall be regulated to produce approximately horizontal surfaces.

b. When a tremie is used, it shall consist of a tube having a diameter of not less than 10 in. and constructed in sections having flanged couplings fitted with gaskets. The tremie shall be supported to permit free movement of the discharge end over the entire top

surface of the work and shall permit rapid lowering when necessary to choke off or retard the flow. The discharge end shall be entirely sealed at all times and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper, the tremie shall be slightly raised, but not out of the concrete at the bottom, until the batch discharges to the bottom of the hopper. The flow shall then be stopped by lowering the tremie. The flow shall be continuous until the pour has been completed.

c. When a bucket is used to place concrete in water, it shall have a capacity of not less than 1/2 cubic yard.

7. Protection and Cleaning of Exposed Structural Steel:

a. The Contractor shall take all necessary precautions to prevent mortar and concrete splashes on the steel. The Contractor shall exercise care to prevent abrasion or scuffing of the paint on the structural steel while concrete is being formed, placed or stripped.

b. The Contractor shall thoroughly clean the structural steel of all concrete drippings or other foreign matter that may have been deposited on the steel or on any other part of the structure as a result of his operations. All the work involved in thoroughly cleaning the steel shall proceed before concrete drippings have hardened. Immediately after the concrete has been placed, the Contractor shall clean the steel with water and/or such other additional means subject to the approval of the Supervising Engineer for Concrete Construction as may be necessary to remove all mortar, concrete and other foreign matter that has been dropped, dripped, splashed or otherwise deposited on the steel as a result of his operations. It will be the Contractor's obligation and responsibility to remove all foreign matter to the satisfaction of the Supervising Engineer for Concrete Construction.

c. After formwork has been removed, any concrete or other foreign material that may have been previously missed and that still remains on the steel shall be removed.

8. Concrete finishes shall conform to the requirements of Section 03 35 00 - Concrete Finishing.

C. Concrete Curing and Protection

1. General:

a. Protect all freshly deposited concrete from premature drying, from weather elements, from defacement, from flowing water, and from mechanical injury. The concrete shall be maintained with minimal moisture loss at a relatively constant temperature for a period of time necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements specified herein.

b. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for maintaining the concrete in a moist condition for at least a 7-day period thereafter except for high early strength concrete, for which the period shall be at least the first three days after placement. Horizontal surfaces shall be kept covered, and intermittent, localized drying will not be permitted.

c. Concrete curing shall be in accordance with NYCBC Section 1905.11.

2. Curing Methods:

a. The Contractor shall use one of the following methods to insure that the concrete remains in a moist condition for the minimum period stated above.

1) Ponding or continuous fogging or sprinkling.

2) Application of mats or fabric kept continuously wet.

3) Continuous application of steam (under 150 degrees F).

4) Application of sheet materials conforming to ASTM C 171.

5) If approved by the Engineer, application of a curing compound in accordance with Article 3.02, Paragraph C.7.

6) High Early Strength concrete shall be maintained above 50 degrees F and in a moist condition for at least the first 3 days. Accelerated curing of concrete shall comply with ACI 318, Section 5.11.3.

3. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in Article 3.02, Paragraph C.2.

4. Any of the curing procedures used in Article 3.02, Paragraph C.2 may be replaced by one of the other curing procedures listed in Article 3.02, Paragraph C.2 after the concrete is one-day old. However, the concrete surface shall not be permitted to become dry at any time.

5. Curing Concrete under Cold Weather Conditions:

a. Curing under cold weather conditions shall conform to the requirements of ACI 306.

b. Stripping time for forms and supports shall be increased as necessary to allow for retardation in concrete strength caused by colder temperatures. This retardation is magnified when using concrete made with blended cements or containing fly ash or ground granulated blast furnace slag. Therefore, curing times and stripping times shall be further increased as necessary when using these types of concrete.

c. The methods of protecting the concrete shall be approved by the Engineer and shall prevent local drying. Equipment and materials approved for this purpose shall be on the site in sufficient quantity before the work begins. The Contractor shall assist the Engineer by providing holes in the forms and the concrete in which thermometers can be placed to determine the adequacy of heating and protection. All such thermometers shall be furnished by the Contractor in quantity and type which the Engineer directs.

6. Curing Concrete under Hot Weather Conditions:

a. When air temperatures exceed 85ºF, the Contractor shall take extra care in placing and finishing techniques to avoid formation of cold joints and plastic shrinkage cracking. If ordered by the Engineer, temporary sun shades and/or windbreakers shall be erected to guard against such developments, in addition to generous use of wet burlap coverings and fog sprays to prevent drying out of the exposed concrete surfaces.

b. Curing and protection of the concrete shall begin immediately after completion of the finishing operation. Continuous moist-curing, consisting of methods listed in Article 3.02, Paragraph C.2.a.1 or C.2.a.2, is mandatory for at least the first 24 hours. Method specified in Article 3.02, Paragraph C.2.a.2. may be used only if the finished surface is not marred or blemished during contact with the coverings.

c. At the end of the initial 24-hour period, curing and protection of the concrete shall continue for at least four (4) additional days using one of the methods listed in Article 3.02, Paragraph C.2.

d. Curing procedures during hot weather conditions shall conform to the requirements of ACI 305.

7. Use of Curing Compound:

a. Curing compound shall not be used on surfaces to receive subsequent coatings. Curing compound shall not be used on surfaces exposed to water in potable water storage tanks and treatment plants unless curing compound is certified in accordance with ANSI/NSF Standard 61.

b. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time period, and the subsequent appearance of the concrete surface shall not be affected.

c. The compound shall be applied in accordance with the manufacturer’s recommendations after water sheen has disappeared from the concrete surface and after finishing operations. The rate of application shall not exceed 300 square feet per gallon. For rough surfaces, apply in two directions at right angles to each other.

8. Early Termination of Curing:

   a. Moisture retention measures may be terminated earlier than the specified times only when at least one of the following conditions is met:

      1) The strength of the concrete reaches 85 percent of the specified 28-day compressive strength in laboratory-cured cylinders representative of the concrete in place, and the temperature of the in-place concrete has been constantly maintained at 50 degrees Fahrenheit or higher.

      2) The strength of concrete reaches the specified 28-day compressive strength as determined by accepted nondestructive methods or laboratory-cured cylinder test results.

      3) Tests are made of cylinders kept adjacent to the structure and cured by the same methods and reach 70 percent of the specified compressive strength f'_c as determined in accordance with ASTM C 39.

9. Protection:

   a. Floors which have received their final finish shall be closed to all traffic for at least 48 hours following the completion of trowelling. Thereafter, before the floor is subjected to any traffic, it shall be covered with paper covering meeting the requirements of ASTM C 171. This protection shall be maintained as long as necessary to avoid damage to the floor.

   b. During the curing period, and thereafter as conditions may require, the concrete shall be protected from damaging mechanical disturbances, particularly excessive load stresses, heavy shock, and excess vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

   c. Following removal of protective paper, the surface shall be protected from painting and other work. All stains shall be removed.

D. Mass Concrete

1. Concrete sections 4 feet or more in the least dimension are termed mass concrete and shall conform to the special provisions of this article in addition to all applicable provisions of other articles in this Section. Mass concrete proportioning, placement, consolidation and curing shall be in accordance with ACI 304R, 309R, 211.1, and 207.1R.

2. Additional requirements for heating, cooling, curing and protecting concrete sections more than 6 feet in the least dimension shall be as

specified in the Contract. Consideration shall be given to temperature rise caused by the hydration of the cement. Large differences in temperature within the concrete shall be avoided.

3. Proportioning and Mix Design:

   a. Materials and mix proportioning for mass concrete shall be in accordance with ACI 207.1R - Mass Concrete, latest edition. Type III Portland cement and accelerating type admixtures shall not be used.

   b. Selection of concrete aggregates for mass concrete is of paramount importance to the quality of the concrete and to the economy and durability of the structure. Aggregates shall conform to the requirements of ASTM C 88 and C 227. Aggregate size shall be in accordance with ASTM 467.

   c. The selection of the mix design should recognize that serious volume change stresses can be avoided by controlling the temperature drop of the concrete from the maximum to ambient. Avoidance of thermal shock is important in preventing surface cracks due to temperature gradients. The maximum internal temperature will depend upon the initial concrete temperature and the type and quantity of cementitious materials used.

   d. Mixes shall be designed using types and amounts of cement which will reflect lower internal temperatures. Optimum cement is only obtainable by aggregate proportioning that reduces the volume of the void spaces and depends upon aggregate gradation. Minimum cement factors with maximum size aggregate, air entrainment and low water cement ratios should be used, to produce workable concrete and the specified strength.

4. Placement:

   a. Concrete with lower than usual slump may be used, provided it can be properly placed and consolidated.

   b. Placing Temperatures - Unless otherwise permitted or specified, the temperature of the concrete when deposited at the point of placement shall not exceed 70 degrees F, nor be less than 35 degrees F. When the temperature of the surrounding air is expected to be below 40 º F during placing, or within 24 hours thereafter, the temperature of the concrete when deposited at the point of placement shall be in accordance with ACI 306R.1.

   c. Concrete shall not be placed until the installation of the temperature monitoring system has been inspected and approved by the Engineer and adequate materials for the curing and thermal protection of the concrete are on the site.

5. Curing and Protection:

a. The curing period shall be a minimum of 14 days.

b. Temperature Monitoring:

1) Thermocouples or thermistors shall be installed in mass concrete placements in sets of two located on a grid at a maximum spacing of 25 feet on center in each direction and no closer than 6 feet from any edge or 4 feet from any opening. One thermocouple shall be placed at mid-depth of the concrete placement and the second thermocouple shall be located directly above the first and 2 inches below the surface. Additional thermocouples shall be placed at exposed edges of concrete placements at 50 feet on center, at mid-depth, and 2 inches beneath the surface. Where cooling pipes are installed, thermocouples shall be located mid-way horizontally between the pipes.

2) Each wire lead shall extend a minimum of 6 feet out of the concrete and shall be securely labeled with the location of the corresponding sensor and a tracking number.

3) Placement plans showing all temperature sensors and manufacturer's installation instructions and operating manuals for all related equipment shall be submitted to the Engineer for approval prior to concrete placement.

4) Temperature monitoring shall continue during the curing period and until the internal temperature is within 25 degrees F of the ambient air temperature following the end of the curing period.

c. Thermal Control:

1) At mass concrete placements, the curing water added shall not be colder than 30 degrees F below the interior temperature of the concrete. If necessary, curing water shall be heated.

2) For mass concrete, large differentials of temperature between the interior of the concrete and the exterior of the concrete shall be avoided. The maximum allowable temperature differential between the interior of the concrete (core) and the exterior of the concrete (surface) shall not be more than 35 degrees Fahrenheit. When the difference in temperature between the core and the surface (horizontal or vertical) exceeds 30 degrees Fahrenheit, insulation blankets shall be added in 1/2 inch layers as needed to prevent the difference from increasing. Joints in insulation blankets shall be staggered a minimum of 12 inches at adjacent layers. Insulation blankets shall be placed over curing mats and

moisture retaining cover. If the addition of layers of insulation are not sufficient to limit the temperature gradient to 35 degrees Fahrenheit, the concrete placement shall be tented and heat shall be applied as needed to control the temperature gradient.

3) Thermal controls and protection shall be maintained until the interior concrete temperature is less than 35 degrees Fahrenheit greater than the average daily ambient air temperature.

4) The rate of cooling within the interior of the concrete shall be regulated to control the temperature drop to not more than 1 degree Fahrenheit in any period of one hour and 10 degrees Fahrenheit in any 24-hour period.

5) Where insulation blankets are provided over mass concrete, at the end of the curing period they shall be removed one layer at a time at such a rate that the temperature differential between the core and the surface never exceeds 35 degrees Fahrenheit and the cooling rate specified above is not exceeded, but not more than one layer in an 8 hour period.

E. Concrete Repairs

1. Repair of Formed Surfaces:

a. The following defects shall be repaired in all types of formed finishes:

1) Spalls, air bubbles, rock pockets, form depressions, and other defects which are more than 1/4 inch in depth.

2) Holes from tie rods and other form tie systems.

3) Fins, offsets and other projections which extend more than 1/4" beyond the designated member surface.

4) Structural cracks, as defined by the Engineer.

5) Non-structural cracks, as defined by the Engineer, which are greater than 0.010 inches wide. In water retaining members, elevated slabs subject to rainfall and washdown, and below grade members, any crack which shows any amount of leakage. Where it is not possible to verify that a crack is not leaking, it shall be repaired.

6) Stains and substances marring the surface.

b. The following defects shall be repaired in smooth finish surfaces, in addition to those listed above:

1) Spalls, air bubbles, rock pockets, form depressions, and other defects which extend to more than 1/2" in width in any direction, no matter how deep.

2) Spalls, air bubbles, rock pockets, form depressions, and other defects of any size which exceed 3 in number in a 12 inch square or 12 in number in a 3 foot square.

3) Fins, offsets and other projections shall be completely removed and smoothed.

4) Scratches and gouges in the surface.

5) Surfaces that exceed allowable tolerances.

6) Texture and color irregularities. At water retaining surfaces, texture and color irregularities need not be repaired when greater than 12 inches below the minimum normal operating water surface except where such defects are indicative of reduced durability.

c. Where a smooth rubbed or grout cleaned finish is specified, minor surface defects repairable by the finishing process need not be repaired prior to the finish application, when approved by the Engineer.

2. Method of Repair of Formed Surfaces:

a. Repair and patch defective areas with cement mortar or concrete repair mortar immediately after removal of forms and as directed by the Engineer.

b. Repairs made to water bearing and below grade surfaces shall be made with repair mortar only. Repairs of form tie holes in water bearing or buried surfaces shall be made with non-shrink grout as specified in Section 03 60 00 - Grouting.

c. Cut out honeycomb, rock pockets, voids, and holes left by tie rods and bolts, down to solid concrete but, in no case, to a depth of less than 1 inch for cement mortar and 1/2 inch for repair mortar. Make edges of cuts perpendicular to the concrete surface. Before placing the cement mortar, thoroughly clean and brush-coat the area to be patched with the specified bonding agent. Where concrete repair mortar is used, the surface shall be prepared and mortar placed per manufacturers recommendations. Compact mortar in place and strike off slightly higher than the surrounding surface. Cure as specified.

d. Repairs to surfaces exposed to public view shall match the color and texture of surrounding concrete.

e. Provide test areas at inconspicuous locations to verify mixture, texture and color match before proceeding with the patching.

f. Structural cracks shall be pressure grouted using epoxy injection in accordance with the manufacturer's directions and recommendations.

g. Non-structural cracks shall be pressure grouted using hydrophilic resin in accordance with the manufacturer's directions and recommendations.

h. Fill holes extending through concrete by means of a plunger- type gun or other suitable device from the least exposed face, using a flush stop held at the exposed face to ensure completely filling.

i. Remove stains, grout accumulations, sealing compounds, and other substances marring surfaces by scrubbing, power washing, or abrasive blast using sand finer than No. 30 and air pressure from 15 to 25 psi.

3. Repair of Unformed Surfaces:

a. Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to the tolerances specified for each surface and finish according to ACI 117. Correct low and high areas as herein specified.

b. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.

c. Repair finish of unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects include crazing, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.

d. Repair structural cracks as defined by the Engineer in all structures.

e. Repair non-structural cracks as defined by the Engineer which are greater than 0.01 inches wide, which are in below grade structures, or which are exposed to public view. In water retaining structures, repair any crack which shows any amount of leakage and all cracks where leakage potential cannot be determined.

4. Methods of Repair of Unformed Surfaces:

a. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.

b. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Where the concrete has already set and repairs are required, sawcut around the perimeter of the area to be repaired to a 1/2-inch depth and remove concrete so that the

minimum thickness of the repair is 1/2 inch. Apply specified concrete repair mortar in accordance with the manufacturer's directions and recommendations.

c. Remove defective areas to sound concrete with clean, square cuts, to a minimum depth of 1.5 inches. Provide 3/4 inch clearance all around exposed reinforcing steel. Clean and dampen all concrete surfaces in contact with patching concrete and brush with the specified bonding agent. Place patching concrete while the bonding agent is still tacky. Mix patching concrete of the same materials and proportions to provide concrete of the same type or class and color as the adjacent finished concrete. Place, compact and finish as required to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

d. Repair isolated random non-structural cracks in members which are not below grade or water retaining, and single holes not over 1 inch diameter, by the dry-pack method. Groove the top of cracks, and cut out holes to sound concrete and clean of dust, dirt and loose particles. Dampen all cleaned concrete surfaces and brush with the specified bonding agent. Place dry-pack grout before the cement grout takes its initial set. Mix dry-pack grout as specified in Section 03 60 00 - Grouting, Grout. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.

e. Structural cracks shall be pressure grouted using an epoxy injection system. Apply in accordance with the manufacturer's directions and recommendations.

f. Non-structural cracks in below grade and water retaining structures shall be pressure grouted using hydrophilic resin. Apply in accordance with the manufacturer's directions and recommendations.

g. Where flooring material is to be installed, assure that surface is acceptable for flooring material to be installed in accordance with manufacturer's recommendations.

5. Other Methods of Repair:

a. Repair methods not specified above may be used with written approval of the Engineer.

F. Shotcrete

1. Shotcrete is concrete or mortar pneumatically projected at high velocity onto a surface. Shotcrete proportioning, placement, curing and testing shall be in accordance with NYCBC Section 1911, where applicable.

2. For projects where NYCBC is not applicable, ACI 506R and 506.2 guidelines shall be followed.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Quality Control Testing:

1. General:

a. Unless required otherwise by the Contract, all field quality control testing of materials and the resulting concrete for compliance with the technical requirements of the specifications shall be performed by the Division of Design Services of the Bureau of Engineering Design and Construction and/or it's QA/QC Consultant.

b. The use of these, or any, testing services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the Contract. The Contractor shall provide concrete of the quality specified and it is hereby emphasized that the responsibility for so doing is solely and completely his. It shall be the Contractor's responsibility to work with the Supervising Engineer for Concrete Construction and the DEP designated Testing Laboratory and to keep himself fully informed of the Evaluation of the Compression Test results as described in Paragraph 3.03 B.

2. Testing Provided by DEP – at DEP's discretion, the following testing and inspection shall be provided.

a. Secure production samples of materials at plants or stockpiles during the course of the work and test for compliance with the specifications unless otherwise noted in the Schedule of Mixes Proportioning and Testing stipulated in the Contract.

b. Provide the services of a qualified concrete technician at each location on the job site where concrete is being mixed and discharged from the mixer for the duration of the concrete placement.

c. Strength Tests: The Concrete Testing Laboratory provided by DEP shall conduct all strength tests (in accordance with ASTM C39). Strength tests of the concrete shall be conducted in accordance with the following procedures.

1) Secure composite samples in accordance with ASTM C 172.

2) Each strength test shall be obtained from a different batch of concrete on a representative, truly random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.

3) Additional concrete test cylinders shall be made from concrete taken out of the bucket, hopper or forms as directed by the Supervising Engineer for Concrete Construction. These test cylinders shall be separate and distinct from those

made from the mixer and shall be made from the same batch as the sample taken from the mixer. Where concrete is placed directly from the mixer into forms, without any intermediate conveyance, these additional cylinders will not be required.

4) When pumping or pneumatic equipment is used, samples shall be taken at the discharge end.

5) Compressive strength tests shall be conducted on a set of four specimens molded from each sample in accordance with ASTM C 31, and cured under standard moisture and temperature conditions in accordance with ASTM C 31.

6) Test two specimens at 7 days in accordance with ASTM C 39. Test two specimen at 3 days instead of 7 days when high early strength is required.

7) Test three specimens at 28 days in accordance with ASTM C 39. The 28-day test result shall be the average of the strengths of the three specimens, except that if one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the remaining two strengths averaged. Should more than one specimen in a test show any of the above defects, the entire test shall be discarded. When high early strength is required, the specimens shall be tested at 7 days instead of 28 days.

8) When the 7-day test results (3-day for high early strength) are below 65% of the specified strength and/or whenever the 28-day test results (7-day for high early strength) are below the specified strength, the specimens shall be kept intact and stored for a minimum of 30 days or until inspected by both the Supervising Engineer for Concrete Construction or his authorized representative and the Contractor.

9) Written results of the compression test results shall be posted on the DEP's concrete database 24 hours following the test date on the following business day. The test results are available to the Supervising Engineer for Concrete Construction, the Engineer, Contractor and concrete supplier. A hard copy of the final result will be sent to the Resident Engineer.

10) Unless otherwise directed, all cylinders shall only be handled by DEP designated personnel.

d. Other Required Tests:

1) Check the slump, air content, concrete temperature, unit weight, yield, and water content of each sample of concrete to be used in molding strength test specimens.

2) Perform all other field testing of concrete as required by the New York City Building Code.

3) Slump testing shall be conducted in accordance with ASTM C 143.

4) Air content testing shall be conducted in accordance with either ASTM C 231 (Pressure Method) or ASTM C 173 (Volumetric Method) on concrete samples from which the compressive strength test specimens are made. Note that the chase indicator is not the approved ASTM volumetric test method. Air content testing of Lightweight Concrete shall be in accordance with ASTM C 173.

5) Additional tests of air content shall be performed on a regular and frequent basis for control as directed by the Supervising Engineer for Concrete Construction. A Chase indicator, calibrated at least once daily against the readings for air content obtained by methods outlined in Article 3.03, Paragraph A.2.d.4, may be used for additional testing. Use of the Chase Indicator alone will not be considered as having met the requirements of Article 3.03, Paragraph A.2.d.1 for checking air content.

6) Measurements of concrete temperature shall be performed in accordance with ASTM C 1064.

7) Unit Weight tests shall be made with a calibrated one-half (1/2) cubic foot bucket in accordance with ASTM C 138. On obtaining the unit weight, the yield shall be immediately computed as the ratio; weight of all the ingredients batched including the water added per cubic yard (from the batching ticket) divided by the unit weight determined times 27. Over-yielding or under-yielding by more than 2% are cause for concern and should be immediately investigated.

8) Water content testing shall be conducted in accordance with AASHTO TP 23.

9) Properly note and record the time of day when all tests were made and the corresponding results. Also, record from what truckloads the samples were taken, the class of concrete which the samples represent and exactly where the concrete represented by the sample was deposited in the structure.

e. Frequency of Testing:

1) For buildings, make one strength test for each 50 Cu. Yd. or fraction thereof for each mix design placed in any one day except that a minimum of two tests will be made for each day's placement.

2) The minimum number of tests shown in the following table will be made for concrete used for all structures other than buildings.

Total Cubic Yards of Concrete Placed During Day	Minimum Number of Strength Tests
Up to 100	One for each 50 Cu. Yds.*
OVER 100 CU. YDS.	One for each 100 Cu.Yds.*
* or fraction thereof.	

3) The Supervising Engineer for Concrete Construction may require that additional tests be made.

f. Additional Services: The DEP provided testing agency shall provide additional services to the extent deemed necessary by DEP and shall also perform the following services.

1) Inspect concrete batching, mixing, and delivery operations in accordance with Inspection Requirements of the administrative building code of the City of New York.

2) Check batching and mixing operations.

3) Review the manufacturer's report of each shipment of cement, aggregates and reinforcing steel and/or conduct laboratory spot checks of these materials as received.

4) Inspect the location and dimension of the forms, the placing of the reinforcing steel and the placing, conveying and depositing of the concrete.

5) Sample concrete at point of placement and other locations directed by the Supervising Engineer for Concrete Construction and perform required tests.

6) Additional testing and inspection required because of changes in materials or mixture proportions requested by the Contractor. When required, such testing shall be performed at the Contractor's expense.

7) Additional testing of materials or concrete occasioned by failure to meet specification requirements. When required, such testing shall be performed at the Contractor's expense.

3. Authority and Duties of the DEP provided Special Inspection Testing Agency:

   a. Special Inspections of concrete shall be in accordance with NYCBC Table 1704.4.

   b. Technicians representing the testing agency shall inspect the materials and the manufacture of concrete and shall report their findings to the Supervising Engineer for Concrete Construction or his authorized representative and the Contractor.

   c. When it appears that the material furnished or work performed by the Contractor fails to fulfill specification requirements, the technician shall immediately notify the Supervising Engineer for Concrete Construction or his authorized representative, and the Contractor of such failure.

   d. The technician shall not act as foreman or perform other duties for the Contractor.

   e. Technicians are not authorized to revoke, alter, relax, enlarge or release any requirement of the specifications, nor to approve or accept any portion of the work.

4. Responsibilities and Duties of the Contractor:

   a. Submit data and test documentation on materials and design mixtures including trial batch and shrinkage test results to the Engineer at least 60 days prior to the start of field operations.

   b. Submittal to the Supervising Engineer for Concrete Construction the procedures, methods and concrete mix designs, the name and location of the proposed concrete plant. Submit the quality assurance programs of the concrete suppliers and provide copies of all test reports to the Engineer.

   c. Provide all materials, labor and equipment necessary to assist the representatives of the Owner's testing agency in obtaining, preparing and handling test samples at the project site or at other sources of material. When directed by the Engineer, the Contractor shall be responsible for transferring strength test specimens from point of casting to curing boxes and/or to testing agency vehicles.

   d. Advise the Resident Engineer and the Supervising Engineer for Concrete Construction and the DEP provided Testing Agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.

e. Provide and maintain for the sole use of the testing agency adequate facilities for safe storage and proper curing of concrete test cylinders on the project site for the first 24 hours, as required by ASTM C 31. The Contractor shall provide an insulated box of substantial construction for use in storing cylinders on the site until such time as they are transported to the testing laboratory. The box shall be large enough to accommodate the maximum number of test cylinders which may be required for any day's concrete placement, and shall have an insulated hinged cover. Heating facilities shall be installed in the box such that the temperature within the box may be maintained at the limits specified by ASTM C 31. The box shall be of such dimensions as to permit placing the cylinders in the box one (1) high only. No stacking of cylinders will be permitted. A high-low thermometer shall be placed in the storage box and the maximum and minimum temperatures noted shall be recorded on an appropriate identification card for each test. To minimize the hazard of disturbance during curing, the storage box shall be located in an area free from vibration such as pile driving and traffic of all kinds. No concrete shall be delivered on the site until such storage curing box has been provided and any identified problems with the box addressed to the satisfaction of the Engineer. Cylinders shall remain in the curing box until ready for delivery to the testing laboratory but not less than 24 hours. Sufficient box storage capacity shall be provided by the Contractor to allow for up to 72 hours of cylinder storage.

f. The DEP provided Testing Agency shall deliver concrete test cylinders to the DEP designated testing laboratory, or such other location as designated in the Contract. Delivery methods shall be in accordance with the requirements of ASTM C 31. Deliveries shall be made such that cylinders remain at the job site (in the boxes provided for their storage) no less than 24 hours and no more than 72 hours after the casting.

g. The Contractor shall furnish copies of mill test reports of all shipments of cement, aggregates and reinforcing steel being used to Supervising Engineer for Concrete Construction and the testing agency.

h. The Contractor shall be responsible for:

1) All testing associated with the evaluation proposed mix designs including required trial batch and shrinkage testing.

2) Establishing and controlling the mix proportions during the entire progress of the work in accordance with Article 2.02, Paragraph E.

3) Testing required because of changes in materials or proportions of the mix requested by the Contractor, as well as, any extra testing of concrete or materials occasioned by failure to meet specification requirements.

B. Evaluation of Concrete Quality:

1. General:

a. Concrete quality shall include but not be limited to satisfactory strength, durability, density (air entrainment), wearing quality, shrinkage cracks, color, physical appearance etc.

b. Wherever there is evidence that any of the concrete in place does not appear to produce the results required by the specifications, such concrete shall be considered questionable and evaluations shall be made as detailed below.

2. Evaluation of Compressive Test Results:

a. Test results shall be evaluated separately, for each type and each specified strength of concrete. Evaluation shall be in accordance with the ACI 214R.

b. The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:

1) Every arithmetic average of any three consecutive compressive strength tests equals or exceeds the specified compressive strength f'c.

2) No individual strength test (average of two cylinders) falls below the specified compressive strength f'c by more than 500 psi when f'c is 5,000 psi or less, or by more than 0.10 f'c when f'c is more than 5,000 psi. The strength level of the concrete will be considered satisfactory as long as the averages of all sets of three consecutive compressive strength test results equal or exceed the specified compressive strength f'c and no individual strength test result falls below the specified compressive strength f'c by more than 500 psi.

c. For evaluation of the control of the quality and uniformity, each type and specified strength of the concrete shall be represented by at least five (5) tests.

d. If results of a number of consecutive seven (7) day tests at any stage of the work indicate abnormalities or results of a number of twenty-eight (28) day tests are below the specified strengths, the production and testing of the concrete shall be immediately investigated and reported upon by the Evaluation Committee noted in Article 3.03,

Paragraph B.5. It is emphasized that the report of the Evaluation Committee is advisory. The responsibility for the production of the concrete and the decision as to how to proceed with the work remain with the Contractor. However, the decision as to how to proceed is subject to review and approval by the Commissioner.

3. Evaluation of Questionable In-Place Concrete Construction by Non-destructive Methods:

   a. Visual inspection, impact hammers, sonoscopes, microscopic examination, chemical analysis of the hardened concrete, probes or other nondestructive testing devices may be used as an indicator of the relative quality and uniformity of various areas of the structure, as an aide in evaluating concrete in place, or in determining locations of areas to be cored. Any program of nondestructive testing shall be performed as directed by and under the supervision of the Evaluation Committee noted in Article 3.03, Paragraph B.5. Test results of any program of nondestructive testing and recommendations based thereon shall be reported by the Committee to the Commissioner prior to the commencement of any other program of further testing, if recommended or required. All viewpoints if there is no complete agreement, shall be noted in the report.

   b. Nondestructive Tests:

      1) Test results shall be evaluated and shall be valid only if tests have been conducted by properly calibrated equipment in accordance with recognized standard procedures.

      2) Nondestructive tests shall not be used as the sole basis for accepting or rejecting concrete.

4. Evaluation of Questionable In-Place Concrete Construction from Core Tests:

   a. Core tests shall be conducted only as recommended and directed by the Evaluation Committee noted in Article 3.03,Paragraph B.5 and only after a program of nondestructive testing as noted in Article 3.03,Paragraph B.3. Core tests shall be evaluated and shall be valid only if tests have been conducted in accordance with specified procedures.

   b. When core testing is required, cores shall be obtained and tested in accordance with ASTM C 42. Cores shall be tested saturated-surface-dry or shall be tested air-dry depending as to whether the area where the questionable concrete is located shall be wet or dry under service conditions. Such determination shall be made by the Committee and they shall direct the condition of the cores at the time of testing. If the cores are to be tested dry, they shall be air dried

(temperature 60 to 70 degrees F and relative humidity less than 60 percent) for seven (7) days before the test. If the cores are to be tested wet, they shall be tested after moisture conditioning in accordance with ASTM C 42. The laboratory report shall state whether the cores were tested saturated-surface-dry or surface-dry.

c. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Committee so as to least impair the strength of the structure.

d. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal from the structure, or is obviously defective, replacement cores shall be taken.

e. Concrete in the area represented by a core test, made and tested in accordance with the specified requirements above will be considered adequate for structural strength if the average strength of the three cores taken from the immediate area of the questionable concrete is equal to or greater than the specified strength and no single core strength is less than 85 percent of the specified strength (f'c).

f. The Committee shall determine the area where the cores are to be taken and they shall determine the number of cores to demonstrate the adequacy of the questionable concrete. Corrections to the strength values shall be made if the length to the diameter ratio is different from two. No strength correction shall be made for the age of the concrete cores.

g. If the average strength of the cores as tested is less than the required value, the Committee will make a recommendation as to whether the values obtained are acceptable or they will recommend that the values obtained be checked against a structural analysis as covered in Paragraph 3.03 C.

h. Core holes shall be plugged solid as specified.

5. Evaluation Committee:

a. The following shall constitute a Committee for the investigation and the evaluation of the quality of the concrete when there are indications that the requirements of Paragraph 3.03 B are not being met. The Resident Engineer (who shall act as Chairman of the Committee), the Supervising Engineer for Concrete Construction or authorized representative, representatives of the Contractor, the Concrete Producer, the Testing Agency, the Architect/Engineer responsible for the design and such other members as the Commissioner may designate. Such members of the Committee as designated by the Chairman shall meet whenever request for such

meeting is made by any member and/or as otherwise specified. Reports and recommendations of the Committee shall be submitted to the Contractor and the Commissioner. All viewpoints, if there is no complete agreement shall be noted in the report and reports shall be countersigned by all participating members of the Committee. The Contractor shall be responsible for the preparation and submission of reports.

b. The functions of the Committee and any reports, recommendations, etc., it submits shall be advisory in nature. The responsibility for the production and quality of the concrete remains solely and completely with the Contractor.

c. All expenses incurred due to the functioning of the Committee shall be borne by the Contractor except that all members of the Committee shall serve without fee.

6. Additional Curing:

a. If the concrete fails to meet the specified compressive strength requirement, additional curing as specified by the Supervising Engineer for Concrete Construction may be required and modifications may be required in the concrete mix design for the remaining concrete work, at the expense of the Contractor, in addition to the measures outlined in Article 3.03, Paragraph B.

7. Acceptance of Concrete:

a. Concrete Strength:

1) Concrete not meeting the requirements of Article 3.03, Paragraph B.2 shall be considered potentially deficient. Steps shall be taken to increase the strength to ensure that the strength level will be satisfactory. For potentially deficient concrete, see Article 3.03, Paragraph C.

b. Air Content:

1) Concrete not within the specified limits of air entrainment and tested in accordance with Article 3.03, Paragraph B shall be rejected.

2) Steps must be made to control the proper air content.

c. Slump:

1) Concrete not within the specified slump limits at the point of placement may be rejected.

2) When the concrete is tested and found to be out of specifications the Contractor shall immediately adjust the mix to bring the mixture within the specified slump limits.

d. Acceptance of Lightweight Concrete shall be based on fresh unit weight measured in accordance with ASTM C 138. The nominal fresh unit weight shall be that corresponding to the specified maximum air-dry unit weight calculated from the formula for approximate air-dry weight in ASTM C 567. When the nominal fresh unit weight varies by more than 2 lb./ft. from the required weight, adjust the mixture as promptly as conditions permit to bring the unit weight to the desired level. Do not use any batch for which fresh unit weight varies by more than 3 lb./ft. from the desired level.

C. Acceptance of Structure:

1. General:

a. Notwithstanding the provisions of any section of this Contract, all concrete shall conform to the requirements of the New York City Building Code.

b. Completed concrete work which meets all applicable requirements will be accepted without qualification.

c. Completed Concrete work which fails to meet one or more requirements shall be considered potentially deficient. Potentially deficient concrete which has been repaired to bring it into compliance will be accepted without qualification. The decision as to whether it has been brought into compliance except as otherwise noted in this Section shall rest with the Supervising Engineer for Inspection subject to approval of the Commissioner and the Building Department.

d. Potentially deficient concrete which cannot be brought into compliance shall be evaluated by the Committee noted in Article 3.03, Paragraph B and a report submitted to the Commissioner. The Commissioner will then, in writing, either accept without qualification or accept subject to Retainage (as outlined in Article 3.03, Paragraph .C.8) or direct that the concrete be reinforced or supplemented with additional construction to bring it into compliance after which it may be resubmitted to the Commissioner.

e. Repair potentially deficient concrete work by removing and replacing or by reinforcing with additional construction as required by the Engineer. To bring the rejected work into compliance, use repair methods that will maintain the strength of the structure and meet all other applicable requirements for function, durability, dimensional tolerances, and appearance.

f. Obtain acceptance by the Engineer for repair methods and materials and for modifications needed to assure that concrete work complies with requirements in the Contract Documents.

g. The Contractor shall pay all costs incurred including redesign and reverification in bringing the concrete work into compliance and acceptance.

2. Dimensional Tolerances:

a. Formed surfaces resulting in concrete outlines smaller than required by an amount exceeding the requirements of Section 3.3 of ACI 347R shall be considered deficient in strength and subject to the provisions of Article 3.03, Paragraph C.4.

b. Formed surfaces resulting in concrete outlines larger than required, by an amount exceeding the requirements of Section 3.3 of ACI 347R may be rejected and the excess material shall be subject to removal. If removal of the excess material is permitted, it shall be accomplished in such a manner as to maintain the strength of the section and to meet all other applicable requirements of function and appearance.

c. Concrete members cast in the wrong location may be rejected if the strength, appearance or function of the structure is adversely affected or misplaced items interfere with other construction.

d. Inaccurately formed concrete surfaces exceeding the requirements of Section 3.3 ACI 347R and which are exposed to view may be rejected and shall be repaired or removed and replaced if required.

3. Appearance:

a. Concrete exposed to view with defects which adversely affect the appearance of the specified finish may be repaired, if possible. If, in the opinion of the Supervising Engineer for Concrete Construction, the defects cannot be repaired, the concrete shall be considered potentially deficient, such concrete shall be evaluated by the Committee noted in Article 3.03.B and a report submitted to the Commissioner. The Commissioner will then in writing, either accept without qualification or accept subject to Retainage (as outlined in Article 3.03, Paragraph C.8) or direct that other remedial measures be taken after which it may be resubmitted to the Commissioner.

4. Strength of Structure:

a. The strength of the structure in place will be considered potentially deficient if it fails to comply with any requirements which control the strength of the structure, including but not necessarily limited to the following conditions:

1) Low concrete compression test strength as evaluated by Article 3.03, Paragraph B above. However, in those areas or members containing such concrete, if a structural analysis by the architect/engineer indicates the completed structure will be suitable for its intended use, i.e., that the stresses which

will be developed under design load in the members containing below-strength concrete are less than the design stress permitted for the actual compression test strengths reported and the analysis is approved by the Building Department, the member or members will be accepted without qualification.

2) Low concrete core tests as evaluated by Article 3.03, Paragraph B above. However, in those areas or members where core tests are made in accordance with Article 3.03, Paragraph B.4, if a structural analysis by the architect/engineer indicates the suitability of the structure for its intended use, i.e., that the stresses which will be developed under design load in the members containing below-strength concrete are less than the design stress permitted for the actual core test strengths reported, and the analysis is approved by the Building Department, the areas or members will be accepted without qualification.

3) Reinforcing steel size, quantity, strength, position or arrangement at variance with the specified requirements or the Contract Drawings.

4) Concrete which differs from the required dimensions or location in such a manner as to reduce the strength.

5) Curing less than specified.

6) Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

7) Mechanical injury, construction fires, accidents or premature removal of formwork likely to result in deficient strength.

8) Poor workmanship likely to result in deficient strength.

5. Action Required When Strength Is Potentially Deficient:

a. When the strength of the structure is considered potentially deficient, the following actions may be required by the Engineer/Architect:

1) Structural analysis or additional testing or both may be required.

2) Core tests may be required.

3) If testing is inconclusive or impractical or if structural analysis does not confirm the Safety of the structure, load tests may be required and their results evaluated in accordance with ACI 318.

4) Concrete Work rejected by structural analysis or by results of a load test shall be reinforced with additional construction as required by the Engineer/Architect, or replaced.

5) Document all repair work performed to bring strength-deficient concrete work into compliance with Contract Documents, and submit the documentation to the Engineer/Architect for acceptance.

6. Durability:

a. The durability of the concrete work will be considered deficient and therefore the concrete work shall be rejected, if it fails to comply with any of the requirements which control the durability of the structure, including, but not necessarily limited to, the following conditions:

1) Strength failing to comply with Article 3.03, Paragraph B above.

2) Materials for concrete not conforming with the specified requirements of Article 3.03, Paragraph C.2. above.

3) Concrete not conforming with either the specified air-entrainment requirements or the air content limits.

4) Curing not accomplished in accordance with Contract Documents.

5) Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

7. Withholding:

a. Where concrete is placed which is considered to be deficient, whether in strength, appearance, durability or any other quality defined, payment may be withheld at the discretion of the Supervising Engineer for Concrete Construction. If such concrete is subsequently accepted without qualification, then payment shall be made for such concrete including return of all monies withheld.

8. Retainage:

a. Deficient concrete which cannot be brought into compliance and is nevertheless accepted by the Commissioner shall be subject to the following permanent retainage. For every cubic yard of concrete so placed, an amount equal to 10% of the unit price for concrete in place for unit price contracts or 10% of the price established in the detailed estimate for concrete in place for lump sum contracts shall be permanently retained.

9. Rejected Concrete:

a. Concrete which has been rejected, in writing, by the Commissioner, shall be removed and replaced. The cost of all such removed and replaced concrete shall be borne by the Contractor.

10. Protection of In-Place Concrete:

a. Loading and Support of Concrete:

1) Do not allow construction loads to exceed the superimposed load which the member, with necessary supplemental support, is capable of carrying safely and without damage. Submit for acceptance data on the amount of loading, method of distributing load, and any proposed supplemental support during construction.

b. Protection from Mechanical Injury:

1) During the curing period, protect, the Contractor shall protect the concrete and its shoring from damaging mechanical equipment inducing shock and vibrations at all times. Protect all concrete surfaces from damage by construction traffic, equipment, materials, rain or running water, and other adverse weather conditions.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

The items below are found on the following pages:

"Table 1 -- Concrete Mix Requirements"

Sample Concrete Placement Card

Mix Design Submittal (MDS) Forms

TABLE 1 - CONCRETE MIX REQUIREMENTS

Classes of Concrete	Coarse Aggregate Sizes (ASTM C 33)			Minimum Cementitious Materials (lbs/cu yd.)	Cement Type (ASTM C 150)	Mineral Admixtures (%)		W/(C + P) Maximum	Specified Strength (psi)	
	A	B	C			A	B		fc minimum field condition	f_{cr} minimum for mix design See FN3
50	#67 (3/4" to No. 4)	#8	---	550	III	See FN 1	---	0.42	5,000 at 28 days	6,200 at 28 days
45	#57 (1" to No. 4)	#8	---	525	II	---	---	0.42	4,500 at 28 days	5,850 at 28 days
45F	#4 (1.5" to 3/4")	#67	#8	525	II	See FN 2	---	0.41	4,500 at 56 days	5,850 at 56 days
40LW	3/4" to No. 4	---	---	525	I or II	---	---	0.45	4,000 at 28 days	5,200 at 28 days
45PG	3/8” to No. 16	#8	---	660	II	---	---	0.40	4,500 at 28 days	5,850 at 28 days
25	#57 to #67	---	---	376	II	See FN 2	---	0.60	2,500 at 28 days	3,500 at 28 days

Note: Concrete containing coarse aggregate smaller than #67 shall only be used with the approval of the Engineer.

Footnotes (FN) to Table 1:

1. At the Contractor’s option, and as approved by the Engineer, up to 15% fly ash and 20% GGBF may be used in Class 50 concrete that will not be in contact with potable water.
2. At the Contractor’s option, and as approved by the Engineer, up to 15% fly ash and 20% GGBF may be used in Class 25 and Class 45F concrete that will not be in contact with potable water.
3. Minimum $\mathbf{f_{cr}}$ for mix design listed in this column are based on ACI 301, Table 4.2.3.1; when data are not available to establish standard deviation.

END OF SECTION

SAMPLE CONCRETE PLACEMENT CARD

Contract:	**Contractor:**		
Placement Date:		**Concrete Mix:**	
Scheduled Start Time:		**Approximate Quantity:**	**cu. yds.**
Identification of Placement: **Placement No:**			
Item	**Initials** **Inspector**	**Date**	**Remarks**
Foundations			
Construction Joint Preparation			
Forms and Blockouts			
Waterstops			
Reinforcement			
Embedments/Anchor Bolts			
Piping/Test			
Temperature Checkout			
Cleanup			
Provisions for Weather			
Contractor			
Electrical Contractor			
HVAC Contractor			
Plumbing Contractor			
Structures Contractor			

Mix Design
Proportions Summary Sheet
MDS

- USE ONE FORM PER MIX DESIGN -

Contract:	Mix Design Code (DEP Only):	Class (Specified Strength): PSI + %	Proposed Trial Batch Date:	Submittal Date:
Contractor:	Concrete Supplier:		Testing Laboratory:	
Mix Description (Common Name)	Concrete Supplier Address:		Testing Laboratory Address:	
	City: / State: / Postal Code:		City: / State: / Postal Code:	

Expedite:	Application:	Field Inspection:	Weight Type:	Fly Ash:	Field Curing:
☐ Yes (Comment Reqd.) ☐ No	☐ Structural ☐ Non-structural	☐ Yes (Controlled) ☐ No (Uncontrolled)	☐ Normal ☐ Lightweight	☐ Yes, List %: ☐ No	☐ Yes, Min. Days: ☐ No

Specimen Transport, Testing & Disposal Ages (Use Comments Area, If Applicable):	No. of Specimens (Per Set)	Transport Age (Days)	Test Age (No. of Specimens at Days)						Disposal Age for Unused Specimens (Days)
			Preliminary		Final		Other(s)		
			Qty	Days	Qty	Days	Qty	Days	
☐ Yes ☐ No CQAP Standard	5	2	2	7	3	28	-	-	28
☐ Yes ☐ No Other:									

Cement /Slag /Fly Ash

Grade/Class:	Source:	PCY:

Cement/Slag /Fly Ash

Grade/Class:	Source:	PCY:

Crushed Stone

Size Number:	Source:	PCY (SSD):

Crushed Stone

Size Number:	Source:	PCY (SSD):

Sand

Type:	Source:	FM:	PCY (SSD):

Water

	PCY:	GAL/CY:

Air Entraining Admixture

Designation:	Brand:	OZ/CY:

_____-Range Water Reducing Agent

Designation:	Brand:	OZ/CY:

Water-Reducing/Retarding Agent

Designation:	Brand:	OZ/CY:

Other Admixtures

Designation:	Brand:	OZ/CY:
Designation:	Brand:	OZ/CY:
Designation:	Brand:	OZ/CY:

Specified Slump (IN):	Specified Air Content (%):	Yield (CY):	Theoretical Unit Weight (PCF):	Water-Cement Ratio (from trial batch):

Comments:

- SUBMIT TO NYCDEP CQAP AT 1-800-673-2816 -

Submitted By (Print): **Testing Laboratory:** **Signature:** **Date:**

Mix Design
Submittal of Proportions
MDS

Contract:	Mix Design Code (DEP Only):	Class (Specified Strength): PSI + %	Proposed Trial Batch Date:	Submittal Date:
Contractor:	Concrete Supplier:		Testing Laboratory:	

Cement (ASTM C150)

Type:	Sp. Gr.:	Class/Grade:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Other Cementitious Materials (ASTM C18)

Type:	Sp. Gr.:	Class/Grade:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Aggregate No. 1, Fine (ASTM C33)

Type:	SSD Sp. Gr.:	Size:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Dry Rodded Unit WT (PCF):	Absorption (%):	FM:

Aggregate No. 2, Coarse (ASTM C33)

Type:	SSD Sp. Gr.:	Size:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Dry Rodded Unit WT (PCF):	Absorption (%):	

Aggregate No. 3, 4 Coarse (ASTM C33)

Type:	SSD Sp. Gr.:	Size:	Source:	Total Mass Per CY (PCY):	Volume (CU FT):

Dry Rodded Unit WT (PCF):	Absorption (%):	

Aggregate No. 2, Lightweight Alternative (ASTM C330)

Type:	Sp. Gr. Factor:	Size:	Source:	Oven Dry (PCY):	Volume (CU FT):

Loose Unit WT (PCF):	Estimated Wet (PCF):	

Chemical Admixtures (OZ/CY)

No. 1 ASTM C:	Type:	Source:	Name:	WT (OZ):
No. 2 ASTM C:	Type:	Source:	Name:	WT (OZ):
No. 3 ASTM C:	Type:	Source:	Name:	WT (OZ):

Water (Total)			**Air Content**		**Total Mixture Mass and Volume**	
GAL:	PCY:	CU FT:	%:	CU FT:	LB/CU FT:	CU FT:

Comments:

Submitted By (Print): **Company:** **Signature:** **Date:**

Mix Design
Aggregates Gradation
MDS

Sieve Size	Percent Passing Aggregate No.								
	1 (Fine)		2 (Coarse) Stone Size (no):_____		3 (Coarse) Stone Size (no):_____		4 (Coarse) Stone Size (no):_____		Combined Gradation
	Per ASTM C33:	Tested:	Per ASTM C33:	Tested:	Per ASTM C33:	Tested:	Per ASTM C33:	Tested:	
3 IN									
2 1/2 IN									
2 IN									
1 1/2 IN									
1 IN	-								
3/4 IN	-								
1/2 IN	-								
3/8 IN	100								
1/4 IN	-								
#4	95-100								
#8	80-100								
#16	50-85								
#30	25-60								
#50	5-30								
#100	0-10								
Dry Unit WT (PCF)									
Absorption (%)									
FM									

Remarks:

1029

Mix Design
Trial Batches Proportions
MDS

Material (Trial Batch Proportions Per Cubic Yard)			Trial Batch No. #1	#2	#3	#4
1. Cement						
Type:	Source:		LB:	LB:	LB:	LB:
2. Other Cementitious Material						
Type:	Source:		LB:	LB:	LB:	LB:
Grade/Class:						
3. Aggregate No. 1 (Fine) SSD						
Type:	Source:		LB:	LB:	LB:	LB:
Sp. Gr.:	FM:	Absorption (%):				
4. Aggregate No. 2 (Coarse) SSD						
Type:	Source:		LB:	LB:	LB:	LB:
Sp. Gr.:	Size:	Absorption (%):				
5. Aggregate No. 3 & 4 (Coarse) SSD						
Type:	Source:		LB:	LB:	LB:	LB:
Sp. Gr.:	Size:	Absorption (%):				
6. Aggregate No. 2 (Lightweight, Alternative)						
Type:	Source:		Oven Dry: LB:	LB:	LB:	LB:
Sp. Gr.:	Size:	Absorption (%):	Wet: LB:	LB:	LB:	LB:
7. Water (Total):			LB:	LB:	LB:	LB:
8. Water-Cementitious Ratio:						
9. Chemical Admixtures						
No. 1 Type:			WT (OZ):	WT (OZ):	WT (OZ):	WT (OZ):
No. 2 Type:			WT (OZ):	WT (OZ):	WT (OZ):	WT (OZ):
No. 3 Type:			WT (OZ):	WT (OZ):	WT (OZ):	WT (OZ):
10. Total Mass			LB:	LB:	LB:	LB:
11. Total Mass Per Cubic Foot (Theoretical Unit Weight)			PCF:	PCF:	PCF:	PCF:

Mix Design
Mixture Properties
MDS

Properties	ASTM	Target Per Specification	Trial Batch No.			
			#1	#2	#3	#4
1. Fresh Concrete						
Temperature (F):	C1064					
Slump (IN):	C143					
Before Add HRWR						
End of Mixing						
15 (MIN)						
30 (MIN)						
45 (MIN)						
1 (HR)						
Unit WT (PCF):	C138					
Air Content (%):	C231/C173					
Mortar Content (%):						
Yield (CU FT/CU YD):						
Water-Cementitious Ratio						
Time of Set (MIN):	C403					
Initial (MIN):						
Final (MIN):						
Difference (MIN):						
2. Hardened Concrete						
Cylinder No.			1 (A-_____)	2 (A-_____)	3 (A-_____)	4 (A-_____)
Compressive Strength (PSI):	C39/C192					
3 Days						
Specimen 1						
Specimen 2						
Average						
7 Days						
Specimen 1						
Specimen 2						
Average						
28 Days						
Specimen 1						
Specimen 2						
Specimen 3						
Average						

Mix Design
Mixture Properties
MDS

Properties	ASTM	Target Per Specification	Trial Batch No.			
			#1	#2	#3	#4
56 Days (If Required by Contract Only)						
Specimen 1						
Specimen 2						
Average						
Shrinkage (%):	C157					
_____ Days						
Specimen 1						
Specimen 2						
Average						
_____ Days						
Specimen 1						
Specimen 2						
Average						
Observations						
Color						
Bleeding						
Heat Signature (If Specified in the Specification and for the Submitted Batch Only)						

Trial Batch No. (Submitted and Recommended for Approval):

Comments:

Laboratory Director (Print):	**Company:**	**Signature & Seal:**	**Date:**
CQAP WITNESS (Print):	**Company:**	**Signature:**	**Date:**
Contractor (Print):	**Company:**	**Signature:**	**Date:**
Designer Of Record (Print):	**Company:**	**Signature:**	**Date:**

Mix Design
Laboratory Trial Batch Mix Design Data
MDS

- TO BE COMPLETED BY CQAP -

Contract No.	Contract Name:	Basic Description of Specified Mix Design (Mix Design Common Name):	Trial Batch Date:
Batch Plant Name:	Design Trial Lab Name:	Class (Specified Strength): PSI + %	Weight Type: ☐ Normal ☐ Lightweight
			Concrete Type: ☐ Pump ☐ Conventional

Description				Weight Per Cubic Yard			
Mix Point No.:				1	2	3	4
Cement:			LBS				
Cementitious:			LBS				
Sand:			LBS				
Stone:			LBS				
Stone:			LBS				
Water:			GAL				
Water:			LBS				
Admixture:		Air	OZ				
Admixture:		HRWR/MRWR	OZ				
Unit Weight:			PCF				

Description				Laboratory Trial Batch Weights			
Mix Point No.:				1	2	3	4
Cement:			LBS				
Cementitious:							
Sand:			LBS				
Stone:			LBS				
Stone:			LBS				
Water:			LBS				
Admixture:		Air	ML				
Admixture:		HRWR/MRWR	ML				

Description			Trial Batch Results							
Mix Point No.:			1		2		3		4	
Time:			Initial	30 MIN	Initial	30 MIN	Initial	30 MIN	Initial	30 MIN
Slump:		IN								
Water Content:		LBS								
Water Used:		LBS								
Computed Mix Water:		LBS								
Total Mix Water:		LBS								
Unit Weight:		LBS								
		PCF								
Air:		%								
Temp:		DEG								
Actual W/C Ratio										

Comments:

CQAP WITNESS (Print): **Company:** **Signature:** **Date:**

Mix Design
Trial Batch Strength Test Results Form
ASTM C39/ C192

- TO BE COMPLETED BY CQAP -

Contract No.	Contract Name:	Design Trial Lab Name:	Class (Specified Strength): PSI + %	Trial Batch Date:

Preliminary Strength Testing (See Page 1 for Preliminary Strength Age):

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

Final Strength Testing (See Page 1 for Final Strength Age):

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

CQAP CPM Comments (Preliminary & Final Age Testing):

CQAP CPM (Print): Company: Signature: Date:

Mix Design
Trial Batch Strength Test Results Form
ASTM C39/ C192

- TO BE COMPLETED BY CQAP -

Contract No.	Contract Name:	Design Trial Lab Name:	Class (Specified Strength): PSI + %	Trial Batch Date:

Additional Strength Testing:

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

Additional Strength Testing:

Age of Specimen:	Trial Batch #1 (Maximum Load / PSI)	Trial Batch #2 (Maximum Load / PSI)	Trial Batch #3 (Maximum Load / PSI)	Trial Batch #4 (Maximum Load / PSI)
Testing Date:	#1	#2	#3	#4
Specimen 1				
Specimen 2				
Specimen 3				
Average				

Comments:

CQAP WITNESS (Print): Company: Signature: Date:

CQAP CPM Comments (Preliminary & Final Age Testing):

CQAP CPM (Print): Company: Signature: Date:

NO TEXT ON THIS PAGE

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 30 00 - Cast-in-Place 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, showing the extent of the waterstop installations that are proposed to ensure that all construction and expansion joints, in water-containing structures, will be watertight. The drawings shall include elevations, sections, etc., and all details to show that a continuous watertight installation is provided.

5. Equipment pad layout drawings.

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

A. Concrete Bonding Agent

1. The concrete bonding agent product and manufacturer shall be as specified in this Section.
2. 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 30 00 – Cast-In-Place 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.

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

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all materials, labor, and equipment required to provide finishes of all concrete surfaces specified herein and shown on the Drawings.

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. 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. New York City Building Code
2. ACI 301 - Specifications for Structural Concrete for Buildings
3. ACI 302.1R - Guide for Concrete Floor & Slab Construction
4. ACI 303R - Guide to Cast-in-Place Architectural Concrete Practice
5. ACI 308.1 - Specification for Curing Concrete
6. ACI 318 - Building Code Requirements for Structural Concrete
7. ACI 303R - Guide to Cast-in-Place Architectural Concrete Practice
8. ACI 347R - Guide to Formwork for Concrete
9. ISO 14025 - Environmental labels and declarations - Type III environmental declarations

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Erect, on the site where directed, a full size mock-up of a cast-in-place wall or panel a minimum of 4 feet high, 4 feet from the corner on two sides, 12 inches thick or as shown in the Contract Drawings conforming to ACI 303R.

1. Reinforce the panel as shown in the Contract Drawings. Use form ties the same as those approved and with the form tie pattern similar to that approved. Use one face for the panel for smooth architectural concrete including “reveal” rustication with form joints, and the opposite face for form liner concrete.
2. Plug the tie holes as specified to determine the correct mortar mixture to match the panel color. If required, remove and replace tie hole plugging mortar until an acceptable color match is obtained. After the sample panels have been approved, intentionally damage and patch portions of the finish surface of the panels for the purpose of determining the correct mixture for patching mortar and patching technique to match the original panel color and surface.
3. Leave the approved mock-up on the job during construction as the standard of workmanship for the project. Remove mock-up form the premises after completion of the work.

B. Perform work in accordance with ACI 301, ACI 302.1R, ACI 308.1, ACI 318 and ACI 347R and other applicable codes.

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. Material certifications and technical data sheets.

2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, and appropriate uses for each type of material used in the Work.

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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. General: Failure to comply with the following shall be sufficient cause for rejection of materials by the Engineer and his requiring its removal from the Site. Upon determination by the Engineer that the material is subject to rejection, the Contractor shall supply new material at no additional expense to the City.

B. Delivery of Materials:

1. Deliver materials in manufacturer's original unopened and undamaged containers, with all labels intact and legible at the time of use.

2. The label shall include:

a. Name of material and manufacturer.

b. Installation, handling and protection requirements.

c. Safety Data Sheet as required.

3. Deliver materials in sufficient quantities to allow uninterrupted continuity of the work, minimizing the amount of time stored prior to being used on the Site.

C. Storage of Materials:

1. Store only approved materials on project site.

2. Store materials in original, undamaged containers with manufacturer's labels and seals intact.

3. Store all materials in secure, enclosed, dry area, off the ground and away from all possible contact with water and in a location where temperature can be maintained above freezing. Protect stored materials as per manufacturer's instructions.

4. Prevent damage to materials during storage primarily by minimizing the amount of time they are stored at the Site before being incorporated into construction systems.

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 Floor Sealer

1. Floor sealer shall be:

a. MasterTop TC 493 330 as manufactured by Master Builders Solutions by BASF, Florham Park, NJ;

b. Superior Diamond Clear VOX as manufactured by Euclid Chemical, Cleveland, OH;

c. ArmorSeal Rexthane I as manufactured by Sherwin Williams,

d. Masterseal 330 as manufactured by Master Builders Solutions, Shakopee, MN.

e. Eucothane as manufactured by Euclid Chemical, East Brunswick, NJ.

f. Or approved equal.

B. Concrete Floor Hardener

1. Liquid Floor hardener shall be:

a. MasterKure 300 WB (Lapidolith) as manufactured by BASF, Florham Park, NJ;

b. Liquid Hard as manufactured by W.R. Meadows, Hampshire, IL;

c. Diamond Hard as manufactured by Euclid Chemical Company, Cleveland, OH;

d. Or approved equal.

2. Aggregate floor hardener shall be:

a. MasterTop 110ABR as manufactured by Master Builders Solutions, Shakopee, MN;

b. Surflex as manufactured by Euclid Chemical, East Brunswick, NJ.

c. Or approved equal.

C. Non-Slip Shake-On Aggregate and abrasion resistant floor hardener:

1. Non-slip abrasion resistant floor hardener shall be:

a. Duraltex 1805 with Duraltex 1807 or broadcast silica sand as manufactured by Euclid Chemical Company, Cleveland, OH;

b. Amorseal 8100 with Armorseal Hi-Wear Additive as manufactured by Sherwin Williams, Cleveland, OH;

c. Or approved equal.

2. Non-slip shake-on aggregate shall be:

a. MasterTop 120 SR (formerly Frictex NS) as manufactured by Master Builders Solutions by BASF, Florham Park, NJ;

b. Sikafloor 2 Syn Top as manufactured by Sika, Lyndhurst, NJ;

c. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Concrete Floor Sealer:

1. Sealer shall be aliphatic urethane or epoxy coating with resistance to abrasion and chemical attack.

B. Concrete Floor Hardener

1. Liquid Floor hardener product and manufacturer shall be as specified in this Section.

2. Aggregate floor hardener product and manufacturer shall be non-metallic and shall be as specified in this Section.

C. Non-Slip and Abrasion Resistant Floor Hardener:

1. Non-slip abrasion resistant floor hardener for application for new concrete to harden and provide a non-slip walking surface, even when wet. The

floor system shall contain flakes or broadcast 20/40 mesh silica sand for traction.

2. Shake-on aggregate floor hardener designed for application to freshly cast concrete to harden and densify the surface for resistance to wear and abrasion.

a. Product shall be a non-slip and non-rusting aggregate.

b. Non-slip aggregate shall NOT be permitted if the base concrete mix design uses air entraining agents (exceeds 3%), fly ash, slag, fibers, water reducers, accelerators or retarders. These admixtures severely diminish and slow the availability of bleed water.

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. Examine substrates, areas, and conditions where concrete finishing products will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Prepare cementitious substrates according to manufacturer's published installation instructions prior to application of concrete finishing products.

3.02 IMPLEMENTATION

A. Finishes on Formed Concrete Surfaces

1. After removal of forms, the finishes described below shall be applied in accordance with – "Concrete Finish Schedule" included in this Section. Unless specified in the Contract, all surfaces shall receive at least a Type I finish. The Engineer shall be the sole judge of acceptability of all concrete finish work.

a. Type I - Rough or Board Form Finish: All fins, burrs and other projections left by the forms shall be removed. All holes left by removal of ties, and all other holes, depressions, or voids shall be filled solid with cement grout after first being thoroughly wetted. Honeycombs shall be chipped back to solid concrete as directed, prior to patching with cement grout. Holes shall be filled with a small tool that will permit packing the hole solidly with cement grout. Cement grout shall consist of one part cement to three parts

sand, and the amount of mixing water shall be as little as consistent with the requirements of handling and placing. Color of cement grout shall match the adjacent wall surface. The surface shall be thoroughly cleaned of all stains or discolorations that will interfere with the final finish.

b. Type II - Smooth Form Finish: Concrete shall be cast against forms constructed of plywood not less than 5/8 inch thick, or of boards lined with tempered hardboard not less than 3/16 inch thick, or other approved materials. Form material shall not have torn grain, worn edges, patches of holes from previous use, or other defects which would impair the texture of the concrete surface. Form material shall utilize sheets as large as practicable in an orderly and symmetric configuration. Other aspects of the finish shall conform to the requirements of the rough form finish.

c. Type III - Grout Cleaned: Where this finish is required, it shall be applied after completion of Type II finish. After the concrete has been predampened, a slurry consisting of one part cement (including an appropriate quantity of white cement in order to produce a color matching the surrounding concrete) and 1-1/2 parts sand passing the No. 30 sieve, by damp loose volume, shall be spread over the surface with clean burlap pads or sponge rubber floats and scrubbed into the surface using a rotary motion. Any surplus material shall be removed by scraping and then rubbing with clean burlap. The finish shall be kept damp for at least 36 hours after application.

d. Type IV - Smooth Rubbed: Where this finish is required, it shall be applied after the completion of the Type II finish no later than one day following form removal. Nor rubbing shall be done before the concrete is thoroughly hardened and the mortar used for patching is firmly set. A smooth, uniform surface shall be obtained by wetting the surface and rubbing it with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities requires it, the general surface of the concrete shall not be cut into. Corners and edges shall be slightly rounded by the use of the carborundum stone. Brush finishing or painting with grout or neat cement will not be permitted.

e. Type V - Textured: Use textured forms or textured form liners of plastic, wood, or sheet metal. Secure liner panels in forms by cementing or stapling, not by methods which will permit impressions of nail heads, screw heads, washers, or the like to be imparted to the surface of the concrete. Seal edges of textured panels to each other or to divider strips to prevent bleeding of cement paste. Use a sealant that will not stain the concrete surface.

f. Type VI - Aggregate transfer: Produce aggregate transfer and other special finished that duplicate mock-ups or sample panels prepared in advance and accepted.

g. Type VII - Exposed Aggregate: Expose aggregate using one of the following methods. Provide a concrete surface that will duplicate a mock-up or a sample panel prepared in advance and accepted.

1) For a scrubbed finish, cast concrete against form faces which have been coated with a chemical retarder used in accordance with the manufacturer's recommendations. Wet the partially hardened concrete surface thoroughly and scrub with fiber or wire brushes, using water freely until the surface mortar is removed and the aggregate is uniformly exposed. Then rinse the surface with clear water. If portions of the surface have become too hard to permit uniform aggregate exposure, use dilute hydrochloric acid (one part commercial muriatic acid diluted with 4 to 10 parts water) to remove the excess surface mortar after the concrete is at least 2 weeks old. Remove the acid from the finished surface with clean water within 15 minutes after application.

2) For a blast finish, sandblast or waterblast the concrete surface to a degree sufficient to expose fine aggregates with occasional exposure of coarse aggregate, and to produce a uniform color with a maximum reveal of 1/16 inch unless specified otherwise in the Contract Documents. All surfaces with the same specified blast finish shall be done at approximately the same time after placing co concrete. Use stainless steel or plastic reinforcement supports and spacers near concrete surfaces to be blasted. Protect adjacent materials and inserts during blasting operations.

3) For a tooled finish, dress the thoroughly cured concrete surface with electric, air, or hand tools to a uniform texture removing surface mortar as specified in the Contract Documents. Then provide the surface with a hand tooled, rough or fine pointed, crandalled, or bush-hammered surface texture, as specified by Contract Documents.

h. Type VIII - Applied: When finishes of stucco, cementitious coatings, or similar troweled materials are required or permitted, prepare the surface of the concrete to ensure permanent adhesion of the finish. If the concrete is less than 24 hours old, roughen it with a heavy wire brush or scoring too. If the concrete is older, roughen the surface mechanically or by acid etching. After roughening, wash the surface free of all dust, acid, chemical

retarder, and other foreign material before any final finish is applied.

B. Slab and Floor Finishes

1. The finishes described below shall be applied to floors, slabs, flow channels and top of walls in accordance with – "Concrete Finish Schedule" included in this Section. The Engineer shall be the sole judge of acceptability of all such finish work.

a. Type "A" - Screeded: This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required.

b. Type "B" - Scratched: Following completion of Type "A" finish, roughen the surface with stiff brushes or rakes before final set.

c. Type "C" - Floated: Following completion of Type "A" finish, do not work the concrete further until it is ready for floating. Begin floating with a hand float, a bladed power float equipped with float shoes, or a powered disc float as soon as the water sheen had disappeared and the surface has stiffened sufficiently to permit the operation. During or after the first floating, check flatness of surface with a 10 ft straightedge applied in two or more directions. Eliminate high spots and low spots during this procedure to produce a conventional, straight edge finish, then refloat the slab immediately to a uniform texture.

d. Type "D" - Troweled: Following completion of a Type "C" finish and sufficient hardening of the concrete to prevent excess fine material from working to the surface, the surface shall be compacted and smoothed with a power trowel. Following the power trowel, hand trowel to provide a smooth, dense surface, free from defects, trowel marks, and blemishes. For surfaces exposed to wear as indicated in the Contract Documents, continue hand troweling until a ringing sound is produced as the floor is troweled.

e. Type "E" - Broom or Belt: This finish shall provide the surface with a transverse scored texture by drawing a broom or burlap belt across the surface immediately after completion of a Type "C" finish.

f. Type "F" - Liquid Hardened Finish: Liquid hardened finish shall be provided by application of a liquid floor hardener. Floors to receive this finish shall have previously received a Type "D" finish. Liquid hardener shall be applied between 30 to 60 days after concrete placement. Surface to be treated shall be dry, clean and free of all loose dust, dirt, oil, wax, sealers and curing compounds. Application procedure shall be in accordance with

manufacturer's instructions and shall consist of a three-coat treatment.

g. Type “G” - Dry Shake Hardened Finish: Aggregate hardened finish shall be provided by applying an aggregate floor hardener concurrently with the application of a Type “D” finish. Application procedure shall be in accordance with manufacturer's instructions.

h. Type “H” - Non-Slip Finish: This finish shall be provided by applying a non-slip shake-on aggregate concurrently with the application of a Type “D” finish. Application procedure shall be in accordance with manufacturer's instructions.

C. Sealing of Concrete Floor

1. After installation of all equipment and piping, and after completion of other related construction activities, all floor slabs which are to remain unpainted and not intended to be immersed, and all equipment pads, shall be sealed with a floor sealer unless the slab has had liquid hardener applied or stated otherwise. Remove all dirt, droppage, grease, asphalt or other foreign matter with caustics and detergents as required prior to application. Sealer shall be applied in accordance with the manufacturer's recommendations.

D. Finishes on Equipment Pads

1. Formed surfaces of equipment pads shall receive a Type II finish.

2. Top surfaces of equipment pads, except those surfaces subsequently required to receive non-shrink grout and support equipment bases, shall receive a Type "D" finish, unless otherwise noted. Surfaces which will later receive non-shrink grout shall, before the concrete takes its final set, be made rough by removing the sand and cement that accumulates on the top to the extent that the aggregate will be exposed with irregular indentations in the surface up to 1/2 inch deep.

E. Concrete Finish Schedule

Item	Finish Type
All concrete surfaces not exposed to public view including utility spaces	I
All exterior surfaces and interior vertical surfaces exposed to public view	IV
All interior overhead surfaces exposed to public view and interior walls of tanks	II
Surfaces to be painted	III
Architectural finish	V, VI, VII, or VIII as indicated in

Item	Finish Type
	the contract documents
Surfaces to receive bonded cementitious mixtures	B
Drives, interior stairs, surfaces to receive waterproofing, roofing insulation, or terrazzo, and floors of tanks	C
Floors for walking surfaces in manufacturing, storage, and warehousing areas, and floors to receive coverings	D
Sidewalks	E
Garage and storage area floors	F or G
Exterior stairs, platforms, landings and ramps and interior ramps	E or H

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 03 60 00 - GROUTING
CONTRACT TI-181

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 30 00 - Cast-in-Place 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	-	Packaged Dry, Hydraulic Cement Grout (Nonshrink).
6.	CRD-C 621	-	Corps of Engineers Specification for Non-shrink Grout.
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.

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 shall be used for grout toppings and for patching of fresh concrete.

   b. Non-shrink grout shall be used for grouting beneath base plates of equipment and structural metal framing.

   c. Epoxy grout shall be used for bonding new concrete to hardened concrete.

2. New concrete surfaces to receive cement grout shall be as specified in Section 03 30 00 – Cast-in-Place 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.

   b. Curing and protection of cement grout shall be as specified in Section 03 30 00 – Cast-in-Place 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 4,000 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 30 00 – Cast-in-Place 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. 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.

2. 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.

3. 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.

4. 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.

5. 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 ensure 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

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. This Section furnishes requirements for all iron or steel materials which are to be galvanized as shown on the Contract Drawings.

B. All galvanizing shall be done by the hot-dip process.

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

D.

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E. 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. Not Used

1.04 REFERENCES

A. Acronyms

1. American Galvanizers Association (AGA)
2. Canadian Standards Association (CSA)

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 A111 - Zinc-Coated (Galvanized) "Iron" Telephone and Telegraph Wire
4. ASTM A116 - Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric
5. ASTM A121 - Zinc-Coated (Galvanized) Steel Barbed Wire
6. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
7. ASTM A143 - Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
8. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware
9. 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)
10. ASTM A384 - Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies
11. ASTM A385 - Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
12. ASTM A392 - Zinc-Coated Steel Chain-Link Fence Fabric
13. ASTM A475 - Zinc-Coated Steel Wire Strand
14. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
15. ASTM A780 - Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
16. ASTM A924 - General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

17. ASTM B6 - Specification for Zinc
18. ASTM E536 - Test Methods for Chemical Analysis of Zinc and Zinc Alloys
19. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated
20. CAN/CSA G164-M92 - Hot Dip Galvanizing of Irregularly Shaped Articles.

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.
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.
2. The plant shall follow the procedures in the Quality Assurance Manual of the AGA.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings for approval by the Engineer. The submittals shall include, but not be limited to:

1. The producer's or supplier'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.

B. A report of the test results shall be furnished to the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling

B. 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.

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-annealling.

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.

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 regalvanized 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.

2. The extent of the area to be repaired and the method of repair to be used shall be approved 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

NO TEXT ON THIS PAGE

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 • Rolled, pressed and forged, shapes, castings, plates, bars and strips • Gratings, iron and steel	B6, E536	A123	A123	A90, G164-M92	A123	A123, A239	Table 1, A123
SHEETS • 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
WIRE							
• Line wire	B6, E536	A111	--	A90	A111	A111	Table 1, A111
• Fencing wire	B6, E536	A116	--	A90	--	--	Table 3, A116
• Fencing fabric, chain link	B6, E536	A392	--	A90	--	--	Tables 1 and 2, A392
• Barbed wire	B6, E536	A121	--	A90	--	--	Table 3, A121
• Strand wire	B6, E563	A475	--	A90	A475	A475	Table 4, A475

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
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 repair 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

1.04 REFERENCES

A. Definitions

1. Definitions of welding terms shall be in accordance with ANSI/AWS A3.0.

B. Reference Standards:

1. AISC-04 - Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design
2. ANSI/AWS A2.4 - Standard Symbols for Welding, Brazing and Nondestructive Examination
3. ANSI/AWS A3.0 - Standard Welding Terms and Definitions
4. ANSI/AWS D1.1 - Structural Welding Code - Steel
5. ANSI/AWS D1.4 - Structural Welding Code - Reinforcing Steel
6. AWS Z49.1 - Safety in Welding and Cutting and Allied Processes
7. American Institute of Steel Construction (AISC)
8. American Welding Society (AWS)
9. New York City Building Code (NYCBC)

1.05 DESCRIPTION

A. All welding shall be performed in accordance with ANSI/AWS D1.1 and ANSI/AWS D1.4. 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.

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-04. When ANSI/AWS D1.1 and AISC-04 are in conflict, the requirements of ANSI.AWS D1.1 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 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. Gun welded studs shall conform to the requirements of ANSI/AWS D1.1, Section 7.

7. 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 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, other than stud 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 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.

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 and ANSI/AWS D1.4.

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 Annex E of ANSI/AWS D1.1.

   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 and ANSI/AWS D1.4, 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 or ANSI/AWS D1.4, 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, Section 4. 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 and ANSI/AWS D1.4.

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. 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

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:

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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 13.01 - Galvanizing

B. Section 05 05 23.01 - Welding

C. Section 05 12 00 - Structural Steel Framing

1.04 REFERENCES

A. ASTM International (ASTM)

1. ASTM A 36 - Carbon Structural Steel.
2. ASTM A 307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
3. ASTM A 489 - Carbon Steel Lifting Eyes.
4. ASTM A 563 - Carbon and Alloy Steel Nuts.
5. ASTM B 348 - Titanium and Titanium Alloy Bars and Billets.
6. ASTM D 1785 - Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120.
7. ASTM E 488 - Standard Testing Method for Strength of Anchors in Concrete Elements
8. ASTM E 1109 - Test Method for Strength of Power-Actuated Fasteners Installed in Structural Members
9. ASTM E 1512 - Test Method for Testing Bond Performance of Bonded Anchors
10. ASTM F 436 - Specification for Hardened Steel Washers Inch and Metric Dimensions
11. ASTM F 467 - Nonferrous Nuts for General Use.
12. ASTM F 593 - Stainless Steel Bolts; Hex Cap Screws, and Studs.
13. ASTM F 594 - Stainless Steel Nuts.
14. ASTM F 1554 - Specification for Anchor Bolts, Steel, 36, 55 and 105 ksi Inch and Metric Dimensions
15. ASTM F 3125 - 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)

1. ACI 355.2 - Qualification of Post-Installed Mechanical Anchors in Concrete
2. ACI 355.4 - Qualification of Post-Installed Adhesive Anchors in Concrete

C. International Code Council – Evaluation Service (ICC-ES)

1. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements

2. ICC-ES AC58 - Acceptance Criteria for Adhesive Anchors in Masonry Elements
3. ICC-ES AC60 - Acceptance Criteria for Anchors in Unreinforced Masonry Elements
4. ICC-ES AC70 - Acceptance Criteria for Fasteners Power-Driven into Concrete, Steel and Masonry Elements
5. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements
6. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements
7. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements

D. American Welding Society (AWS)

1. AWS D1.1 - Structural Welding Code - Steel
2. AWS D1.2 - Structural Welding Code - Aluminum
3. AWS D 1.6 - Structural Welding Code – Stainless Steel

E. American Society of Mechanical Engineers (ASME)

1. 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)
2. ASME B 18.2.2 - Square and Hex Nuts (Inch Series)
3. 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)

1. Steel Construction Manual
2. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges
3. AISC 360 - Specification for Structural Steel Buildings
4. RSCS Specification for Structural Joints Using High-Strength Bolts

I. Aluminum Association

1. 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.
4. 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.

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:

1. 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.
2. Copy of valid AWS certification for each person who is to perform field welding.
3. Certified weld inspection reports, when required.
4. Adhesive Anchors
    a. For all adhesive anchors, submit anchor sizes and location plan
    b. Testing methods, procedures and equipment.

c. 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 316 stainless steel KH-EZ screw anchor as manufactured by Hilti, Plano, TX;
2. Type 316 stainless steel Wedge-Bolt screw anchor as manufactured by DeWalt, Brewster, NY;
3. Type 316 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;
4. 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:
    a. AC200+ as manufactured by DeWalt, Brewster, NY;
    b. HIT HY-200 as manufactured by Hilti, Plano, TX;
    c. A7+ as manufactured by ITW Ramset/Redhead, Glendale Height, IL;
    d. AT-XP as manufactured by Simpson Strong-Tie, Pleasnaton, CA;
    e. Or approved equal.

E. The wedge inserts shall be as manufactured by:
    a. Hohmann & Barnard, Inc., Hauppauge, NY;
    b. Heckmann Building Products, Norwalk, CT;
    c. Or approved equal.

F. Anchor channel shall be as manufactured by:
    a. Halfen Anchoring Systems, Tampa, FL;
    b. Hilti, Plano, TX;
    c. Or approved equal.

G. 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.

H. Expansion Bolts in Structural Steel Connections shall be:
1. T ype HB Hollo-Bolt as manufactured by Lindapter, Syracuse, NY;
2. Blind Bolt USA Yorkville, IL;
3. 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 316 with nitronic 60 stainless steel nuts and locknuts.
3. All underwater anchor bolts shall be Type 316 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 316 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 316 stainless steel. Unless otherwise specified, fasteners for aluminum members shall be Type 304 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 316 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 316 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.

    a. 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.

    a. 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 316 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.

    a. 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.

b. Manufacturer for Epoxy adhesive and Vinylester adhesive anchor systems and shall be as specified in this Section.

c. Adhesive anchoring system shall have an ICC-ES Evaluation Service Report issued in accordance with AC308.

d. 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

5. Concrete anchors shall be of Stainless Steel Type 316 unless noted otherwise. Concrete anchors for stainless steel attachments shall be of matching grade.

6. All underwater concrete anchors shall be Type 316 stainless steel and shall have nitronic 60 stainless steel nuts.

7. Material for concrete anchors submerged in salt water or other corrosive liquids for which stainless steel Type 316 is not suitable shall be as indicated in the Contract.

E. Concrete Inserts

1. Wedge Type Inserts:

a. The concrete inserts for attachment of shelf angles or brick relieving angles to the reinforced concrete beams or concrete encased steel beams, shall be wedge type inserts. The inserts shall have an askew head bolt to produce an automatic tightening action when a load is placed on the bolt.

b. The wedge inserts shall be of malleable iron, hot dipped galvanized. The askew bolt and the horseshoe shim plates shall be of stainless steel Type 304 or 316. The type of insert and size of bolts shall be as shown on the Contract Drawings.

c. Manufacturer for wedge inserts shall be as specified in this Section.

2. Anchor Channel Inserts: for the top attachment of the masonry wall panels to steel encased or concrete structures, the inserts shall be:

   a. Manufacturer for anchor channel inserts shall be as specified in this Section.

   b. The anchor channel shall be made from channel profiles with "I" anchors shop welded to the back of channels. Anchor channels shall be furnished with the head bolts, channel nuts, etc., for a complete installation. All material shall be stainless steel type 304.

   c. The type and series of the anchor channel shall be as shown on the Contract Drawings.

   d. Anchor channels can be used for other attachments if detailed on the Contract Drawings.

F. 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 304 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"	255
5/16"	370
3/8"	525
1/2"	525

G. 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.

H. Eye Bolts

1. Eyebolts shall be of the size indicated on the Contract Drawings and shall conform to ASTM A489 unless noted otherwise.

2. Carbon steel eyebolts shall be galvanized in accordance with Section 05 05 13.01 - Galvanizing.

I. 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

J. Expansion Bolts in Structural Steel Connections

1. Expansion bolts for connecting to hollow section steel or where access is restricted (blind-bolts) shall be Type 316 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 Contract 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 304 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."

5. Adhesive Anchors: Adhesive anchoring installation shall be subject to special inspection requirements of NYCBC section BC 1704.32.

B. Testing of Adhesive Anchors

1. 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 are as indicated on the Contract Drawings.

2. 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.

3. 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, ansectiond 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 TI-181

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 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. A6 - General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling

b. A36 - Carbon Structural Steel

c. A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

d. A193 - Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

e. A194 - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service

f. A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

g. A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

h. A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

i. A563 - Carbon and Alloy Steel Nuts

j. A572 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel

k. A588 - High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4-Inches Thick

l. A992 - Standard Specification for Steel for Structural Shapes for Use in Building Framing

m. F436 - Hardened Steel Washers, Inch and Metric Dimensions

n. F 594 - Stainless Steel Nuts

o. 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. A5.1 - Carbon Steel Covered Arc-Welding Electrodes

b. A5.5 - Low-Alloy Steel Covered Arc-Welding Electrodes

c. A5.9 - Corrosion-Resisting Chromium and Chromium-Nickel Steel Bare and Composite Metal Cored and Stranded Arc Welding Electrodes and Welding Rods

d. A5.17 - Carbon Steel Electrodes and Fluxes for Submerged-Arc Welding

e. A5.18 - Filler Metals for Gas Shielded Arc Welding, Carbon Steel

f. A5.23 - Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

g. D1.1 - Structural Welding Code

h. 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 A307 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. Structural steel work shall be painted in accordance with Section 09 91 00 - Painting. 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.

1) All structural steel shall be given one prime coat before shipment to the field.

2) Structural steel encased in concrete shall not be painted.

3) Structural steel encased in masonry or which will be otherwise inaccessible in the finished work, shall receive two shop coats. After erection and before the steel is enclosed, all damaged surfaces shall be prepared and touched-up.

4) No paint shall be permitted on faying surfaces of slip critical joints unless it is qualified by test in accordance with AISC "Test Methods to Determine the Slip Coefficient for Coatings used in Bolted Joints" as adopted by the Research Council on Structural connections. Manufacturer's certification shall include a certified copy of the test report.

5) Prime coat shall be compatible with fireproofing system.

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. Finished Surfaces: Machine finished surfaces with zero clearance metal to metal contact shall be protected against corrosion by rust-inhibiting coating that can be easily removed prior to erection or which has characteristics that make removal unnecessary prior to erection.

3. 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.

4. 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

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install all stainless steel floor gratings as indicated on the Contract Drawings and specified herein.

B. Gratings shall be complete with frames, anchors, fastening devices and miscellaneous appurtenances.

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 05 05 23.01 - Welding

1.04 REFERENCES

A. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ASTM A276 - Stainless and Heat-Resisting Steel Bars and Shapes.

C. ASTM A480 - General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plates, Sheet and Strips.

D. ASTM A666 - Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar.

E. ASTM F593 - Stainless Steel Bolts, Hex Cap Screws and Studs.

F. ASTM F594 - Stainless Steel Nuts.

G. ANSI/NAAMM MBG 531 - Metal Bar Grating Manual.

H. ANSI/NAAMM MBG 532 - Heavy Duty Metal Bar Grating Manual.

I. NAAMM MBG 533 - Welding Specifications for Fabrication of Steel, Aluminum and Stainless Steel Bar Grating.

J. ASTM A992 - Steel Plates, Shapes and Bars; Carbon, Structural.

K. National Association of Architectural Metal Manufacturers (NAAMM).

L. New York City Building Code (NYBC).

1.05 DESCRIPTION

A. Design Requirements

1. The design live load for grating covering floor openings shall be that designated for the adjacent floor area but not less than a uniform load of 150 pounds per square foot or a concentrated load of 300 pounds distributed over a 12-inch square area at the center of span, whichever produces the greater stress.

2. The design live load for grating on platforms shall be as designated on the Contract Drawings but not less than a uniform load of 100 pounds per square foot.

3. Grating in areas subject to vehicular traffic shall be designed for the maximum weight vehicle which can access the area. Forklifts or other similar wheeled vehicles shall have maximum wheel loads defined by the manufacturer. When wheel loads are not defined by the manufacturer, the wheel load shall be defined as 40 percent of the gross loaded weight of the maximum size vehicle to be accommodated.

4. The maximum allowable deflection due to dead load plus live load shall not exceed the span divided by 240, but not more than 1/4 inch.

5. Gratings shall be designed in accordance with the design criteria specified herein, and the NAAMM specifications, unless otherwise noted on the Contract Drawings or as required by the NYBC.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications of all gratings for approval by the Engineer.

B. Gratings shall not be manufactured until the Contractor's Shop Drawings have been approved by the Engineer.

C. Samples of grating and fastening devices shall be submitted for approval by 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. Type of Gratings

1. Unless otherwise shown or specified, gratings shall be one of the following types and shall be the product of one manufacturer:

a. Type "A" - Parallel bearing bars, with cross members at right angles.

b. Type "B" - Parallel bearing bars, with diagonal cross members.

B. Materials

1. Floor gratings and appurtenances shall be Type 316L Stainless Steel and shall conform to the requirements specified herein and to the following standards:

a. Gratings: ASTM A167; ASTM A480; ASTM A666

b. Frames, Curb Angles, Braces, Skirt Angles, Bolts and Fastening Devices: ASTM A276; ASTM A480; ASTM F593, ASTM F594

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Gratings shall be accurately fabricated, free from warps, twists or other defects which affect the appearance and serviceability of the grating,

B. The tops of the grating bearing bars and cross bars shall be in the same plane.

C. Gratings shall have a mill finish unless otherwise noted on the Contract Drawings.

D. All welds shall be ground smooth and conform to the requirements of Section 05 05 23.01 - Welding and NAAMM MBG 533.

E. Openings in and edges of all grating sections shall be banded with bearing bars. Bands shall be welded to all intersecting members.

F. Grating Fabrication

1. Type "A" Grating (Pressure Locked or Welded) shall consist of parallel bearing bars spaced not more than 1-3/16 inches on centers joined by cross members spaced not more than 4 inches on center (unless shown otherwise on the Contract Drawings), to form rectangular openings. Approved welded, electric-forged, slotted, friction fitted or interlocking joints shall be used in joining cross members to the bearing bars to give the grating the required strength, rigidity and durability. The distance between the support and the nearest cross bar shall not exceed 2 inches.

2. Type "B" Grating (Welded or Riveted) shall consist of parallel bearing bars spaced not more than 1-5/16 inches on center, joined by welded or riveted bent diagonal cross bars. Rivets shall be 1/4 inch in diameter and shall be spaced not more than 4 inches on center unless shown otherwise on the Contract Drawings. The distance between the support and the center of the nearest rivet shall not exceed 1 inch.

3. Minimum grating depth shall be 1-1/4 inches with bearing bars not less than 3/16 inches thick.

4. Welded cross members shall not be less than 3/16 inch in thickness. Mechanically interlocked cross members shall not be less than 1/8 inch in thickness. The depth of cross members shall not be less than one-half the depth of the bearing bars, but such depth need not exceed 1 inch. Riveted cross members shall be as specified for mechanically interlocked cross members.

5. Serrated grating shall be provided where shown on the Contract Drawings. Depth of serrated grating shall be not less than ¼ inch greater than required standard bar grating.

6. Each section of grating shall be sized to weigh a maximum of 100 pounds unless noted otherwise on the Contract Drawings.

G. Grating Cut-outs

1. Cut-outs shall be provided in the grating for the passage of pipe, valve stems, columns and similar work. Where more than two bearing bars are included in the cut-out, banding bars of the same dimensions as the bearing bars shall be provided around the opening and welded or electric-forged to the component parts of the grating.

H. Grating Stair Treads and Landings

1. Grating stair treads shall be 1 inch wider than tread widths shown on the Contract Drawings and shall be securely fastened to angles or carrier bars which in turn shall be fastened to stringers. The outer edge or nosing of stair treads shall be so constructed as to make it distinctly visible and contrasting with the other part of the tread. Non-slip nosings shall be furnished on all the stair treads and landings.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurements

1. The Contractor shall check all dimensions in the field after all piping and equipment are set in place and determine the exact dimensions and locations of openings and cut-outs.

2. Templates shall be made where required for location and size of openings and cut-outs.

3. The Contractor shall field verify all pertinent dimensions prior to grating fabrication.

3.02 INSTALLATION

A. Installation

1. Gratings shall be installed with each section readily removable and replaceable. Adjacent units shall be neatly fitted together.

2. The clearance at the ends or between sections of gratings shall be a maximum of 1/4 inch.

3. Tops of gratings shall be set flush with surrounding construction.

4. Gratings shall be set with a full and uniform end bearing on the stainless steel frames to preclude rocking movement; wedges or similar shimming devices shall not be used.

B. Fastening Devices

1. Approved fastening devices shall be installed to hold the gratings rigidly to the supports with means for easy removal.

2. Fastening devices shall not protrude above the walking surface of the grating.

3. Fasteners shall be installed in accordance with the manufacturer's recommendations.

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

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

1. Material Paint 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. Section 40 05 97 - Identification for Process Equipment.

1.04 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. 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.

E. 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.

1.05 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. 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.

1.06 QUALITY ASSURANCE

A. 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. Holiday Test Results and Repair Data

k. Peel Test Results and Repair Data

l. Foreman or Supervisor's Signature

B. 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.

C. 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. 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. Manufacturer's Standard Finished Items: The following items shall be furnished with the manufacturer's standard prime and finish coats applied in the shop: pumps, motors, gears, gear housings, air compressors, wall fans, temperature control and instrument panels, process air blowers, engines, filters, strainers, air dryers, meters, gas boosters, gas turbines, generators, panelboards, transformers, boilers, condensing units, water chillers, cooling towers, condensers, heat exchangers, humidifiers, air handling units, sound attenuators, air conditioning and dehumidification units, convector cabinets, unit heaters, enclosures for finned tube radiators, cabinet heaters, boilers, wood seats, lockers, metal toilet partitions, metal urinal screens, aluminum fascia, motor control centers, aluminum light standards, and hoisting equipment. Steel reinforcing bars for concrete shall be coated in accordance with the Contract. When powder coatings are required by the Contract, the powder coatings shall be in accordance with the requirements of the manufacturer of the item.

3. 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.

4. 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.

1.07 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.

3. 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.

4. 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. Finished areas shall be considered adequate for the purpose of determining the quality of the Work. 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.

5. 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.

6. 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.

7. 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.

8. Applicator's Quality Assurance:

   a. Submit 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

9. Warranty:

   a. Submit manufacturer's standard warranty.

10. Environmental Product Declarations

    a. The Contractor shall provide product-specific type III Environmental Product Declarations (EPDs) conforming to ISO 14025 and ISO 14044.

1.08 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.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 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.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Compatible shop and field coats shall be provided.
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 V69 Hi-Build Epoxoline II	69	3.0-5.0
	Carboline: Carboguard 60/61 or Carboguard 635 or Carboguard 890 Series	72 65 75	4.0-8.0 4.0-6.0 4.0-8.0
	Sherwin Williams: Macropoxy 240	72	2.0-4.0
	International Paint: Integrated 345 or Devran 224V	70/77	3.0-4.0 (typically 4.0-6.0)
	PPG: Amerlock 2/400	85	4.0-8.0
B	**Tnemec:** Series V140-44 BR Pota-Pox Plus	69	4.0-6.0
	Carboline: Sanitile 120	38	1.0-2.0
	Sherwin Williams: Dura-Plate 235 (Waste Water)	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 1095 Endura-Shield	68	2.0-3.0
	Carboline: Carbothane 134 Series or Carbothane 134WB	70 50	2.0-3.0 2.0-3.0
	Sherwin Williams: Hi Solids Polyurethane 250 or Sherloxane 800	63 90	3.0-5.0 4.0-6.0
	International Paint: Interthane 990V or Devthane 379	71/63	2.0-3.0
	PPG: Pithane Ultra	70	2.0-3.0
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

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
	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
	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

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
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	3.0-5.0
	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)
	PPG: Amerlock 2	85	4.0-8.0
M	**Tnemec:** Series 431 Perma- Shield PL	100	30.0-40.0
	Carboline: Reactamine ET	100	30.0-40.0
	Sherwin Williams: Duraplate UHS or Duraplate 6000	100 100	30.0-40.0 40-60
	PPG: Novaguard 890	100	25.0-30.0

CLASSIFICATION OF PAINTS			
Paint Group	**Product Name and Number**	**Volume Solids %**	**Dry Film Thickness Mils per Coat**
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

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. 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).

SURFACE PREPARATION GUIDELINES	
Class of Work	Preparation of Surface Prior to Painting
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.

3.02 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.

   b. Miscellaneous steel and wrought iron

   c. Ornamental wrought and light iron

   d. Iron castings

2. Machinery and Equipment:

   a. Mechanical and electrical equipment

3. Pipe:

   a. All piping except galvanized iron, stainless steel, aluminum, copper, brass and bronze piping.

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. 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. An approved low voltage wet sponge "holiday" detector shall be used as directed by the Engineer. 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. Inaccessible Items: Exposed members which will be inaccessible after erection shall be painted and cleaned prior to erection.

10. 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.

11. 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.

E. 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.

F. 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.

G. 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.

H. 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.

I. 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.

J. Concealed Surfaces: All wall surfaces which will be concealed by equipment shall be painted before equipment installation.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 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	--	--	--	--	--

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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				--

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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.																				

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PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install fire extinguishers, complete and operational, with cabinets and all anchor bolts, fasteners, and accessories.

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

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C. Refer to the Contract Drawings for the Fire Extinguisher 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. Abbreviations and Acronyms:

1. DC Dry Chemical
2. CO2 Carbon Dioxide

B. Reference Standards:

1. NFPA 10 Portable Fire Extinguishers.

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, the following:

1. Action Submittals:
    a. Shop Drawings:
        1) Complete detail and installation drawings for fire extinguisher s and cabinets.
        2) Wall mount hardware.
2. Information Submittals:
    a. Manufacturer's specification data sheets and verification of UL ratings.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver equipment provided under this Section in accordance with the requirements of the Contract Documents.

B. The Contractor shall store and handle equipment 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. All products specified under this Section shall be covered under the manufacturer's standard warranty unless specified otherwise.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. DC and CO2 fire extinguishers:

1. Ansul Inc., Marinette, WI.
2. Kidde as manufactured by United Technologies Corp., Mebane, NC.
3. JL Industries, division of Activar Construction Products Group, Bloomington, MN.
4. Larsen's Manufacturing Company, Minneapolis, MN.
5. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. DC fire extinguishers shall be 10 lb. capacity, cartridge operated, hand portable, with wall mount, tri-class dry chemical type, with Underwriters' Laboratories rating of 4A:60B:C.

B. CO2 fire extinguishers shall be 10 lb. capacity, portable carbon dioxide type with wall mounts, having Underwriters' Laboratories rating of at a minimum 1A:10B:1C.

C. Except where indicated to be mounted within cabinets, provide the manufacturer's standard wall-mounting bracket for each fire extinguisher.

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. Install fire extinguishers in complete accordance with the manufacturer's printed instructions and the approved shop drawings.

1. Fire extinguishers shall be installed where shown on the Contract Drawings and as directed by the Engineer.

B. Wall mounts for extinguishers shall be securely mounted to masonry with Type 316 stainless steel lag bolts and shields.

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 23 05 93 – TESTING, ADJUSTING, AND BALANCING FOR HVAC
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances as shown, specified, and required to perform testing, adjusting and balancing of all Heating, Ventilation, and Air Conditioning Systems, as specified and/or required for proper 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 40 80 82 – PMCS Startup and Field Testing

1.04 REFERENCES

A. Abbreviations and Acronyms:

1.	AABC	Associated Air Balance Council
2.	NEBB	National Environmental Balancing Bureau
3.	HVAC	Heating, Ventilating, Air Conditioning
4.	TAB	Testing, Adjusting, and Balancing

B. Reference Standards:

1.	ASHRAE	Handbook – Fundamentals.
2.	AABC-MN-1	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems (1989).
3.	NEBB-01	Procedural Standards for Testing Adjusting Balancing of Environmental Systems (1991).
4.	AABC 81266	National Standards for Field Measurements, Total System Balance, Air Distribution, Hydronics Systems, Volume One.

1.05 DESCRIPTION

A. This Section includes requirements for the testing, adjusting, and balancing for HVAC Systems. In addition:

1. HVAC equipment shall be completely installed and in continuous operation as required to accomplish the test, adjust, and balance work specified.

2. Reports shall be certified by the testing engineer that the methods used and the results achieved are as specified.

3. Should corrective measures caused by faulty installation require retesting, adjusting and balancing, such work shall be performed at no additional expense to the City.

1.06 QUALITY ASSURANCE

A. Balancers Qualifications:

1. Balancer shall have certification by NEBB, AABC, or SMACNA, or demonstrate that the standards and experience required for certification are possessed, all to the satisfaction of the Engineer.

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. Contractor shall submit one (1) copy of the standard procedure manual, published by the TAB organization affiliated with the Contractor, to the Engineer for his records.

b. Prior to testing all systems, the Contractor shall submit a test procedure for each and every system to undergo TAB as part of the Work.

c. Report Forms:

1) Submit specimen copies of report forms for Engineer's approval.

2) Forms shall be 8½-in. × 11-in. paper for loose leaf binding, with blanks for listing of the required test ratings and for certification of report.

3) Reports shall be on the organization’s approved forms imprinted with the company's name.

4) Certified report outlining procedure used to balance the system and the types of measuring devices used.

d. Test results shall be submitted on approved forms in a typed format.

e. Submit certified copies of required test reports to the Engineer for approval.

B. Information Submittals:

1. Data Sheets:

a. Submit samples of data sheets on each item of equipment for approval.

b. Submit data sheets on each item of testing equipment required.

c. Include name of device, manufacturer's name, model number, latest date of calibration, and correction factors.

2. Balancer's Qualifications:

a. Submit work experience or resume of proposed biographical data on employee who will directly supervise the TAB Work.

b. Licenses held by the balancer.

c. Submit a record of at least five (5) years' experience in the testing and balancing contracting industry, engaged in HVAC work, including but not limited to:

1) Names of projects.

2) Approximate contract cost of the TAB Work.

3) Amount of area that was tested, adjusted, and balanced for each 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. Instruments:

1. General:

a. Contractor shall provide all necessary instrumentation, tools, ladders, etc. to complete all air and hydronic balancing tests and adjustments.

b. Instrumentation shall be in accordance with NEBB, AABC, or SMACNA requirements and shall be calibrated to the accuracy standards demanded by these organizations.

c. Flow-measuring hoods (manufactured, not fabricated) shall be acceptable for measurement of ceiling diffuser performance only.

d. Contractor shall assume full responsibility for safe keeping of all instrumentation during the course of work.

B. Air balance instruments:

1. Provide all velometers, anemometers, pitot tubes, differential air pressure gages, manometers, hook gages, static pressure probe units, etc. as may be required to perform all air balance tests of HVAC equipment, ducts, registers, grilles, etc.

C. Water balance instruments:

1. Provide manometers, pressure gages, and other instruments and accessories as required to balance the water system.

D. System performance measuring instruments:

1. Provide insertion thermometers, sling psychrometers, tachometers, revolution counters, clamp-on volt-ammeter recorders, and other instruments as required to measure all facets of the complete HVAC system performance.

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. All TAB of air and hydronic systems shall be performed in compliance with the standard procedure manual published by the TAB organization affiliated with the Contractor and submitted to the Engineer for approval as specified herein. Contractor shall be solely responsible for the protection and safeguarding of his work and shall provide every protection against accidents, injury, and damage to persons and property.
2. Contractor shall keep dust, dirt, and debris to an absolute minimum and reinstall all removed ceiling components to their original positions at the end of each day.
3. Contractor shall be fully responsible for removal and reinstallation of ceiling system and replacement of any component damaged.
4. Contractor shall install additional access panels at no extra cost to the City, as is required to gain access to equipment concealed above ceilings, behind walls, or any other concealed space.
5. Air systems shall be tested, adjusted, and balanced with clean filters.
6. Hydronic systems shall be tested, adjusted, and balanced with clean strainers.

B. Inspection:

1. The Contractor shall conform to the requirements of this Contract Equipment Check:
    a. Verify proper overload heater sizes.
    b. Verify function of safety and operating controls.
    c. Verify proper operation of equipment.
    d. Report on inspection, observation and checking procedures.

C. Testing of Piping, Equipment, and Duct:

1. General:
    a. The Contractor shall be bound by this Section to test and adjust all systems and accessories covered under this Contract.

b. The Contractor shall also comply with the requirements of testing as outlined in the individual sections.

c. Furthermore, the Contractor shall operate and maintain these systems as per the requirements of the Contract Documents, and shall leave them in good working order.

d. The Contractor shall provide all necessary equipment and labor for this work.

2. All piping systems shall be thoroughly cleaned by flushing with water, disinfected, and tested by the Contractor for tightness.

a. Pipe lines shall be flushed at a rate of at least 2.5 ftps for a duration of minimum 1 hr.

b. The units and control valves shall be isolated before flushing.

c. The pipe line shall be flushed again after opening the valves at the units.

d. In general, piping shall be tested hydrostatically at 1.5 times the maximum design pressure for which the system is intended, but not less than 100 psig.

e. The line shall be filled with water for a period of not less than six (6) hours, then subject to the indicated test pressure.

f. Duration of test pressure shall be four (4) hours.

g. During the pressure test there shall be no leakage. All air shall be purged from the line before pressure testing.

h. Any leak shall be repaired in a manner acceptable to the Engineer and the system retested until all such piping shows tight.

3. Overall System Test:

a. After all final tests have been performed on all equipment and on all sub-systems installed under this Contract, including the testing of all controls specified in other Sections, and after the results from all such testing have been accepted, the Contractor shall test the overall system by demonstrating its ability to respond properly to normal changes in controlled parameters, as well as to system upsets.

b. To facilitate this, the Contractor shall make available a minimum of two (2) personnel, thoroughly familiar with the systems and equipment installed under this Contract, for a minimum of seven (7) days to test the system by changing controlled parameters and generating system upsets as directed by the Engineer, and demonstrating that the sequential action appropriate to the particular change or upset occurs automatically.

c. Where actual change or upset is not feasible, the Contractor shall simulate the change or the upset.

d. Controlled parameter changes shall include, but not necessarily be limited to, any change in temperature, pressure, flow rate, fluid level, load, etc., which should result in an automatic change in the position of a control valve or control damper, in the output rate of a piece of equipment, in the normal start-up or shutdown of equipment, etc.

e. The change in the state of the controlled device or equipment shall be shown to result in a corrective action on the controlled parameter.

f. Upsets shall include, but not necessarily be limited to, any condition which should cause annunciation of an alarm, safety shutdown of equipment, startup of standby equipment, closing of fusible-link devices, lifting of relief valves, etc.

g. The Contractor shall immediately restore to its original state any safety device, the state of which has been changed by its having been tested.

4. Contractor shall immediately correct any system deficiency that should occur during testing.

5. After the overall system testing has been completed, and after all final adjustments have been made, the Contractor shall operate and maintain all new systems and equipment, site-wide, associated therewith, for a period of thirty consecutive days.

a. During this period all normal maintenance (filter replacements, strainer cleaning, periodic checks of safety devices, datalogging, etc.) shall be performed by the Contractor.

b. If, during this period, any work beyond routine maintenance of equipment and materials installed under this Contract, should be required to maintain proper operation of the overall system, the elapsed time shall be forfeited, and a new thirty-day period shall commence following the completion of the corrective action.

D. Balancing and Adjusting:

1. In addition to any other reference to balancing and adjusting specified elsewhere in these Section, the Contractor shall be bound by this portion of the Section to balance, adjust and leave in good working order all systems and accessories covered under this Contract.

2. The Contractor shall procure the services of an independent balancing and testing agency which specializes in the balancing and testing of heating, ventilating and air conditioning systems to balance, test and adjust all systems installed under this Section.

3. The Contractor shall advise the Engineer at least two weeks in advance of the date scheduled for balancing to commence; at the Engineer's discretion, the balancing shall be conducted in the Engineer's presence.

4. At least three (3) months prior to the commencement of balancing, the Contractor shall forward a detailed explanation of the balancing procedure to the Engineer for review. In general, the method shall conform to those specified by the AABC or SMACNA.

5. All piping systems shall be balanced under this Section to provide the flows indicted on the Contract Drawings.

6. Air systems shall be balanced before all hydronic and refrigerant systems.

7. Before beginning to balance the air systems the Contractor shall check, in the presence of the Engineer, all filters and coils for cleanliness, dampers (automatic, volume and fire) for correct position, all fans for proper rotation, and temperature controls for minimum completeness to allow for proper balancing.

    a. If any of the above or other conditions are found which would not allow for proper balancing the Contractor shall take the necessary corrective actions, at his own expense, before balancing begins.

8. All heating and ventilating systems shall be balanced by the Contractor by adjustment of, fan sheaves, apparatus and air outlets to provide the air quantities indicated on the Contract Drawings. If necessary, adjustments of air outlets shall be made to eliminate drafts.

9. Balancing for all air systems shall be accomplished in a manner to first minimize throttling losses, then fan speed shall be adjusted to meet design conditions. All air outlets and fans shall be balanced within 5% of the design capacity.

10. Finned Coils: Plate type fins shall be combed out with a fin comb for appropriate fin spacing. Helical fins shall be straightened with blunt bladed instrument.

11. Balancing of Hydronic Systems:

    a. Balancing for all hydronic systems shall be accomplished in a manner that results in the balancing valve which is hydraulically furthest from the pumps having a pressure drop of 5 ft at design flow, unless when wide open its pressure drops exceeds 5 ft, in which case, it shall be left wide open. (Inadequate pressure drop renders flow readings inaccurate; excessive pressure drop imposes needless additional head on the pumps).

    b. Balancing for the remainder of the system shall be accomplished in a manner to first minimize throttling losses.

12. After the systems have been balanced, the Contractor shall submit and certify to the City, a list containing the following minimum information for air outlets and equipment:
    a. Room or facility served.
    b. Size, quantity and model of air outlet or equipment.
    c. Type of air outlet or equipment.
    d. Air flow indicated on Contract Drawings.
    e. Air flow measured.
    f. GPM indicated on Contract Drawings.
    g. GPM measured.
    h. Entering and leaving water temperatures.
    i. Fan cfm indicated on the Contract Drawings.
    j. Fan cfm measured.
    k. Fan motor running amps.
13. The Contractor shall advise the Engineer two days in advance of the start-up of the heating and cooling water circulating systems. To be ready for start-up, the boilers, chillers, condensers and pumps and related equipment must be "off", and the system must be filled, purged, balanced and cool.
14. The Contractor shall record the following:
    a. Pressure at system fill valve.
    b. Pressure at pumps (inlet or outlet).
    c. Pressure at building piping entries.
    d. System temperature.
15. The Contractor shall start the pumps and record the following pressures:
    a. System fill valve.
    b. Pump inlets.
    c. Pump outlets.
    d. Building piping entries (supply and return).
16. The Contractor shall start heating and/or cooling equipment. Once system design temperature has been reached, and system is in equilibrium, again record the pressures listed above, as well as the temperatures at the inlets and outlets of the boilers, chillers, condensers, coils, and heat exchangers.
17. The Contractor shall submit all recorded data to Engineer for review.

18. The Contractor shall adjust any or all equipment which, in the City's opinion, is not set within acceptable limits of ±5%.

E. Automatic Control Systems:

1. In cooperation with the control manufacturer's representative and as per the requirements of Section 40 80 82 - PMCS Startup and Field Testing, set and adjust automatically operated devices to achieve required sequence of operations.

2. Testing organization shall verify all controls for proper calibration and list those controls requiring adjustment by control system installer.

F. Marking Of Setting:

1. Following approval of TAB Verification Report, the setting of all HVAC adjustment devices including valves, and manual dampers shall be permanently marked by the TAB Specialist so that adjustment can be restored if disturbed at any time.

G. Identification Of Test Ports:

1. The TAB Specialist shall permanently and legibly identify the location points of duct test ports. If the ductwork has exterior insulation, the identification shall be made on the exterior side of the insulation. All penetrations through ductwork and ductwork insulation shall be sealed to prevent air leakage or to maintain integrity of vapor 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

PART 1 GENERAL

1.01 SUMMARY

A. Scope: This Section specifies provisions for materials, installation and testing for HVAC piping. The following index of this Section is presented for convenience:

1. Pipe Materials
2. Pipe Couplings and Flexible Pipe Pieces
3. Piping Specialties
4. Insulation.

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 09 91 00 - Painting

C. Section 40 05 05.30 - Leakage Testing for Exposed Piping

D. Section 40 05 22 – Steel and Stainless Steel Process Pipe.

E. Section 40 42 13 - Process Piping Insulation

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Reference Standards:

1. This Section incorporates by reference the latest revisions of the following documents. They are part of this Section insofar as specified and modified herein. In the event of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.

2. Unless otherwise specified, references to documents shall mean the documents in effect on the effective date of the Agreement. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

Reference	Title
ASME B31.9	Building Services Piping

B. Materials and equipment furnished under this Section shall be of manufacturers who have been regularly engaged in the design and manufacture of the materials and equipment for a period of at least 5 years. Demonstrate to the satisfaction of the Owner that the quality is equal to the materials and equipment made by the manufacturers specifically named herein, if an alternate manufacturer is proposed.

C. Factory Quality Control: The Contractor shall test all products as noted herein and by the reference specifications.

D. In addition, meet the following:

1. Installer Qualifications: Company specializing in performing work of the type specified in this section, with minimum 5 years of experience.

2. Welder Qualifications: Certify in accordance with ASME.

3. ASME Compliance: Comply with ASME B31.9 "Building Services Piping" for materials, products, and installation. Provide safety valves and pressure vessels with the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 01.

1.07 SUBMITTALS

A. Procedures: Section 01 33 00 – Submittal Procedures.

B. Action Submittal Items for this Section:

1. Manufacturer's data to show that the following items conform to the Specification requirements:

a. Pipe, fittings and accessories

b. Pipe couplings and flexible pipe pieces.

2. Shop Drawings:

a. Verify by excavation, inspection, and measurement all installation conditions, including existing utilities and structures, for buried OR all pipe before preparation of Shop Drawings. Submit field measurements and photos with Shop Drawings where exposed conditions are significantly different than specified on the Contract Drawings.

b. Layouts and Schematics: Submit detailed installation drawings of all piping. Schematics may be submitted for piping 4 inches and smaller. The Drawings and schematics shall include: pipe support locations and types, fittings, valves, other appurtenances.

c. Submit certified test reports as required herein.

d. All items that are submitted for use on potable water piping, including, but not limited to, pipe and valve linings, solvent cements, welding materials, gaskets and gasket lubricants and additives in concrete or cement mortar shall be NSF certified for use in water systems. Submit proof of NSF certification for each item 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. Furnish and install all necessary guides, inserts, anchors and assembly bolts, washers and nuts, hangers, supports, gaskets, couplings and flanges; all other appurtenant items shown on the Contract Drawings, specified or required for the proper installation and operation of the piping; devices included in or on the piping equipment; and piping accessories.

B. Pipe Materials

1. Steel Pipe: Section 40 05 22 – Steel and Stainless Steel Process Pipe.

C. Pipe couplings and flexible pipe pieces

1. General Requirements: For typical pipe joints refer to pipe material specifications. Other joint devices shall be furnished where called for on the Contract Drawings.

2. Piping Connections:

a. Provide standard products recommended by manufacturers in service specified which effectively isolate ferrous from non-ferrous piping to prevent galvanic action and stop corrosion.

b. Provide dielectric unions or waterways for transitions between dissimilar metal piping.

D. Pipe insulation

1. General Requirements: Section 40 42 13 - Process Piping Insulation

a. Insulation shall meet the minimum requirements of the New York State Energy Code.

b. Delivery: Deliver insulation materials to the job in original packages with manufacturer's "R" values clearly shown. Provide certification of compliance.

c. Warning: The Contractor is warned that working with fiberglass or rock wool materials may constitute a serious health hazard. The Contractor shall take all necessary precautions to ensure the safety of the workers.

d. Insulation Protection Shields: Provide insulation protection shields at all pipe supports for insulated piping.

2. Pipe Support System Design:

a. Design Loads: Pipe suspension shall be such as to prevent excessive stress or excessive variation in supporting force while system is in

operation. Pipe supports shall support the sum of the weight of the pipe, fittings, appurtenances, and contents. In addition, the pipe shall be anchored to resist internal pressure forces tending to separate any unrestrained joint at pressures 1-½ times the maximum working pressure for the applicable service.

b. Location: All piping shall be supported in a manner that will prevent undue strain on any valve, fitting, or piece of equipment. In addition, pipe supports shall be provided at changes in direction or elevation, adjacent to flexible couplings, at all nonrigid joints, and where otherwise shown. Where piping connects to equipment, it shall be supported by a pipe support and not by the equipment.

1) Maximum support spacing shall conform to the following table:

Pipe Size Inches	Pipe Material	Maximum Spacing Feet
1-inch and smaller	Iron or Steel	6
	Copper	4-1/2
	Plastic	continuous
	Tubing	continuous
1-¼-inch to 2-inch	Iron or Steel	8
	Copper or Plastic	5

2) Piping penetrations through concrete walls and slabs are considered to resist seismic loading, provided penetrations for pipes 3 inches in diameter and larger are complete with a wall flange.

3) Branch piping is not considered to provide resistance to seismic forces.

c. Thermal Expansion Allowance:

1) Provide one rigid pipe support for each straight run of pipe and between each pair of flexible couplings, flexible connectors, or expansion loops for pipes listed below. Provide other supports at the required spacing that allow sliding or rolling, as noted, along the pipe axis:

a) Building heating hot water (rolling).

2) Provide vertical support only, that is, no lateral support, within 4 feet of an angle or tee for pipes listed above.

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 Requirements: Division 40.

1. Install heating water and refrigerant piping in accordance with ASME B31.9 requirements.

B. General Handling and Placing:

1. Exercise great care to prevent injury to or scoring of the pipe lining and coating, as applicable, during handling, transportation, or storage. Do not store pipe on rough ground and do not roll the pipe on the coating. Any damaged pipe sections, specials, or fittings shall be repaired or replaced at the expense of the Contractor as satisfactory to the Owner.

2. Carefully inspect each pipe, fitting, valve and accessory before installation to insure there is no defective workmanship or obstructions. Inspect the interior and exterior protective coatings and patch all damaged areas in the field or replace to the satisfaction of the Owner.

3. Place or erect all piping to accurate line and grade and backfill, support, hang, or brace against movement as specified or shown on the Contract Drawings, or as required for proper installation. Remove all dirt and foreign matter from the pipe interior prior to installation and thoroughly clean all joints before joining.

4. Use reducing fittings where any change in pipe size occurs. Do not use bushings unless specifically noted on the Contract Drawings. Use eccentric reducing fittings wherever necessary to provide free drainage of lines.

5. Cast all metallic pipes and sleeves 6-inch and larger into new concrete walls without blockout. Pipes 5 inches and smaller may be cast in place or installed in a smooth core drilled hole using a link type seal at the Contractor's option. Maintain at least ½-inch clearance between reinforcing steel and metal pipe in penetrations.

C. General Exposed Piping Installation:

1. Unless shown otherwise, install piping parallel to building lines, plumb, and level.

2. Install piping without springing or forcing the pipe in a manner that would set up stresses in the pipe, valves, or connected equipment.

3. Set all pipe flanges level, plumb, and aligned. All flanged fittings shall be true and perpendicular to the axis of the pipe. All bolt holes in flanges shall straddle vertical centerline of pipes.

4. Flexibility and Expansion: Provide flexible couplings, flexible hose, or flexible spools for all piping connections to motor driven equipment and where otherwise shown. The Contractor may install additional flexible couplings at favorably reviewed locations to facilitate piping installation, provided that he submits complete details describing location, pipe supports, and hydraulic thrust protection. Anchor piping subject to expansion or contraction in a manner permitting strains to be evenly distributed. Sleeves for branches through walls from adjacent mains shall be of sufficient size to allow for free side motion of covered pipe in sleeves.

5. Install unions or flexible connections where shown on the Contract Drawings, and at all non-motor-driven equipment to facilitate removal of the equipment.

6. Provide valves wherever equipment drain connections are furnished and carry the discharge pipe to the nearest floor drain, drain trench or sump. Where no receptacle for drain exists, install drain piping to 1-inch above the floor. Drain piping and valve materials shall conform to the requirements of the system served.

7. Where piping conveying liquids passes over motor control centers, electrical panels and other electrical devices, install a protective drainage tray below the piping.

D. HVAC Piping Installation Requirements:

1. Provide access panels for concealed valves.

2. Install pipes and pipe fittings in accordance with recognized industry practices.

3. Align piping accurately at connections. Comply with ANSI B.31 Code for Pressure Piping.

4. Locate piping runs, as specified, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details, and notations or, if not otherwise specified, run piping in shortest route which does not obstruct space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, and other structural and permanent-enclosure elements of building. Limit clearance to 1/2-inch where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1-inch clearance outside insulation. Whenever possible in finished and occupied spaces, conceal piping from view by locating it in column enclosures, hollow wall construction or above

suspended ceilings. Do not encase horizontal runs in solid partitions, except as specified.

a. Do not run piping through transformer vaults, telephone, elevator, electrical or electronic equipment spaces or enclosures.

b. Concealed Piping Above Suspended Ceiling: Plan and coordinate to avoid interferences; install to maintain suspended ceiling heights shown on Architectural Drawings. Allow sufficient space above removable ceiling panels for panel removal. Locate piping so that valves are visible and accessible horizontally and vertically from point of access to the ceiling space.

c. Exposed Work: Run pipes parallel to the closest wall unless otherwise shown on Contract Drawings; maintain maximum headroom; avoid light fixtures.

d. Insulation Space Allowance: In piping work, allow space for pipe insulation and jackets. If interferences occur, move the piping to accommodate insulation thickness specified.

e. Pipe Lengths: Do not use short lengths or nipples at locations where a full length of pipe will fit.

f. Alignment Prior to Supporting and Anchoring: Place piping in proper alignment and position prior to connection to anchors, expansion loops, and equipment. Furnish jacking devices, temporary steel structural members, and assembled structures as necessary. Remove temporary equipment and structures supplied by contractor at completion; such items to remain Contractor property.

g. Valve and Equipment Connections: Piping not to place undue stress on flanged valves and equipment connections. Mating flange faces to be true and parallel to each other and not to require springing of piping for assembly. Pipe hangers and supports to carry the full weight of the pipe and fluid.

h. Piping Leaks: Correct immediately; use new materials; leak-sealing compounds or peening not permitted.

i. Pressure Ratings of Fittings, Valves, and Devices in Piping Systems: Pressure rating to be equal to or greater than the maximum working pressure of the system.

j. Equipment Vents and Drains: Provide for coils and vessels which contain water. Provide isolation valves and outlet valves at piping high and low points to permit venting and draining of the vessel without venting and draining connected piping. Provide hose connections and caps on drain lines.

k. Escutcheon Plates: Where exposed insulated and un-insulated piping passes through walls, floors, or ceilings; provide spring clip type. Provide plates on both sides of wall

E. Insulation Installation:

1. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions. Seal joints and seams to maintain vapor barrier. Seal penetrations for hangers, supports, and anchors. Keep insulation material dry during application. Apply vapor barrier on seams, joints, over staples, and at end butt to fittings.

2. Interior Walls and Partitions Penetration: Apply insulation continuously through walls and partitions, except fire-rated walls. Apply aluminum jacket with factory-applied moisture barrier over insulation. Extend 2 inches from both surfaces of wall on partition. Secure aluminum jacket with metal bands at both ends. Seal ends of jacket with vapor barrier coating. Seal around penetration with joint sealer.

3. Whenever possible, slip insulation on pipe before making connections. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.

4. Cover exterior insulation, except for metal-jacketed insulation with PVC fitting covers and seal circumferential joints with butt strips. Paint all exterior PVC covering.

3.03 FIELD TESTING / QUALITY CONTROL

A. Procedures: Section 40 05 05.30 - Leakage Testing for Exposed Piping.

1. Provide temporary equipment for testing, including pumps, compressors, tanks, and gauges, as required. Test piping systems before insulation (if any) is installed and remove or disengage control devices before testing. Where necessary, test sections of each piping system independently, but do not use piping valves to isolate sections where test pressures exceed local valve operating pressure rating. Fill each section with water, compressed air, or nitrogen and pressurize for the specified pressure and time.

2. Leave joints, including welds, uninsulated and exposed for examination during test.

3. Notify Owner and Authority Having Jurisdiction 2 days before tests.

4. Drainage, Waste and Vent Piping. Test in accordance with governing plumbing code or as follows: Test drainage and venting systems, with necessary openings plugged, to permit system to be filled with water and subjected to water pressure of minimum of 5 PSI head. System to hold water without water level drop greater than 1/2 pipe diameter of largest nominal pipe size within 24-hour period. Test system in sections if

minimum head cannot be maintained in each section. 5 PSI head to be minimum pressure at highest joint.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

3.06 COATINGS

A. Coating Procedures: Section 09 91 00 - Painting.

B. Primer Coating: Shop apply in accordance with Section 09 91 00 - Painting .

C. Finish Coating: Field apply in accordance with Section 09 91 00 - Painting .

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 furnish, install, and test all metal ductwork, with auxiliary equipment and accessories, 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 23 31 14-1, Schedule of Metal Duct Construction Standards.

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 23 05 93 – Testing, Adjusting, and Balancing for HVAC

C. Section 40 05 07 – Hangers and Supports for Process Piping

1.04 REFERENCES

A. ASHRAE Latest Edition.

B. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials

C. ASTM E437 Standard Specification for Industrial Wire Cloth and Screens (Square Opening Series)

D. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

E. SMACNA HVAC Duct Construction Standards.

F. SMACNA Rectangular Industrial Duct Construction Standards

G. SMACNA Seismic Restraint Manual - Guidelines for Mechanical Systems.

H. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems.

I. UL 181 Standard for Factory-Made Air Ducts and Air Connectors.

J. UL 214 Standard for Tests for Flame-Propagation of Fabrics and Films.

K. UL 555 Standard for Fire Dampers

1.05 DESCRIPTION

A. This Section includes requirements for providing metal ducts and accessories in accordance with applicable standards and regulations. In addition:

1. Metal duct and accessories 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. Requirements of Regulatory Agencies: Comply with applicable provisions of regulatory agencies below and other authorities having jurisdiction.

1. Underwriters Laboratories, Inc.

2. National Fire Protection Association.

3. National Electrical Code.

4. Local and State Building Codes and Ordinances:

a. New York City Building Code.

b. New York State Uniform Fire Prevention and Building Code.

B. Qualifications of Manufacturer:

1. Engage a single firm, with undivided responsibility for performance and other requirements and components of the metallic ductwork.
2. Engage a firm which can show successful experience in the fabrication and erection for metallic ductwork systems of scope and type similar to the required Work.

C. Qualifications of Installer:

1. The Contractor shall have at least five (5) years' experience in the installation of the Work specified herein. The Contractor shall employ only tradespersons with specific skills and experience in this type of Work.
2. The Contractor shall have undivided responsibility as a single firm for performance and other requirements for the installation of the Work specified herein.

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. The Contractor shall submit the following Shop Drawings and material specifications for the approval of the Engineer:
      1) ¼-in. scale duct layouts, complete with.
         a) Dimensions.
         b) Details of construction.
         c) Details of installation, hanger details and spacing.
      2) Manufacturer's literature, illustrations, specifications, and Engineering data for the following items, including weights of all component parts:
         a) Access Doors.
         b) Duct Access Doors.
         c) Flexible connections.
         d) Duct sealants.
      3) Details of sheet metal safing construction and installation.
      4) An air outlet schedule indicating room name and location of each outlet. Cross reference contract designation and manufacturer's model number or name.
      5) Details of construction and material to the Engineer for all access doors to ensure the access door material matches the appearance of the finished work.

b. Test Reports: Submit the following test reports for the following:

1) Volume Damper leakage tests from an AMCA-approved testing laboratory.

2. Information Submittals:

a. Contractor shall submit an affidavit stating that all stainless steel accessories (including, but not limited to: screws, hangers, supports, etc.) for stainless steel ductwork are Type 316 stainless steel.

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. All ductwork shall arrive on site fully fabricated, and not in two halves for field fabrication.

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. The Contractor shall provide spare parts and special tools necessary to service, disassemble, repair and adjust the materials and products provided under this Section, and as per the requirements of the Contract Documents. In addition, furnish the following spare parts:

1. Twelve (12) spare fusible links.

B. Tools: Provide standard and special tools and supplies necessary to service, disassemble, repair and adjust the products.

1.10 WARRANTY

A. All products provided under this Section shall be covered by a five year manufacturer warranty, which shall commence upon Substantial Completion, and shall cover 100% of the parts and labor involved in repair or replacement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ductwork Accessories:

1. Transverse Duct Connections:

a. Ductmate 35® System as manufactured by Duct Mate Industries Inc., Charleroi, PA.

b. Or approved equal.

2. Volume Dampers:

a. Ruskin Co., Grandview, MO.

b. Aire Technologies, Inc

c. Or approved equal.

3. Exhaust and Return Registers:

a. A-J Manufacturing Co., Inc., Kansas City, MO

b. Price company

c. Or approved equal.

4. Exhaust and Return Grilles:

a. A-J Manufacturing Co., Inc., Kansas City, MO.

b. Price company

c. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Metal Ductwork:

1. General:

a. All work shall be constructed and installed properly in accordance with the recommendations given in the latest edition of SMACNA HVAC Duct Construction Standards and SMACNA Rectangular Industrial Duct Construction Standards.

b. All ductwork shall be constructed in accordance with Schedule 23 31 14-1, Schedule of Duct Construction Standards, located after the "End of Section" designation.

2. Materials:

a. All ductwork shall be constructed of Type 316 stainless steel and all duct accessories (e.g., air outlets, hardware, and fasteners, etc.) shall also be of Type 316 stainless steel, except as follows:

1) Provide galvanized steel (G90, as per ASTM A653 coating) only where explicitly shown on the Contract Drawings. Air devices and ductwork accessories for galvanized ductwork shall be aluminum.

2) Provide aluminum (with 3003 ductwork H-14 alloy and temper) only where explicitly shown on Contract Drawings. Air devices and ductwork accessories for aluminum ductwork shall be aluminum.

3. Stainless Steel Ductwork:

a. Stainless steel duct sheet thicknesses shall be two (2) gauges heavier than the thickness specified for galvanized steel duct in the SMACNA Duct Construction standards.

4. Connections:

a. The transverse duct connections shall be bolted, gasketed connections.

5. Duct Elbows:

a. Duct elbows shall have a minimum centerline radius of 1½ times the width of the duct.

B. Ductwork Accessories:

1. Hangers and Supports:

a. All ductwork shall be securely hung and anchored to the building structure.

1) Unless otherwise explicitly shown on the Contract Drawings, hangers and stiffeners for ducts shall conform to all the recommendations and requirements given in the SMACNA HVAC Duct Construction Standards and the SMACNA Seismic Restraint Manual - Guidelines for Mechanical Systems.

2) Unless otherwise specified herein, hangers and supports shall also conform to all the requirements of Section 40 05 07, Hangers and Supports for Process Piping.

b. The maximum hanger spacing shall be as follows:

1) For ducts with half perimeter up to 72-in.: 8 ft

2) For ducts with half perimeter larger than 72-in.: 6 ft

c. All hangers, rods, supports, bolts, nuts, washers, inserts, and appurtenances shall be Type 316 stainless steel, except for use on galvanized steel ductwork, when such may be of galvanized steel construction.

d. Seismic Requirements:

1) All piping and ductwork shall be provided with seismic restraints in accordance with the SMACNA Seismic Restraint Manual – Guidelines for Mechanical Systems and in accordance with the New York City Building Code and referenced Uniform Building Code requirements.

2) Piping and ductwork shall be supported to withstand seismic forces anticipated in seismic zones 2A.

2. Volume Dampers:

a. Volume dampers shall comply with SMACNA Standards.

b. Materials:

1) For stainless steel ductwork: Provide manual volume dampers of Type 316 stainless steel construction.

2) For aluminum and galvanized steel ductwork: Provide manual volume dampers of and aluminum construction.

c. Blades: Opposed blades, vinyl edge seals.

d. Provide outside handle, quadrant, and approved position indicator and locking device.

e. Performance:

1) Damper Leakage: Not more than 16 cfm/ft^2 at 4-in. W.G.

3. Self-Acting Dampers:

a. Provide adjustable, counter-balanced type, with fabricated blades set in frame.

b. Materials:

1) For stainless steel ductwork: Provide self-acting dampers and frames of Type 316 stainless steel construction.

2) For aluminum and galvanized steel ductwork: Provide self-acting dampers and frames of aluminum construction.

4. Flexible Connections:

a. Provide flexible connections in accordance with SMACNA HVAC Duct Construction Standards.

1) Flexible connections shall be for a pressure classification of 3 in. w.g.

b. Materials:

1) For galvanized steel ductwork: Provide 16 ga., 3-in. wide galvanized steel strip flexible connections.

2) For stainless steel ductwork: Provide Type 316 stainless steel flexible connections.

3) For aluminum ductwork: Provide 0.080-in. thick, 3-in. wide aluminum strip flexible connections.

5. Vibration Isolation Flexible Connections:

a. Provide flexible connections for preventing the transmission of vibrations through the ductwork at the locations specified herein.

b. Materials: Vibration isolation flexible connections shall be neoprene-impregnated fabric collars with cemented seams fastened

with straps and bolts of the same material as the connecting ductwork.

6. Turning Vanes:
   a. Provide turning vanes in accordance with SMACNA HVAC Duct Construction Standards.
   b. Materials: Provide turning vanes of the same materials as ductwork in which they are installed.
   c. Construction: Vanes shall be of double thickness design.
7. Air Volume Extractors:
   a. Provide air volume extractors in accordance with SMACNA Standards.
   b. Material: Provide air volume extractors of the same material as the ductwork in which they are installed.
   c. Construction: Provide gang-operated curved adjustable blades controlled through manual adjusting lever.
8. Gravity Backdraft Dampers
   a. Provide gravity backdraft dampers located in ductwork:
   b. Materials: Provide gravity backdraft dampers of the same material as the ductwork in which they are installed. In addition:
      1) Tie Rods: Shall be of aluminum 0.081 ga..
      2) Louver Arms: Shall be of aluminum 0.081 ga..
      3) Bumpers: Shall be waterproof felt.
      4) Bearings: Shall be stainless steel or brass.
   c. Construction:
      1) Multiple, interlocked blades mounted in frame.
      2) Felt gasketed blade edges.
      3) Tie rod connecting each blade.
      4) Counterweights or adjustable spring attached to tie rods.
      5) Metal frame.
9. Metallic Flexible Duct:
   a. Metallic flexible duct shall conform to UL 181 and shall be rated for positive or negative working pressure of minimum 5 in. w.g. at 250°F.
   b. Materials: Single-ply Type 316 stainless steel.

c. Construction: Duct shall be of corrugated/interlocked, folded and knurled type seam construction, bendable without damage through 180° with a throat radius equal to ½ duct diameter.

d. Runout length shall be limited to 10 ft and size limited to 8-in. in diameter.

10. Bird Screens and Frames:

a. Bird screens shall conform to ASTM E437, Type I, Class 1, 2 by 2 mesh, 0.031-in. diameter stainless steel wire.

b. Materials: Type 316 Stainless Steel.

c. Frames shall be removable type stainless steel construction.

11. Hardware:

a. Materials:

1) All fastening devices used for aluminum and stainless steel ductwork and accessories shall be Type 316 stainless steel.

2) All fastening devices used for galvanized and aluminum ductwork and accessories shall be galvanized.

3) All gasketing material shall be butyl.

C. Registers, Grilles, and Diffusers:

1. General:

a. Register, grille, and diffusers units shall distribute the volume of air (cfm) specified and/or as shown on the Contract Drawings.

b. Outlets for diffusion, spread, throw, and noise level shall be as required for specified performance.

1) Performance shall be certified according to ASHRAE 70.

2) Inlets and outlets shall be sound rated and certified according to ASHRAE 70.

c. Where the inlet and outlet openings are located less than 7 ft above the floor, they shall be protected by a grille or screen according to NFPA 90A.

d. Materials:

1) For stainless steel ductwork: Register, grille, and diffuser units shall be of Type 316 stainless steel construction.

2) For aluminum and galvanized steel ductwork: Register, grille, and diffuser units shall be of aluminum construction.

e. Volume Dampers:

1) Diffusers and registers shall be provided with volume damper with accessible operator, unless otherwise indicated; or if standard with the manufacturer, an automatically controlled device will be acceptable.

2) Volume dampers shall be opposed blade type for all diffusers and registers, except linear slot diffusers.

a) Linear slot diffusers shall be provided with round or elliptical balancing dampers.

f. Registers and Grilles:

1) Units shall be four-way directional-control type, except that return and exhaust registers may be fixed horizontal or vertical louver type similar in appearance to the supply register face.

2) Registers shall be provided with sponge-rubber gasket between flanges and wall or ceiling.

3) Grilles shall be as specified for registers, without volume control damper.

2. Exhaust and Return Registers:

a. Exhaust and return registers shall be provided complete with:

1) Fixed vertical face bars, set straight.

2) Key-operated opposed blade damper.

3. Exhaust and Return Grilles:

a. Exhaust shall be provided complete with:

1) Fixed vertical face bars, set straight.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Stainless Steel Ductwork:

1. All stainless steel ductwork shall be shop fabricated in sections with welded flanged ends.

2. No field welding of stainless steel ductwork shall be permitted.

3. Welding equipment and electrodes shall be of a type specifically suited for welding light gauge Type 316 stainless steel to provide consistently good quality welds.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Field Measurements:

1. Take field measurements where required prior to installation to ensure proper fitting of Work.

3.02 INSTALLATION

A. Metal Ductwork:

1. All ductwork shall conform accurately to the dimensions shown on the Contract Drawings, with the exception that:

a. Ductwork shall be as shown on the Contract Drawings, subject to such modifications as may be necessary to suit field conditions to clear any obstruction or conflicts with other equipment.

2. All ductwork shall be straight and smooth on the inside with neatly finished joints, and shall not be decreased at any point to avoid obstructions.

3. No piping, conduit, or structural work shall be installed in or through any ductwork.

4. All ductwork shall be run as close as possible to structural members, walls, and ceilings.

5. Where existing walls, floors, or roofs must be penetrated, Contractor shall neatly cut the required openings and patch the existing work to provide a neat and finished appearance.

6. Ductwork shall be installed so as to preclude the possibility of vibration under all operating conditions.

7. Install all ductwork and accessories to provide a system free from buckling, warping, breathing, or vibration.

8. Where required, and as shown on the Contract Drawings, the Contractor shall provide blank off baffles to eliminate drafts caused by nearby obstructions.

B. Ductwork Joints:

1. After the installation is completed, the Contractor shall seal all joints.

2. Tape and seal all joints as per SMACNA Duct Construction Standards.

3. Sealants and tape shall have the following ratings:

a. Flame Spread Rating, as per ASTM E84: ≤ 25

b. Smoke Developed Rating: ≤ 50

4. Flanged duct joints shall be 0.25-in Butyl gasketed and bolted together with stainless steel (Type 316) bolts, nuts, washers and lock washers.

5. All metal duct joints shall be airtight with no leakage.

C. Coordinate all air outlets for compatibility with ceiling system.

D. Floor Openings:

1. Curbs to prevent water leakage shall be provided around all floor openings.

2. Where concrete curbs are not shown on the Contract Drawings:

a. Provide curbs fabricated of 4-in. × 4-in. × ¼-in. thick angles with welded corners.

b. The curb shall be set in a mastic compound and securely fastened to the floor to provide a watertight installation.

3. Curbs associated with stainless steel ductwork shall be fabricated of Type 316 stainless steel.

E. Turning Vanes:

1. The turning vanes shall be quiet and free from vibration when the system is in operation.

2. Turning vanes shall be double thickness type.

3. Turning vanes shall be installed in the following locations:

a. All miter elbows to permit air to make the abrupt turns with a minimum of turbulence.

b. All collar take-offs to supply registers.

c. All short radius elbows in accordance with SMACNA standards and Industrial Duct Construction standards.

4. Duct clean out doors shall be provided at each elbow with turning vanes.

F. Volume Dampers:

1. Manual volume dampers larger than 11-in. in any dimension shall be opposed blade type.

2. The damper blades shall be operated by a lockable dial regulator and may be set in any position.

a. The dial regulators shall be marked so that the "open" and "shut" positions are clearly identified.

b. The dial regulators on insulated ductwork shall be mounted on an elevated platform which will finish flush with the surface of the insulation.

3. Manual volume dampers shall be located at accessible points and wherever possible some distance from a duct transition or fitting.

4. Care shall be taken during installation to make certain that sheet metal fasteners do not protrude into the duct and interfere with damper operation.

5. Install volume dampers where indicated on the Contract Drawings and as required to facilitate accurate volume control. Volume dampers specified with air devices shall be installed in addition to those shown on the Contract Drawings. In addition, dampers shall be installed in all of the following locations:
    a. Each branch duct take off, and
    b. In both ducts downstream of each trunk duct split.
    c. An additional volume damper shall be installed in duct stub to each air outlet for balancing of air volume.

G. Test openings:
1. The test openings shall be sealed by a screw cap and gasket, and shall be installed so that the insulation is not disturbed when the cover is removed.
2. The test openings shall be located as follows in all heating, ventilating, air conditioning systems:
    a. In the outside air duct adjacent to the unit.
    b. In the exhaust air duct adjacent to the unit.
    c. In the main supply duct on each unit.

H. Flexible Connections:
1. All expansion joints in ducts at building expansion joints shall be suitably supported at each end by support guides within 12-in. of joint.
2. All ducts at flexible connections with air handling equipment, and fans shall be supported at free end within 12-in. of flexible connection.
3. Provisions shall be made for supporting all ductwork, dampers, and other ductwork accessories, where necessary.

I. Vibration Isolation Flexible Connections:
1. Install vibration isolation flexible connections between the ductwork and all air moving equipment and at the building joints.
    a. Provide flexible connections at both the inlet and discharge of air all handling equipment.
2. Vibration isolation flexible connections shall not be painted or used to correct misalignment.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjustment:

1. Set volume control devices for approximate positions in preparation for final testing and balancing.

2. Install fusible links in fire dampers and verify that dampers are in open position.

3. Start fan system and check for excessive leaks and vibration and correct.

B. Balancing:

1. Systems shall be completely tested, adjusted and balanced by a qualified engineer. A complete balancing procedure shall be submitted for approval. All equipment and connections required to balance the systems shall be provided.

2. All duct systems shall be balanced as specified in Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

C. Cleaning:

1. Remove all loose materials and obstructions from interior of ducts.

2. Remove debris and waste materials resulting from installation.

D. Painting:

1. Surface Preparation and Shop Painting:

a. Clean and prime coat ferrous metal surfaces of equipment in the factory/shop in accordance with the requirements of Section 09 91 00 - Painting.

b. Coat polished and non-ferrous metal surfaces with corrosion prevention compound which shall be maintained during storage and until equipment begins operations.

2. Field Painting:

a. Painting required for exterior surfaces of ductwork and insulation, and finish painting of items only primed at the factory, are specified in Section 09 91 00 - Painting.

END OF SECTION

SCHEDULE 23 31 14-1
SCHEDULE OF METAL DUCT CONSTRUCTION STANDARDS [1,2]

Service:	**Pressure Classification: (in. W.G.)**	**Construction Standards:**
All ductwork on fan discharge side	+3	SMACNA HVAC Duct Construction Standards
All ductwork on suction side	-3	
Transfer air duct not connected to fan	±2	

Notes:

1. All accessories (including, but not limited to: turning vanes, air turning devices, manual volume dampers, motor operated control dampers, fire dampers, access doors, supports, angles, clamps, hangers, and hardware) shall be suitable for the pressure classification given above.
2. Ductwork Material Schedule: Refer to the Contract Drawings.

NO TEXT ON THIS PAGE

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 HVAC fans, complete and operational.

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

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C. All HVAC fans shall be provided in accordance with the schedule shown on the Contract Drawings.

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 26 05 91 – Low-Voltage Electric Motors

C. Section 40 05 97 – Identification for Process Equipment

1.04 REFERENCES

A. Abbreviations and Acronyms:

1.	FRP	Fiber Reinforced Plastic

B. Reference Standards:

1.	AISI C1045	Medium Carbon Steel
2.	AMCA 210	Laboratory Methods of Testing Fans for Ratings
3.	AMCA 301	Methods for Calculating Fan Sounds Ratings from Laboratory Test Data.
4.	ANSI S2.19, G6.3	Mechanical Vibration - Balance Quality Requirements Of Rigid Rotors

5. SMACNA Seismic Restraint Manual: Guidelines for Mechanical Systems

1.05 DESCRIPTION

A. This Section includes requirements for providing HVAC fans and accessories in accordance with applicable standards and regulations. In addition:

1. HVAC fans shall be furnished complete with all accessories, special tools, spare parts, base attachments, mountings, anchor bolts and other appurtenances as specified and/or required for proper installation.

1.06 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Comply with the applicable provisions of the standards organizations and regulatory agencies, below:

1. Underwriters Laboratories, Inc.
2. National Fire Protection Association.
3. National Electrical Code.
4. Local and State Building Codes and ordinances
   a. Building Code of the City of New York.
   b. New York State Uniform Fire Prevention and Building Code.

B. Qualifications of Manufacturer:

1. All components of the HVAC fans shall be provided by the Contractor through a single HVAC fan vendor.
   a. The Contractor (through the HVAC fan vendor) shall have the sole responsibility of matching all components and providing equipment which functions together as a system.
2. The HVAC Fans shall be standard equipment of the manufacturer.

3. The HVAC fans shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

4. All fans shall be selected from performance curves and not from rating tables.

   a. Performance data for all fans shall be based on tests conducted in accordance with AMCA 210 and shall be licensed to bear the AMCA certified rating seal for both sound and air performance.

5. Provide units listed by the Underwriters Laboratories, Inc.

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. Equipment specifications and data sheets identifying all materials used and methods of fabrication.

   b. Complete assembly, layout, installation, and foundation drawings with clearly marked dimensions.

   c. Fan performance curve indicating the operating point.

   d. Details of corrosion resistance coating.

   e. Weights of assembled units.

   f. Motor nameplate data as specified in Section 26 05 91 - Low-Voltage Electric Motors.

   g. Detailed specifications and data sheets for all accessories such as roof curbs, dampers, damper operators, disconnect switches, vibration isolators, etc.

   h. Example equipment nameplate data sheet.

   i. Schematic diagrams for electric and control systems showing wiring for individual equipment items and interconnecting wiring diagrams.

   j. Shop and field testing procedures.

   k. Deviations from the Contract Documents.

   l. Wiring diagrams with numbered terminal blocks for all external connections.

   m. Description of control system.

   n. Motor Tests and Data: For each motor submit a certified motor test data sheet or a certified motor data sheet from an electrically

duplicate motor, in accordance with Section 26 05 91 - Low-Voltage Electric Motors.

o. List of recommended lubricants.

p. Operation and maintenance manuals

q. Fan manufacturer shall provide sound power ratings in the eight octave bands.

1) Sound power levels shall be based on AMCA Standard 301.

2) Sound power ratings shall be in decibels, referenced to 10^{-12} W.

2. Information Submittals:

a. Spare Parts List

b. Special Tools List

c. Reports of Certified Shop Tests

d. AMCA Approval for Fan Ratings

e. List of Lubricants:

1) The manufacturer shall submit a list with a minimum of four (4) manufacturers' standard lubricants which may be used interchangeably for each type of lubricant required.

a) The Contractor shall utilize this list in preparing his comprehensive lubrication survey as described in the Contract Documents.

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. The cleaning, preservation, and packing of the HVAC fans for shipment shall be in accordance with the manufacturer's commercial practice.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. The HVAC fans shall be handled in such a manner that they may be transported and unloaded without being over-stressed, deformed, or otherwise damaged.

2. The HVAC fans shall be protected from corrosion and deterioration and shall be stored in a dry area.

a. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with effective and durable waterproof covers approved by the Engineer.

3. Interiors shall be kept free from dirt and foreign matter.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall provide spare parts and special tools necessary to service, disassemble, repair, and adjust the equipment provided under this Section, as per the requirements of the Contract Documents and/or as recommended by the manufacturer. In addition:

1. Provide the following spare parts for up to every four (4) of the same size, model, and type of HVAC fan furnished under this Section:

a. One (1) blower with wheel

b. One (1) set bearing and seal

c. One (1) set sheave

d. One (1) shaft

e. Two (2) sets of belts for each belt driven fan

2. Provide electric motor spare parts in accordance with Section 26 05 91, Low Voltage Electric Motors.

B. Tools: Provide standard and special tools and supplies necessary to service, disassemble, repair, and adjust the equipment.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Centrifugal Base Mounted Fans

1. Twin City Fan & Blower, Plymouth, MN;

2. Greenheck Fan Corp., Schofield, WO;

3. Or approved equal.

B. In-Line Square Centrifugal Fans:

1. Greenheck, Schofield, WI.

2. Loren Cook Company, MO

3. Or approved equal.

C. Coating system shall be as manufactured by:

1. Heresite Protective Coatings, LLC, Manitowoc, WI;

2. Nordson Industrial Coating System, NC

3. Or approved equal.

D. Wall Mounted Propeller Fans:

1. Provide fans as manufactured by:

a. Loren Cook Company, Springfield, MO;

b. Greenheck, Schofield, WI;

c. Or approved equal.

2. Propeller coating system shall be as manufactured by:

a. Heresite Protective Coatings, Manitowoc, WI;

b. Kel-Teck Coating LLC, Oklahoma City, OK

c. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Fans shall be as shown on the Contract Drawings.

a. The capacity of all HVAC fans shall be as shown on the Contract Drawings.

b. Where shown on the Contract Drawings, explosion proof motors and AMCA Type "A" spark resistant construction HVAC fans shall be provided.

2. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

3. Motors:

a. Motors shall comply with the requirements of Section 26 05 91, Low Voltage Electric Motors.

b. Unless otherwise indicated, motors shall be of the totally enclosed premium efficiency fan cooled type.

c. Motors shall not be selected for operation in the service factor range/zone. The maximum brake horsepower required at any point on the performance curve shall not exceed the rated horsepower of the motor.

4. Electrical Service:

a. Motors ≤ ⅓ hp : 115V, single phase, 60 Hz.

b. Motors ≥ ½ hp : 460V, 3-phase, 60 Hz

5. Two speed motors: Shall be two winding type.

6. Disconnect Switches: All fans and damper operators shall each be provided with individual externally mounted disconnect switches.

7. Enclosures:
    a. NEMA 7 enclosures shall be provided where shown on the Contract Drawings. In explosion proof areas:
        1) HVAC fans shall be of AMCA Type A spark resistant construction shall be provided.
        2) Fans shall have all parts in contact with gas fabricated of non-ferrous materials; bearings shall not be located in the gas stream.
        3) Explosion proof fans shall be provided with NEMA 7 explosion proof disconnect switches, explosion proof damper operators, and explosion proof motors.
8. Bearings:
    a. All fan bearings shall be selected for a minimum L-50 life of 100,000 hrs at maximum operating speed.
9. Shafts:
    a. All shafts shall be sized so the first critical speed is at least 20% over the maximum operating speed.
    b. Close tolerance shall be maintained along the length of the shaft.
10. Drive Type:
    a. The fans shall be either direct connected as indicated on the HVAC Fan Schedule shown on the Contract Drawings.
11. Pressure Switch:
    a. Provide UL listed differential pressure switch across fan to determine flow indication, rated for Class 1 Div 1 environment and with SPDT contacts rated for at least 2 amps at 120vac or 24vdc.
12. Thermostat:
    a. Provide explosion-proof with following
    b. Enclosure Rating: Explosion proof NEMA 7&9, Class I, Divisions 1 & 2, Groups C & D; Class II, Division 1, Groups E, F & G; Class II, Division 2, Groups F & G; Class III; Class I, Zones 1 & 2, Groups IIA & IIB.
    c. Switch Type: SPDT snap action switch.
    d. Electrical rating: 22 A @ 480 VAC (res.), 1/2 HP @ 125 VAC, 1 HP @ 250 VAC.
    e. Electrical Connection: Screw terminal
    f. Conduit Connection: 3/4" female NPT

g. Set Point Adjustment: External knob

h. Adjustable Range: 36 to 82°F

i. Compliance: CSA, UL

13. Smoke Detector:

a. UL listed duct mounted smoke detector rated for Class 1 Div 1 environment with SPDT contacts rated for at least 2 amps at 120vac or 24vdc.

14. Seismic Restraints:

a. All fans shall be secured or anchored to withstand seismic forces anticipated in seismic zone 2A.

b. Equipment shall be provided with seismic restraints in accordance with SMACNA Seismic Restraint Manual: Guidelines for Mechanical Systems, as published by, and in accordance with the latest edition of the City of New York Building Code and referenced Uniform Building Code requirements.

15. Vibration isolators:

a. All vibration isolators shall be provided in conformance with the requirements

b. Isolators shall have a minimum efficiency of 90%.

c. Installation, type, number, and size of vibration isolators shall be in conformance with the manufacturer's recommendations for the frequencies involved.

B. In-line Cabinet Fans:

1. General:

a. The fan wheel(s) shall be of the forward curved centrifugal type and shall be dynamically balanced.

2. Construction:

a. Housing:

1) The fan housing shall be constructed of heavy gauge galvanized steel.

2) The housing interior shall be lined with ½–in. acoustical insulation.

3) The outlet duct collar shall include an aluminum backdraft damper and shall be adaptable for horizontal or vertical discharge.

b. Wheel:

1) Fan wheels shall be constructed of galvanized steel.

c. Motor Base:

1) The motor shall be mounted on vibration isolators.

3. Controls:

a. Direct drive fans shall be provided with solid state speed control as required.

b. The access for wiring shall be external.

c. The motor disconnect shall be externally mounted.

C. Centrifugal Base Mounted Fans:

1. General:

a. Centrifugal base mounted fans shall be of the airfoil bladed single inlet centrifugal type.

b. Fans shall be suitable for floor mounting.

2. Construction:

a. Housing:

1) Fans shall be of all aluminum construction conforming to AMCA "B" spark resistant construction.

2) All hardware shall be Type 316 stainless steel.

3) Stainless steel parts to be mill finish.

b. Wheel:

1) Wheels to have aluminum back plate, shroud, and airfoil blades.

c. Bearings:

1) Fan bearings to be provided with aluminum lubrication lines extended to a common point on the bearing stand.

2) The bearing supports shall be constructed of welded structural steel members to prevent vibration and rigidly support the shaft and bearings, bearings shall be heavy duty, self-aligning pillow block ball bearings, and grease lubricated.

3) Shafts shall be turned, ground, polished, and rust protected.

d. Motor Base:

1) Adjustable motor mounting base to be fabricated of 316 stainless steel.

3. Drive:

a. Adjustable drive assemblies to have static resistant belts.

4. Accessories:

a. Fans shall be provided with access door, companion flange, motor operated dampers, and inlet boxes.

b. Fans shall be provided with housed spring type vibration isolation for a minimum of 95% isolation efficiency and having spring assemblies with rubber coated springs.

5. General:

D. Wall Mounted Propeller Fans:

1. General:

a. Propellers shall be airfoil design, statically and dynamically balanced, and consist of six (6) blades.

2. Materials and Construction:

a. Propellers shall be of cast aluminum alloy or heavy gauge steel material.

b. Propellers shall be equipped with malleable iron split-taper bushing for alignment and locking of propeller to the shaft.

1) Bushing held in place by compression and keyed to the shaft to prevent slipping or loosening.

2) Positioned with three (3) standard cap screws for easy assembly and disassembly.

c. Venturi and panel shall be of heavy gauge steel and designed for airfoil propellers.

d. Mounting hardware shall be steel.

e. The Contractor to provide additional stiffeners, angles and supports as required to mount the fans.

3. Drive:

a. Safety Guard shall have removable sections to provide for easy access to motor.

4. Coating:

a. All external and internal metal surfaces of fans, guards, (except propellers and motors) shall be factory primed and factory painted in accordance with Section 09 91 00 - Painting.

b. Propellers shall be factory coated with a 4 coat baked phenolic coating system minimum of 2 to 3 mils dry film thickness total.

c. All structural steel used for mounting fans shall be corrosion resistant coated.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Anchorage Devices:

1. Contractor shall furnish anchor bolts and nuts of Type 316 stainless steel, of ample size and strength for the purpose intended, sized by the equipment manufacturer.

2. All hardware for mounting of motor drives and control panels shall be Type 316 stainless steel.

B. Identification:

1. Provide in accordance with Section 40 05 97 - Identification for Process Equipment.

2. Each unit of equipment shall be identified with the equipment item numbers shown on the Contract Drawings.

3. A corrosion resistant tag and nameplate, securely affixed in a conspicuous place on each unit shall give the equipment item number, manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, to complete identification.

C. Balancing:

1. All fans shall be statically and dynamically balanced at the speed at which the unit is scheduled to operate. Fans with corrosion resistant coatings shall be balanced after being coated.

D. Coatings:

1. Clean and prime coat ferrous metal surfaces of equipment in the shop in accordance with the requirements of Section 09 91 00 - Painting.

2. If no other coating is otherwise specified for a type of fan on the HVAC Fan Schedule shown on the Contract Drawings, fans shall be provided (inside and outside) with baked on phenolic corrosion resistant coating including all accessories but not limited to the housing, wheels, curbs, liners, dampers, damper access sections. Coating shall be applied in the shop using the manufacturer's approved system.

3. Motors shall be painted in accordance with either Section 26 05 91 - Low Voltage Electric.

4. Coat machined, polished, and non-ferrous metal surfaces and similar un-painted surfaces with corrosion prevention compound which shall be maintained during storage and until equipment begins operation

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. All HVAC Fans shall be as efficient as those HVAC Fans that have been tested to perform satisfactorily for at least two (2) years.

B. Shop Tests:

1. All shop tests shall be witnessed by a licensed Professional Engineer.

2. The licensed Professional Engineer shall sign and seal all shop test reports.

a. The state of the Professional Engineer's registration, the Professional Engineer's license number, and the Professional Engineer's name on the seal shall be clearly legible.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Inspection:

1. The inspection shall include welding, dimensions, bearings and overall workmanship.

2. The Contractor shall not install damaged items until repairs are made in accordance with manufacturer's written instructions and approval by Engineer.

a. Only minor repair work will be permitted in the field.

b. All damaged items requiring remedial work shall be returned to the manufacturer for repair or replacement.

3.02 INSTALLATION

A. Install HVAC fans in complete accordance with the manufacturer's printed installation instructions and the approved shop drawings. In addition:

1. Units shall be electrically grounded in the field by installing contractor.

3.03 FIELD TESTING / QUALITY CONTROL

A. Furnish the services of a qualified manufacturer's representative to check and approve all installations before operation as well as conduct field testing, in accordance with the requirements of the Contract documents. In addition:

1. The Contractor shall verify that all work furnished and installed conforms to the requirements the Contract Documents.

2. Reports: Submit a report from the manufacturer of each visit to the site. Reports shall provide complete information on time, schedule, tasks performed, persons contacted, problems corrected, test results, training, instruction and all other pertinent information.

3. Motor tests shall be performed in accordance with Section 26 05 91, Low-Voltage Electrical Motors.

3.04 STARTUP / DEMONSTRATION

A. Furnish the service of a qualified manufacturer representative to assist and train the plant operations and maintenance staff in the care, operation, and maintenance of the HVAC fans in accordance with the requirements of the Contract Documents. In addition:

1. The Contractor shall make all adjustments required to place Work in proper operating condition.

2. The Contractor shall include instruction on care and maintenance of the HVAC fans in the training of plant personnel.

3. In the event of trouble with the equipment, the manufacturer's representative shall revisit the site as often as required until all troubles are corrected and the installation is entirely satisfactory.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjusting:

1. Upon completion of the installation, the Contractor shall adjust all HVAC fans for their intended use.

a. Assembled fans shall then be dynamically balanced using a vibration analyzer to measure velocity.

b. The final reading shall not exceed 0.1-in./sec at the fan shaft speed.

c. The exact level of vibration will be recorded on the fan as proof of the final dynamic balance.

B. Protection:

1. The HVAC fans shall be protected as per the requirements of the Contract Documents. The use of HVAC fans shall not be permitted until permission is given by the Engineer.

a. When permission is given, the Contractor shall operate each HVAC fan to ensure their performance.

C. Cleaning:

1. In addition to the requirements of the Contract Documents, the Contractor shall thoroughly clean all surfaces of the installed HVAC fans and remove all debris and waste materials resulting from installation.

END OF SECTION

NO TEXT ON THIS PAGE

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 intake and relief vents, complete and operational.

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

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C. All air outlet and inlets shall be provided in accordance with the schedule shown on the Contract Drawings.

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. This Section includes requirements for providing air outlets and inlets as well as accessories in accordance with applicable standards and regulations. In addition:

1. Air outlets and inlets shall be furnished complete with all accessories, special tools, spare parts, mountings, anchor bolts, and other appurtenances as specified and/or required for proper installation.

1.06 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Comply with the applicable provisions of the standards organizations and regulatory agencies, below:

1. Underwriters Laboratories, Inc.
2. National Fire Protection Association.
3. National Electrical Code.
4. Local and State Building Codes and Ordinances:
   a. Building Code of the City of New York.
   b. New York State Uniform Fire Prevention and Building Code.
   c. New York State Energy Conservation Construction Code.

B. Qualifications of Manufacturer:

1. All components of the air outlets and inlets shall be provided by the Contractor through a single air outlet and inlet vendor.
   a. The vendor shall engage manufacturer(s) which can show successful experience in the fabrication and manufacture of the equipment specified herein.
      1) The manufacturer(s) shall (each) have at least five (5) years' experience in the installation of Work specified.
   b. The Contractor (through the air outlet and inlet vendor), shall have the sole responsibility of matching all components and providing equipment which functions together as a system.
2. The air outlets and inlets shall be the standard equipment of the manufacturer(s).

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. Manufacturer's literature, illustrations, specifications, and Engineering data including:

1) Dimensions.

2) Materials of construction.

3) Details of installation.

4) Prefabricated curb details.

5) Air velocity through throat (fpm).

6) Air pressure drop through unit (in. W.G.).

b. Drawings showing:

1) The general arrangement of the equipment and methods of installation with detailed mounting information.

c. Documentation from the factory substantiating painting systems in accordance with the specifications. Include types applied and dry film thicknesses. Include color chart for color selection.

d. Operation and maintenance manuals

2. Information Submittals:

a. Spare parts list

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. The cleaning, preservation and packing of the air outlets and inlets for shipment shall be in accordance with the manufacturer's commercial practice.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. The air outlets and inlets shall be handled in such a manner that they may be transported and unloaded without being over-stressed, deformed, or otherwise damaged.

2. The air outlets and inlets shall be protected from corrosion and deterioration and shall be stored in a dry area.

a. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with effective and durable waterproof covers approved by the Engineer.

3. Interiors shall be kept free from dirt and foreign matter.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The 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 and/or as recommended by the manufacturer.

B. Tools: Provide standard and special tools and supplies necessary to service, disassemble, repair, and adjust the equipment.

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. Painting:

1. All exterior and interior surfaces of equipment, including all accessories, shall be coated with a dry phenolic coating system.

a. Finish and color to match housing.

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. Only minor repair work will be permitted in the field.

b. All damaged items requiring remedial work shall be returned to the manufacturer for repair or replacement

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Furnish the services of a qualified manufacturer's representative to check and approve all installations before operation, in accordance with the requirements of the Contract documents. In addition:

1. The Contractor shall verify that all work furnished and installed conforms to the requirements the Contract Documents.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjusting:

1. Upon completion of the installation, the Contractor shall adjust all air intake and relief vents for their intended use.

B. Protection:

1. The air outlets and inlets shall be protected as per the requirements of the Contract Documents. The use of the air outlets and inlets shall not be permitted until permission is given by the Engineer.

C. Cleaning:

1. In addition to the requirements of the Contract Documents, the Contractor shall thoroughly remove all debris and waste materials resulting from installation.

2. Clean tar, dirt, and marks from exterior of units.

3. Touch up all chips in factory finishes.

END OF SECTION

NO TEXT ON THIS PAGE

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 unit heaters, complete and operational.

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

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C. All unit heaters shall be provided in accordance with the schedule shown on the Contract Drawings.

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 23 05 93 – Testing, Adjusting, and Balancing for HVAC

C. Section 26 05 91 – Low-Voltage Electric Motors

D. Section 40 05 97 – Identification for Process Equipment

1.04 REFERENCES

A. Not Used

1.05 DESCRIPTION

A. This Section includes requirements for providing unit heaters and accessories in accordance with applicable standards and regulations. In addition:

1. Unit heaters shall be furnished complete with all accessories, special tools, spare parts, attachments, mountings, anchor bolts, and other appurtenances as specified and/or as may be required for a proper installation.

1.06 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Comply with applicable provisions of the standards organizations and regulatory agencies, below.

1. American Society of Mechanical Engineers.
2. American Society of Testing Materials.
3. Air Movement and Control Association.
4. Air Conditioning and Refrigeration Institute.
5. National Electrical Code.
6. Standards of the Hydraulic Institute
7. American National Standard Institute.
8. National Fire Protection Association.

B. Qualifications of Manufacturer:

1. All components of the unit heaters shall be provided by the Contractor through a single vendor.

a. The Contractor (through the unit heater vendor) shall have the sole responsibility of matching all components and providing equipment which functions together as a system.

2. Provide units listed by the Underwriters Laboratories, Inc.

C. Qualifications of the Contractor:

1. The Contractor shall be a New York City licensed and insured plumber.

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. Equipment specifications and data sheets identifying all materials used and methods of fabrication.

b. Complete assembly, layout, and installation drawings with clearly marked dimensions.

c. Fan performance data.

d. Coil performance data.

e. Details of corrosion resistance coating.

f. Weights of assembled units.

g. Motor nameplate data as specified in Section 26 05 91 - Low-Voltage Electric Motors.

h. Example equipment nameplate data sheet.

i. Schematic diagrams for electric and control systems showing wiring for individual equipment items and interconnecting wiring diagrams.

j. Shop and field testing procedures.

k. Operation and Maintenance Manuals.

2. Information Submittals:

a. Spare Parts List.

b. Special Tools List

c. Reports of Certified Shop Tests.

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. The cleaning, preservation and packing of the unit heaters for shipment shall be in accordance with the manufacturer's commercial practice.

B. The Contractor shall store and handle materials provided under this Section in accordance with the requirements of the Contract Documents. In addition:

1. The unit heaters shall be handled in such a manner that they may be transported and unloaded without being over-stressed, deformed, or otherwise damaged.

2. The unit heaters shall be protected from corrosion and deterioration and shall be stored in a dry area.

a. Materials stored outdoors shall be supported above ground surfaces on wood runners and protected with effective and durable waterproof covers approved by the Engineer.

3. Interiors shall be kept free from dirt and foreign matter.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The 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 and/or as recommended by the manufacturer. In addition:

1. Provide one motor for up to every 4 of same size motor for all heaters.

B. Tools: Provide standard and special tools and supplies necessary to service, disassemble, repair, and adjust the equipment.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Unit Heaters:

1. Trane Company, Long Island City, NY
2. Modine Manufacturing Co., Racine, WI
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Unit Heaters:

1. General:
    a. The unit heater shall be complete with:
        1) Hot water coil.
        2) Fan.
        3) Motor.
        4) Fan Guard.
        5) Louver Fin Diffuser (for horizontal unit heaters).
        6) Casing.
    b. Each unit shall be provided with mounting bracket.
2. Coating:
    a. The entire unit including coil shall be coated internally and externally with a corrosion resistant phenolic coating.
    b. The coating on the entire unit shall be baked on.
3. Coils:

a. The coils shall be constructed of aluminum fins permanently bonded to seamless copper tubes.

b. The coils shall be suitable for pressure up to 200 psig and entering water temperatures up to 325°F inclusive.

c. Coils shall be tested at a minimum of 300 psig air pressure under water.

4. Casing: The casing shall be constructed of heavy gauge steel.

5. Fan Wheels:

a. Fan wheels shall consist of heavy gauge aluminum propeller type blades, statically and dynamically balanced at the speed at which the unit is scheduled to operate.

6. Drive:

a. The fan shall be direct driven by a resiliently mounted, single speed, totally enclosed motor.

7. Motor:

a. Explosion-proof motors shall be provided where shown on the schedule on the Contract Drawings.

B. Balancing Valve:

1. Balancing valve shall be a calibrated valve equipped with an integral, precision machined orifice. A gage connection shall be provided on each side of the orifice for connecting to the portable differential pressure meter Each gage connection shall have an integral check valve and a threaded protection cap. The balancing valve shall have an external, calibrated nameplate to indicate the degree of valve closure.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Identification:

1. Provide in accordance with Section 40 05 97 - Identification for Process Equipment.

2. Each unit of equipment shall be identified with the equipment item numbers shown on the Contract Drawings.

3. A corrosion resistant tag and nameplate, securely affixed in a conspicuous place on each unit shall give the equipment item number, manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, to complete identification.

B. Coatings:

1. All exterior and interior metal surfaces of unit heaters (except coils) shall be factory primed and factory painted in accordance with Section 09 91 00 - Painting.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. All unit heaters shall be as efficient as those have been tested to perform satisfactorily for at least two (2) years and providing equipment, which functions together as a system.

B. Shop Tests:

1. All shop tests shall be witnessed by a licensed Professional Engineer.

2. The licensed Professional Engineer shall sign and seal all test reports.

a. The state of the Professional Engineer's registration, the Professional Engineer's license number, and the Professional Engineer's name on the seal shall be clearly legible.

3. Procedure:

a. Shop test motors in accordance with Section 26 05 91 - Low-Voltage Electric Motors.

b. Coils shall be shop tested at a minimum of 300 psig air pressure under water.

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. Only minor repair work will be permitted in the field.

b. All damaged items requiring remedial work shall be returned to the manufacturer for repair or replacement.

3.02 INSTALLATION

A. Install unit heaters in complete accordance with the manufacturer's printed installation instructions and the approved shop drawings.

3.03 FIELD TESTING / QUALITY CONTROL

A. Furnish the services of a qualified manufacturer's representative to check and approve all installations before operation in accordance with the requirements of the Contract documents. In addition:

1. The Contractor shall verify that all work furnished and installed conforms to the requirements of the Contract Documents.

B. All tests shall be performed in accordance with Section 23 05 93, Testing, Adjusting and Balancing for HVAC.

3.04 STARTUP / DEMONSTRATION

A. Furnish the service of a qualified manufacturer representative to assist and train the plant operations and maintenance staff in the care, operation, and maintenance of the unit heaters in accordance with the requirements of the Contract Documents. In addition:

1. The Contractor shall make all adjustments required to place Work in proper operating condition.

2. The Contractor shall include instruction on care and maintenance of the convectors in the training of plant personnel.

3. In the event of trouble with the equipment, the manufacturer's representative shall revisit the site as often as required until all troubles are corrected and the installation is entirely satisfactory.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Adjusting:

1. Upon completion of the installation, the Contractor shall adjust all the unit heaters for their intended use.

2. Set air deflectors for proper air delivery.

3. Check room thermostat and wiring connections to unit heater.

B. Protection of Finished Work:

1. Unit heaters shall be protected as per the requirements of the Contract Documents. The use of unit heaters shall not be permitted until permission is given by the Engineer.

a. When permission is given, the Contractor shall operate each convector to ensure their performance.

C. Cleaning:

1. In addition to the requirements of the Contract Documents, the Contractor shall thoroughly clean all surfaces of the installed unit heaters and remove all debris and waste materials resulting from installation.

2. Clean work as specified in the Contract Documents.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 26 05 11 – GENERAL ELECTRICAL REQUIREMENTS
CONTRACT TI-181

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 Contractors.

2. Installation procedures and schedules under other contracts shall be reviewed and coordinated with Other 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 Contractors.

4. Notify Other 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. The Contractor shall retain the services of a wiring coordinator, to prepare the point-to-point field wiring diagrams. The wiring coordinator shall have experience in the development of the diagrams of the type specified and shall have served in a similar role on a project of similar size and complexity.

G. 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.
    2. Qualifications of proposed wiring coordinator who shall prepare the 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 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 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. 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 shutdowns and control sequences operate as required.

3. THE Contractor, with coordination of the Other 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 TI-181

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

C. Low-voltage wires and cables shall comply with the latest applicable provisions and recommendations of the following:

1. ANSI/ICEA S-95-658

2. NEMA WC70 - Power Cables Rated 2000 V or Less for the Distribution of Electrical Energy

3. ASTM B5 - Standard Specification for High Conductivity Tough-Pitch Copper Refinery Shapes

4. ASTM B8 - Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

5. ASTM D69 - Standard Test Methods for Friction Tape

6. ASTM D2301 - Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

7. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

8. ICEA S-58-679 - Standard for Control, Instrumentation and Thermocouple Extension Conductor Identification

9.	IEEE 1210	-	Standard Tests for Determining Compatibility of Cable-Pulling Lubricants with Wire and Cable
10.	NEMA WC 26/ EEMAC 201	-	Binational Wire and Cable Packing Standard
11.	NETA ATS	-	NETA Acceptance Testing Specifications
12.	NYCEC	-	NYC Electrical Code
13.	NYCCC	-	NYC Construction Code
14.	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. Field testing of low-voltage wires and cables 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 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.

o. Wire ampacity.

p. Wire temperature rating.

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.

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 location away from construction equipment, falling objects, sources of 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. Not Used

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. 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.

E. 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.

F. 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.

G. Markers shall be as manufactured by:
1. Ideal Industries, Sycamore, IL;
2. Thomas and Betts, Memphis, TN;
3. Brady, Milwaukee, WI;
4. Or approved equal.

H. 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 on the one line diagrams on the Contract Drawings. 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 and listed by UL as type XHHW-2 or RHW.

   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 and listed by UL as type XHHW-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

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

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. Terminals and connectors shall have the same temperature rating as the cable or cable shall be derated for the temperature ratings of the terminals and connectors.

3. 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.

4. Compression connectors shall be UL listed terminals.

5. 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.
6. 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.

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.

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. Where no termination is made, use a plastic-coated, self-adhesive, wire marker. Where termination is made, use a plastic, pre-printed sleeve wire marker. Paper, self-adhesive wire markers shall not be used.

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.

B. 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. 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.

C. Welded grounding connections shall be as manufactured by:

1. Cadwell, Solon OH;

2. Harger, Grayslake, IL;

3. 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. 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. Test points shall be installed at locations and in accordance with the details shown on the Contract Drawings.

C. 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.

D. 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.

E. 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

NO TEXT ON THIS PAGE

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

NO TEXT ON THIS PAGE

SECTION 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
CONTRACT TI-181

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. ASTM-2247 - Standard Practice for Testing Water Resistant Coating Using 100% Relative Humidity

11. 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.

B. Certification that the Contractor has been trained to work on PVC coated conduit system.

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. Southwire Company, Carrollton, GA;
4. 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 watertight 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. 4,160 volt AC: Silver.
4. 13,800 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 obstruct proper clearances to, 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 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.

20. Those installing PVC coated conduit and fittings shall be certified by the manufacturer and be able to present a valid, unexpired Certified Installer Card prior to installation beginning.

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 TI-181

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. 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.

B. 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.

C. 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 20 - Low-Voltage Wires, Cables and Accessories.

D. Arc Flash Labels

1. Labels shall be provided in addition to the manufacturer's 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. 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

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing low-voltage electric motors. Low-voltage electric motors shall be provided in accordance with the requirements specified under this Section and the Contract Drawings.

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 97 – Identification for Process Equipment.

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.

B. Reference Standards

1.	AFBMA Standard 9	-	Load Ratings and Fatigue Life for Ball Bearings.
2.	AFBMA Standard 11	-	Load Ratings and Fatigue Life for Roller Bearings.
3.	API Standard 541	-	Form-Wound Squirrel-Cage Induction Motors 375 kW (500 HP) and Larger
4.	EPAct 1992	-	Energy Policy and Conservation Act of 1992
5.	EISA 2007	-	Energy Independence and Security Act of 2007
6.	IEEE 112	-	IEEE Standard Test Procedure for Polyphase Induction Testing Motors and Generators.
7.	IEEE 841	-	Premium-Efficiency, Severe Duty Totally Enclosed Fan-Cooled Squirrel-Cage Induction Motors.
8.	NEMA MG1	-	Motors and Generators.
9.	NEMA MG 10	-	Energy Management Guide for Selection and Use of Fixed Frequency Medium AC Squirrel-Cage Polyphase Induction Motors.
10.	NETA ATS	-	Acceptance Testing Specifications.
11.	NIST	-	US National Institute of Standards and Technology
12.	NYCEC	-	New York City Electrical Code.
13.	NYC EPPR	-	New York City Environmentally Preferable Purchasing Rule.
14.	UL Standard 674	-	Low-voltage electric motors and Generators for use in Hazardous Locations.
15.	UL Standard 1004	-	Low-voltage electric motors.

1.05 DESCRIPTION

A. Motor Data

1. Motor data is specified under the Section of the Specification detailing the requirements of the driven equipment with which the motor is supplied. These data include voltage, rpm, HP and enclosure types

B. Motor Types

1. The motor types specified under this Section shall include:

a. Single Phase, alternating current, fractional horsepower induction motors.

b. Three Phase, alternating current, NEMA frame, squirrel cage, induction motors.

c. Three Phase, alternating current, above NEMA frame, squirrel cage, induction motors.

d. Three Phase, alternating current, submersible, squirrel cage, induction motors.

e. Three Phase, alternating current, wound-rotor, squirrel cage, induction motors.

f. Direct current, small motors.

1.06 QUALITY ASSURANCE

A. Electric Motors shall comply with the requirements of NYC EPPR.

B. The motor manufacturer shall maintain a documented Quality Assurance Program implementing suitable procedures and controls to monitor all aspects of production and testing.

C. The Quality Assurance Program shall be the manufacturer's standard program specifically dedicated to ensure each motor is designed, assembled and tested in accordance with the requirements specified in this Section, the Specifications and the Contract Drawings,

D. Motor manufacturer shall use a shop test facility that has calibrated testing apparatus, inclusive of a calibrated dynamometer and qualified experienced technicians for all shop tests. Calibration of all testing apparatus shall be within one year.

E. All test equipment, instrument calibration and test reports shall be in accordance with the latest edition of the accuracy standard of The U.S. NIST and NETA ATS.

F. Nameplates shall be provided for each motor. Nameplates shall clearly indicate information in accordance with NEMA requirements. Nameplates shall be engraved or embossed on stainless steel and fastened to the motor frame with stainless steel screws or drive pins.

G. Field Tests:

1. The motors shall be field tested.

2. Field testing shall be performed in accordance with the requirements specified under this Section and the Specifications.

3. Retain the services of the motor manufacturer for field service.

4. Field service shall be in accordance with the requirements specified under this Section and the Specifications.

5. For motors larger than 200 horsepower an independent testing firm shall be retained to perform acceptance testing of the motors.

   a. The testing firm shall have experience in the inspection and testing of motors 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. Acceptance testing 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. For fractional horsepower motors, data sheets showing nameplate data shall be submitted.

3. For motors rated one horsepower or greater, Motor Test Data Sheets shall be submitted. All values shall be from tests of previously manufactured, electrically duplicate motors or calculated data. Sheets shall be marked to indicate motor application location, manufacturer, type, frame size, bearing type, lubrication medium and enclosure type. Data Sheets shall at a minimum include:

   a. Winding resistances.

   b. Torques.

   c. Efficiencies.

   d. Power factors.

   e. Slip.

   f. Full load.

   g. Locked rotor and no load amperes.

   h. Rotor voltage and amperes for wound rotor units.

   i. Nameplates temperature and results of dielectric tests.

4. An outline drawing or an outline data sheet showing complete motor dimensions shall be submitted to cover every motor rated greater than 1/3 horsepower. Several motors of the same type and rating for the same application may be covered by a single drawing or outline sheet. Drawings or sheets shall bear complete identifying data including frame size, speed, horsepower ratings and application for each particular unit.

5. Description of proposed shop and field-testing methods, procedures and apparatus with calibration dates shall be submitted. Testing methods and procedures shall be submitted in advance prior to conformation of witness testing dates and actual testing as follows:

   a. At least 60 days in advance for test locations in the US.

   b. At least 90 days in advance for test location outside of the US.

6. Qualifications of proposed testing firm to perform acceptance testing shall be submitted. Submit firm experience records at least 60 days in advance to actual testing, five recent references with phone numbers shall be submitted.

7. All motor accessories, heaters, detectors, etc., shall be submitted.

8. Bill of Materials for the proposed motors shall be submitted.

B. Certificates of Compliance:

1. Certified copies of motor characteristic curves and all other data necessary for establishing control and protective equipment settings shall be submitted.

2. Results of shop tests shall be certified. When routine tests are made in conjunction with complete initial tests, unwitnessed results shall be certified and copies shall be submitted. Results shall be included for each test.

3. Data and results of witness tests shall be submitted with copies of certified initial tests, accompanied by a certificate of authenticity sworn to before a notary public by an officer of the manufacturing company. Upon approval, release for shipment to site shall proceed and the Engineer shall be notified of the arrival date.

C. Reports:

1. Shop test and field test reports shall be submitted.

2. Manufacturer’s site visit and acceptance testing reports shall be submitted.

D. Operation and Maintenance Manuals.

1. Operation and Maintenance Manuals shall be submitted in accordance with this Section and the Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Low-voltage electric motors shall be delivered, stored and handled in accordance with this Section, the Specifications, the motor manufacturer's instructions and the following:

1. Motors shall be inspected for shipping damage when received.

2. All sleeve or oil lubricated bearings motors shall be identified and the bearing reservoirs filled to normal level.

3. Motors shall be handled using motor base lifting lugs. Avoid pounding or bumping of motor which may damage motor. A hoist and spreader bar arrangement shall be used to avoid damage.

4. Motors shall be stored indoors in clean, dry heated areas.

5. Motor space heaters shall be energized to prevent moisture condensation throughout the storage and construction period.

6. Motors shall not be stored in areas subject to continuous vibration. A small quantity of grease shall be injected into each bearing on a monthly basis. Purged grease shall be inspected for water or rust. Motor shaft shall be rotated by hand to check for binding.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Spare Parts

1. 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 the low-voltage electric motors in accordance with this Section and the Specifications.

2. 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.

3. Spare parts shall be furnished in accordance with the manufacturer's recommendations for the motor size and type. Spare parts shall include at a minimum the following:

a. One complete set of bearing linings, or renewable ball or roller bearings shall be provided for each three (or less) of each type and size of motor. Spare bearings shall be furnished for all motor types. When sleeve bearing motors are provided, spare oil rings shall be furnished for those motors.

b. One set of brushes shall be provided for each DC type motor and wound rotor type motor requiring them.

c. One complete assembly of brush holders and supports shall be provided for each size of DC type motor and wound rotor type motor requiring them.

d. One complete assembly of collector rings shall be provided for each size of wound rotor type motor requiring them.

e. One complete set of fans and guards shall be provided (per each set of three or less) for each size totally enclosed fan cooled type motor.

f. One set of bearing temperature detectors shall be provided (per each set of three, or less) of each type of motor 250 horsepower and larger.

g. One set of upper and outer seal assemblies shall be provided (per each set of three or less) for each size submersible type motor.

h. One set of O ring kit shall be provided (per each set of three or less) for each size submersible type motor.

i. One set of wear rings shall be provided (per each set of three or less) for each size submersible type motor.

B. Lubricants

1. The Contractor shall furnish as part of the bulk lubricant order the quantity of lubricants required to operate and maintain the motors furnished under this section for a period of one year after acceptance. As a minimum, there shall be provided sufficient oil and grease to make a least one lubricant change for each motor as applicable.

2. Replace all lubricants used during startup and testing prior to acceptance of equipment. Furnish this replacement lubricant in addition to the lubricants included in the bulk order.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Driven Equipment

1. The motor manufacturers are as shown on the Contract Drawings or stated in the Sections detailing the driven equipment.

2.02 MATERIALS / EQUIPMENT

A. Design Requirements

1. Motors shall be designed, built, and tested in accordance with the latest applicable editions of ANSI/IEEE, NEMA, UL and NYCEC. The

classifications, ratings, performance and testing of all motors shall be in accordance with the latest edition of NEMA MG1.

2. Motor winding shall be copper.

3. Motors shall be premium efficiency type and shall have nominal efficiencies in accordance with NEMA MG1. Motors with horsepower or rpm's not listed by NEMA shall conform to comparable standards of construction and materials as those for listed NEMA motors.

4. Motors shall be of sufficient capacity to operate the driven equipment under all conditions of operation without loading the motors beyond their rated nameplates current and power under all operating conditions imposed by the driven equipment.

5. The rating of the motors offered shall in no case be less than the horsepower shown on the Contract Drawings or stated in the Specifications. Both the rating and the characteristics of the motor shall be suitable for the successful operation of the driven equipment, under load conditions, within nameplates values of service factor and ambient temperatures.

6. Motors shall be of three phase construction for ratings above 1/3 horsepower and single phase construction for 1/3 horsepower or less.

7. Low-voltage motors shall be of a type approved for starting characteristics and ruggedness as may be required under the actual conditions of operation.

8. Low-voltage motors shall be designed for full voltage starting.

9. Reduced voltage starters, shall ensure that the motor develops ample torque and is able to accelerate and attain its operating speed under the load conditions imposed by the driven equipment.

10. Multi-speed motors shall have a separate winding for each speed unless.

11. Portable devices shall have totally enclosed motors and approved cord with provisions for grounding. They shall be suitable for the available power supply.

12. All motors shall be continuous time rated suitable for operation in a 40 degrees C ambient.

13. Motors shall comply with the EPAct 1992 and EISA 2007.

14. Variable-speed motors shall comply with NEMA MG1.

15. Variable-speed motors operated from variable frequency drives shall comply with NEMA MG1 and shall be inverter duty rated.

B. Single Phase Motors

1. Single phase motors shall be rated 115- or 230-volt, capacitor start. Small fan motors may be split-phase or shaded pole type if such are standard for the equipment.

2. Bearings for single phase, open, enclosed and explosion-proof motors shall be grease-lubricated ball type with grease fittings or with lubrication for 10 years of normal operation.

3. Motors shall be totally enclosed except small fan motors may be open type if suitably protected from moisture, dripping water, and lint accumulation. Motor features shall be in accordance with the following:

   a. Open motors shall be split phase or capacitor start in accordance with torque requirements, 1.35 Service Factor, 40 degrees C Ambient Class B Insulation.

   b. Enclosed motors shall be capacitor start, fan cooled 1.15 service factor, 40 degrees C ambient, Class F, treated insulation. Enclosed motors shall be totally enclosed fan cooled, or non-ventilated. Enclosed motors shall be designed to withstand chemical corrosion and shall be severe duty type equipped with cast iron end shields, neoprene gaskets, stainless steel shaft, heavy pressed steel fan cover and provision for threaded conduit connection.

   c. Explosion-proof motors shall be fan cooled, split phase or capacitor start in accordance with torque requirements, 1.0 service factor, 40 degrees C ambient, equipped with swivel conduit connector and long leads for external connection.

   d. Direct drive fan motors shall be shaded pole or permanent split capacitor, 1.35 service factor, 40 degrees C ambient.

C. Three Phase Motors

1. General

   a. Three phase motors shall be squirrel cage induction type, designed for operation on a 3 phase, 60 hertz alternating current system.

   b. Three phase squirrel cage motors shall be severe duty and shall conform to the requirements of IEEE 841

   c. Motor voltage shall be as shown on the Contract Drawings.

   d. Motors used with adjustable frequency controllers shall be as stated in this Section, the Specifications and the Contract Drawings.

   e. Unless otherwise required by the load, all motors shall be NEMA Design B, normal starting torque. Locked rotor KVA/HP shall not exceed NEMA Code Letter G for 20 HP motors and larger.

   f. The design of the stator, rotor and shaft shall be in accordance with the approved practice of leading manufacturers. The motor frame

shall be a rigid structure, designed to maintain the lamination in correct alignment and shall not be dependent on the lamination or bolts for rigidity.

g. Motors having considerable core length shall be provided with approved means for taking up shrinkage in length.

h. Motor rotors shall be of cast or fabricated aluminum or fabricated copper or copper alloy as required to meet the motor performance characteristics of slip, torque, and efficiency.

2. Bearings

a. Horizontal motors shall be provided with either the rolling element (anti-friction) or sliding element (sleeve) type bearings. Anti-friction type bearings shall be used for all NEMA frame motors. Where greater power and speeds are required by the driven equipment, sleeve type bearings shall be used. The bearings for all motors larger than 200 horsepower shall be insulated to prevent shaft currents and related bearing damage.

b. Bearings for 3 phase drip-proof, enclosed and explosion-proof motors shall be grease lubricated, ball type. Bearings shall be fitted with inlet fittings and outlet plugs. Motor bearings and grease reservoirs shall be protected from the entry of contaminants.

c. Bearings for direct drive fan motor shall be of the oil lubricated sleeve type.

d. When anti-friction bearings are furnished on horizontal motors for ratings to 500 horsepower and speeds to 3,600 RPM, they shall have a minimum bearing life of 100,000 hours as defined by AFBMA. Suitable fittings shall be provided to permit convenient positive purging of old grease during regreasing operation. Close running shaft seals shall prevent leakage of grease as well as prevent the entrance of foreign materials such as water and dirt into the bearing area. Motors equipped with anti-friction bearings shall have the appropriate AFBMA number stamped on a nameplate attached to the motor.

e. When furnished, sleeve bearings shall be ring-oiled with an adequate, integral self-cooled oil reservoir. The bearing sleeves shall be lined with a high tin content babbitt to minimize oil contamination. Close running shaft seals shall prevent oil leakage as well as prevent entrance of foreign material such as water and dirt into the bearing area. Oil level sight gages with permanently marked easily discernible oil level shall be provided. In addition, inspection openings to observe the oil rings shall also be provided.

f. When required by motor speed and bearing size, provision shall be made for forced lubrication. The oil supply shall be supplied with

motor. In addition, oil rings and an adequate oil reservoir in the bearing housings shall be provided to permit orderly shutdown of the motor in the event of failure of the formed feed lubrication system.

g. Vertical motors shall be provided with thrust bearings adequate for all thrusts to which they can be subjected. The rated minimum life of the thrust bearings shall be at least 15,000 hours when operated at rated speed and full load thrust. The driven equipment manufacturer shall supply the motor manufacturer with the speed and thrust conditions required by the driven equipment.

h. Submersible motor bearings shall be permanently sealed and lubricated. Anti-friction guide and thrust bearings shall be replaceable. Bearings shall have a rated minimum life of 15,000 hours.

3. Insulation

a. The insulation system for three phase AC motors shall be rated Class F, with a service factor of 1.15 times the nameplate horsepower rating when operated on a sine wave supply and a service factor of 1.0 on an adjustable frequency supply. Temperature rise shall be limited to Class B insulation system when motor is operated continuously at rated horsepower with an ambient temperature not exceeding 40 degrees C.

b. Windings shall be epoxy coated. The windings shall be thoroughly treated with approved insulating compound suitable for protection against moisture, salt air and slightly acid or alkaline conditions. The insulation system for enclosed motors shall be upgraded by additional dips and bakes to increase moisture resistance.

c. Motors for outdoor service and all motors larger than 200 horsepower shall have vacuum/pressure impregnated epoxy insulation (VPI) for moisture resistance. Motors shall be preheated before VPI and baked in a temperature-controlled oven.

d. Motors applied in speed varying service and operated from variable frequency controllers shall have an inverter grade insulation system designed and built in accordance with NEMA MG1 Part 31.

e. The stator windings and end turn connections shall be fully brazed to withstand full voltage starting regardless of the starting method indicated in this Section, the Specifications and the Contract Drawings. The bracing system shall essentially eliminate coil vibration under the high current conditions of starting as well as during normal operation. If a tied system is used, it shall be such

that no tie depends on the integrity of any other tie within the system.

f. Motors larger than 200 horsepower shall be form wound. Form wound coils with a micaceous ground wall insulation is required with additional insulation similar to Mica 5 and hot pressed to make a sealed system. Coils shall be form wound with mica insulation and each separate coil shall be vacuum pressure impregnated before inserting into slots.

4. Enclosures

a. Wound rotor motors shall be drip-proof, except for crane and hoist installations and where specified otherwise.

b. Motors shall have a steel or cast iron frame and a cast iron or steel conduit box. For wound rotor motors separate boxes for stator and rotor connections shall be provided. For NEMA frame size motors cast aluminum frames and terminal boxes may be used.

c. Motor enclosures shall conform to the NEMA classifications specified and to the following:

1) Open Drip proof: Motors shall have a steel or cast iron frame, cast iron end brackets and steel conduit box. Vertical motors of the open type shall be provided with drip hoods of approved shape and construction. When the drip hood is too heavy to be easily removed, provision shall be made for access for testing. Open motors shall be provided with corrosion resistant screens over the air openings in accordance with NEMA requirements for guarded machines.

2) Totally enclosed fan cooled and non-ventilated motors shall have a cast iron frame, cast iron end brackets and cast iron conduit box. Drain holes shall be provided on each end of motor.

3) Explosion proof motors shall have a cast iron frame, cast iron end brackets and cast iron conduit box. Unless shown otherwise on the Contract Drawings or stated in the Detailed Specifications, explosion proof motors shall be UL listed for Class 1, Division 1, Group D hazardous areas.

4) Severe duty motors shall include a corrosion resistant treatment. Severe duty motors shall have a cast iron frame, cast iron end brackets, cast iron conduit box, stainless steel “T” drains in both end brackets, corrosion resistant fan, and stainless steel hardware.

5) Submersible motors shall be hermetically sealed, watertight with tandem mechanical seals suitable for continuous submergence and listed for Class 1, Division 1, Group D locations.

d. Conduit Boxes

1) Motor conduit box shall be split from top to bottom and shall be capable of being rotated to four positions. Motor conduit box shall be in accordance with the following:

a) Conduit box shall be gasketed and shall include rubber-like gaskets between the frame and the conduit box and between the conduit box and its cover.

b) Conduit boxes or openings in motor housings shall be provided with conduit hub type fittings to permit threaded conduit connections. Single phase, explosion-proof and direct drive fan motors shall be provided with conduit fittings and leads to permit external connection.

c) Conduit box sizes shall be in accordance with code requirements. This shall include appropriate terminations for the rated voltages.

d) Protective and auxiliary devices shall terminate in auxiliary conduit boxes.

e) Terminal leads shall be flexible and shall be of sufficient length to extend for a distance of not less than ten inches beyond the face of the terminal box. Terminal leads shall be fitted with solder less lugs suitable for attachment to lugs installed on external wiring. Leads shall be sealed with a non-wicking, non-hygroscopic insulating material or an insulating "wrap-cap."

f) Provisions for terminal box size, length of leads, size of conduit openings and type of terminal lugs shall be complied with irrespective of any other standards or practice.

g) A motor frame grounding stud shall be provided inside the conduit box. A drilled and tapped hole shall be included.

D. Accessories

1. General

a. Motor accessories shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

2. Rotor Grounding

a. An approved rotor grounding means or mechanism shall be provided to drain induced currents, parasitic and static charges to ground.

3. Space Heaters

a. Each outdoor motor 5 horsepower and larger shall be provided with space heaters.

b. Each motor 5 horsepower and larger enclosed motors installed indoors, in damp unheated spaces, shall also be provided with space heaters.

4. Each motor 250 horsepower and larger shall be provided with space heaters.

5. Space heaters for condensation prevention shall be rated 120 volts. Wattage shall be suitable for the particular frame size and type in accordance with the manufacturer's recommendation.

6. Space heater wire leads shall be brought out to an auxiliary conduit box on the motor. Box construction shall match main power conduit box.

E. Winding Protection

1. Winding Protective Devices:

a. Thermostat type protection shall be provided for each motor in accordance with the following:

1) Submersible motors and explosion proof motors.

2) Variable speed motors up to 25 horsepower.

b. Thermistor type protection shall be provided for each motor in accordance with the following:

1) Constant speed motors 50 horsepower and larger up to 200 horsepower.

2) Variable speed motors 30 horsepower and larger up to 200 horsepower.

c. Resistance temperature detectors shall be 100-ohm precision type with calibrated resistance-temperature characteristics. Detectors, two per phase, shall be positioned to detect highest winding temperature and located between coil sides in stator slots. Detector leads shall be wired to a separate NEMA 4X terminal box.

2. Thermostats shall be bi-metal disk or rod type embedded in the stator windings. Thermostat contacts shall be automatic reset type, rated 120-volt AC, 5 amps minimum opening on excessive temperature.

3. Thermistors embedded in each stator phase winding shall be in direct contact with the winding conductors. Each thermistor circuit shall be factory wired to 120-volt solid state control module mounted at the motor in a NEMA 4X box. The control module contacts shall be automatic reset type, rated 120-volt AC, 5 amps minimum opening on excessive temperature.

F. Bearing Temperature Protection

1. Bearing temperature detectors, RTD type similar to the winding detectors specified under this Section shall be provided on each bearing for horizontal motors and on the thrust bearing for vertical motors.

2. Each motor 250 horsepower and larger shall be provided with stator and bearing temperature detectors.

G. Special Application

1. Cranes, elevators, hoists, and other devices complying with special safety codes shall be furnished complete with their control equipment, and with all accessories and safety devices for approved safe and efficient operation.

H. Single Phase Motors

1. Single phase motors requiring auxiliary starting resistors, capacitors or reactors and switching devices shall be furnished as combination units with such auxiliaries either incorporated within motor housings or housed in suitable enclosures, mounted upon motor frames. Each combination unit shall be mounted upon a single base and shall be provided with a single conduit box.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Painting

1. External Surfaces:

a. All severe duty motors shall have all external surfaces pretreated, primed and painted. External surfaces shall be pretreated so the surface is clean and free of contaminants. After pretreatment, the surface shall be primed with an oxide primer and then spray painted with a minimum of 0.003-inch-thick epoxy polyamide and semi-gloss coating that is chemical, solvent, salt water, and acid resistant.

b. All other motors shall have external surfaces pretreated, primed and painted in accordance with the manufacturer’s standard treatment.

2. Internal Surfaces:

a. All severe duty motors shall have all internal surfaces pretreated, primed and painted. Internal surfaces shall be pretreated so the surface is clean and free of contaminants. After pretreatment, the surface shall be primed with an oxide primer and then painted with an epoxy paint. Machined joints and threaded parts shall be coated with rust inhibiting compound.

b. All other motors shall have internal surfaces pretreated and primed in accordance with the manufacturer's standard treatment.

B. Hardware

1. All machined bolts and screws and other hardware shall be of the hex head type and shall be zinc plated.

2. Stainless steel hardware shall be used on severe duty motors.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Certified Shop Tests:

1. Shop testing shall be performed on the motors at the manufacturer's plant prior to shipment. Shop test shall be in accordance with the latest revisions of IEEE 112 and NEMA MG1 and shall demonstrate that the equipment tested conforms to the requirements specified inclusive of the efficiency requirements stated in this Section.

2. The Contractor shall provide a shop test report. The report shall identify the tests performed and the results obtained.

3. Every motor rated less than 200 horsepower shall be given a routine test at the manufacturer's factory. The routine test shall consist of:

a. No Load Speed, Voltage and Current at rated frequency.

b. Locked Rotor Current.

c. Winding Resistance.

d. High Potential.

e. Bearing Inspection.

f. Measurement of Secondary Volts at standstill for wound-rotor units.

4. Motors rated at 200 horsepower or greater shall be given complete initial tests consisting of:

a. Full-load Heat Run.

b. Percent Slip.

c. No Load Speed, Voltage, Current and losses at rated frequency.

d. Full Load Current.

e. Locked rotor Torque.

f. Locked-rotor Current.

g. Breakdown Torque (Calculated).

h. Starting Torque (squirrel-cage).

i. Winding Resistance.

j. High Potential.

k. Sound.

l. Vibration.

m. Efficiencies at 125, 100, 75 and 50 percent of full load.

n. Power Factors at 125, 100, 75 and 50 percent of full load.

o. Bearing Inspection.

p. Measurement of Secondary Volts at collector rings for wound-rotor units.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Motors

1. Motors shall be installed in accordance with manufacturer's instructions and recommendations.

2. Each motor shall be carefully and properly aligned with the driven equipment.

3. Equipment shall be secured to mounting surface with anchor bolts. Anchor bolts shall be provided meeting manufacturer's recommendations and of sufficient size and number to secure equipment.

4. Motor nameplates shall be installed for identification of equipment. Nameplates shall be provided in accordance with the requirements of Section 40 05 97- Identification for Process Equipment.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Tests

1. After installation, motors shall be field tested for operation and conformance. The Contractor shall perform field tests in accordance with this Section, the Specifications and the Contract Drawings. The field tests shall be witnessed by the Engineer and certified by the Contractor.

2. Motor testing shall be performed by the manufacturer's representative, prior to energizing equipment.

3. Equipment shall not be energized without the permission of the Engineer.

4. The testing shall be in accordance with the recommendations of the manufacturer's representative and shall include at a minimum the following:

   a. Motors shall be checked to determine that they have been properly installed, lubricated and connected.

   b. Motors shall be checked to determine they are not overloading, overheating or defective.

   c. Motors shall be checked to determine they comply with performance and design parameters.

B. Manufacturer's Field Services

1. A qualified manufacturer's service representative shall assist in the installation of the motors, check the motor installation before it is placed into operation, assist in the performance of field tests, observe and assist initial operations and train the plant operations and maintenance staff in the care, operation and maintenance of the motors.

2. The Contractor shall provide equipment start-up services and training in accordance with this Section, the Specifications and the Contract Drawings.

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. Acceptance Testing

1. The Contractor shall provide acceptance testing of the motors. All acceptance testing shall be performed by the testing firm, after the completion of the Field Tests specified under this Section. The acceptance testing shall be witnessed by the Engineer and certified by the Contractor.

2. Acceptance inspection shall be performed on each motor larger than 200 horsepower. Inspection shall include the following:

   a. Electrical and grounding connections shall be inspected.

   b. Shaft alignment, proper mounting and lubrication shall be inspected.

c. Ventilating air passageways shall be inspected for blockage.

d. Excessive noise shall be inspected.

e. Any overheating shall be inspected.

f. Correct rotation shall be inspected.

g. Protective detectors operation shall be checked.

h. Any excessive vibration shall be checked.

i. Space heater operation shall be checked.

3. Acceptance electrical testing shall be performed on each motor larger than 200 horsepower. Testing shall include the following:

a. Insulation resistance tests shall be performed.

b. Surge comparison testing shall be performed.

c. Vibration tests shall be performed.

d. Bearing insulation resistant tests on insulated bearings shall be performed.

e. Running current and voltage shall be measured and evaluated relative to load conditions and nameplate full-load amperes.

f. High-potential tests shall be performed.

g. For wound rotor motors, additional electrical testing at minimum and normal operating load points and at ring short shall be performed.

h. Motors shall be operated with driven equipment for a minimum of 48 continuous hours and rechecked for overheating and vibration.

4. All tests and values for AC and DC motors shall be in accordance with the manufacturer's recommendations and NETA ATS.

5. The Contractor shall provide an acceptance testing report. The report shall be in accordance with NETA ATS.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

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. 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 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 low-voltage cable testing utilizing low-voltage or extra-low voltage methods.

c. All phasing verifications utilizing low-voltage or extra-low voltage methods.

d. All continuity testing utilizing low-voltage or extra-low voltage methods

e. All ground system bonding and continuity testing utilizing low-voltage or extra-low voltage methods.

f. 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 dielectric tests.

b. All low-voltage protective device testing and setting related to Arc Flash Studies.

c. All low-voltage Protective Device testing and calibration.

d. All potential testing and determination of performance curves.

e. All Primary and Secondary injection tests of protective device systems.

f. All ground systems testing.

2. Thermographic Testing and Imaging

a. An independent testing company comprised of Infraspection 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

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing low-voltage fuses. Low-Voltage Fuses shall be provided in accordance with the requirements of the Contract Drawings and Specifications.

B. Fuses shall be suitable for use with power circuits.

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 other Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation within the 600 Volt Class.

B. Reference Standards: Low-voltage fuses shall comply with the latest applicable provisions and recommendations of the following even if not specifically listed in this Section:

1. UL 248 - Low-voltage Fuses.

2. NEMA FU1 - Low-Voltage Cartridge Fuses.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

1. Low-voltage fuses shall be designed, built and tested in accordance with UL 248.

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 fuses proposed for use with specifications and other data required to demonstrate compliance with the specified requirements.

2. Time-current curves for the fuses proposed for use.

B. Operation and Maintenance Manual

1. Operation and Maintenance Manuals shall be submitted in accordance with this Section and the Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Fuses 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. Spares

1. 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 fuses in accordance with this Section and the Specifications.

2. The spare fuses 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.

3. Spare fuses shall include at a minimum the following:

a. 10 percent of each rating used.

b. Minimum of three of each rating.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Low-voltage fuses shall be as manufactured by:

1. Mersen Ferraz Shawmut, San Francisco, CA;
2. Littlefuse, Chicago, IL;
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Fuses shall be compatible with the system operating voltage shown on the Contract Drawings.
2. Low-voltage fuse ampere ratings shall be as shown on the Contract Drawings.

B. Low-voltage Fuses:

1. Low-voltage fuses shall be current limiting, time delay type. Low-voltage fuses shall have a 200,000 RMS symmetrical ampere interrupting rating.
2. Low-voltage fuses with current ratings up to 600 ampere shall be UL class RK1.
3. Low-voltage fuses with current ratings greater than 600 ampere shall be UL class L.

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. Fuses shall be installed within equipment in accordance with the manufacturer's recommendations.

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. Requirements for providing enclosed controllers. Enclosed controllers shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

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. 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.

B. Reference Standards

1.	NYCEC	-	Electrical Code of the City of New York.
2.	UL 98	-	Enclosed and Dead-Front Switches
3.	UL 508	-	Industrial Control Equipment
4.	UL 489	-	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures.
5.	NEMA KS-1	-	Heavy Duty and Dead-Front Enclosed Switches
6.	NEMA ICS	-	Industrial Control and Systems General Requirements
7.	NEMA ICS 2	-	Industrial Control and Systems, Controllers, Contactors and Overload Relays rated 600V.
8.	NEMA ICS 5	-	Industrial Control and Systems Control-Circuit and Pilot Devices
9.	NEMA ICS 6	-	Industrial Control and Systems Enclosures

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Unless otherwise shown on the Contract Drawings, or directed by the standards and codes referenced under this Section, the Contractor shall provide for each low-voltage motor or other power device, complete equipment for starting, stopping and control.

B. The starting, stopping and control equipment shall be provided with features of protection, current limitation, functioning and be complete with all accessories, appurtenances and supporting structures.

C. Control equipment shall be UL listed and properly designed with relation to the characteristics of operation of the motor and or device controlled.

D. Unless otherwise shown on the Contract Drawings or stated in the Specifications, each motor shall be provided with control equipment consisting of apparatus as follows:

1. Motors of 1/4 HP or less may, in the absence of other requirements, be controlled by a manual motor starter having thermal overload protection at all times.

2. Motors larger than 1/4 HP shall be controlled by a magnetic motor starter.

3. For wound rotor motors of all horsepower ratings, the primary and secondary shall be controlled by a magnetic motor starter or as shown on the Contract Drawings.

4. Multiple speed squirrel cage motors, shall be controlled by a magnetic motor starter. The magnetic motor starter shall provide adequate protection of the motor at each speed. A line establishing contactor shall be provided for each motor speed.

E. Each motor shall include overload protection based on latest standards.

1.07 SUBMITTALS

A. Shop Drawings

1. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

a. Manufacturer's catalog cuts, technical information and enclosure details for the enclosed controllers.

B. Operations and Maintenance Manuals

1. Operations and Maintenance Manuals

a. Operation and Maintenance Manuals shall be submitted in accordance with the Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Enclosed controllers shall be delivered, stored and handled in accordance with 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 the enclosed controllers 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. One (1) set of contact tips, shunts and coils shall be provided for each 6 or less of each size motor starter.

2. One (1) auxiliary contact unit or one set of auxiliary contact tips shall be provided for each 6 or less motor starter.

3. Two (2) sets of arc chutes shall be provided for each type and rating of magnetic contactor.

4. One (1) timing relay shall be provided of each type installed as part of control equipment installation.

5. One (1) complete auxiliary relay shall be provided of each type installed as part of control equipment installation.
6. One (1) control transformer shall be provided of each rating and type installed as part of control equipment installation.
7. Two (2) complete sets of fuse replacements shall be provided of each rating and type installed as part of control equipment installation.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Switching devices shall be as manufactured by:
   1. General Electric Company, Stamford, CT
   2. Siemens, Washington, DC
   3. Or approved equal.

B. Magnetic motor starters shall be as manufactured by:
   1. General Electric Company, Stamford, CT
   2. Siemens, Washington, DC
   3. Or approved equal

C. Manual motor starters shall be as manufactured by:
   1. General Electric Company, Stamford, CT
   2. Siemens, Washington, DC
   3. Or approved equal

D. Control stations shall be as manufactured by:
   1. General Electric Company, Stamford, CT
   2. Siemens, Washington, DC
   3. Or approved equal

2.02 MATERIALS / EQUIPMENT

A. Switching Devices
   1. Switching devices shall be low-voltage devices provided in accordance with the details shown on the Contract Drawings. The switching devices required under this Section shall be the disconnect switch and circuit breaker types.
   2. Switching devices shall be enclosed in NEMA type enclosures in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

3. Switching device line and load terminals shall be provided with shields to prevent accidental contact with them. In addition, instrument probe holes shall be provided within the shields to permit investigation of the state of the terminals, by authorized personnel and approved procedures.

   a. Disconnect switch type switching devices shall be in accordance with the following:

      1) Switches shall be heavy duty type with number of poles, voltage and current ratings as shown on the Contract Drawings.

      2) Switches shall be capable of interrupting the full rated current at full rated voltage.

      3) Switch enclosure shall be provided with a viewing window through which it shall be permissible to observe the state of the main contacts and surge protective devices when provided.

      4) Where specifically shown on the Contract Drawings, disconnect switches shall be complete with fuses, surge protective devices and remote operation.

      5) Switches shall be the quick make and quick break type covered with an arc resisting barrier. The switch shall be provided with provision for locking in either open or closed position. The ratings shall be as follows:

Switch Rating in Amperes	Motor Horsepower	
	208-240 Volts	480Volts
60	Over 5 to 15	Over 5 to 30
100	Over 15 to 25	Over 30 to 60
200	Over 30 to 50	Over 60 to 125
400	Over 50 to 75	Over 125 to 200

   b. Circuit breaker type switching devices shall be in accordance with the following:

      1) Circuit breakers shall be the molded case type with number of poles, voltage and current ratings as shown on the Contract Drawings.

      2) Breakers shall be manually or remotely operated thermal magnetic or solid state type, including inverse-time overload and instantaneous short-circuit protection. Contacts shall be nonwelding silver alloy and arc extinction shall be accomplished by means of arc chutes.

3) Breakers shall have 100-amp frames as a minimum. Overload protection shall be provided on all poles, with trip settings as shown on the Contract Drawings.

4) Breakers with frame sizes 225 amp or larger shall have interchangeable trip units and adjustable magnetic trip elements.

5) Breakers shall be operated by a toggle-type handle and shall have a quick-make/quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the breaker shall be clearly indicated by the handle position.

6) Breaker enclosures shall be equipped with an external lockable handle with provision for locking in the closed or open position.

7) Where shown on the Contract Drawings breakers shall be provided with electronic trip units. Electronic trip units shall include long time, short time, instantaneous and ground fault settings as minimum.

8) Where specifically shown on the Contract Drawings breakers shall be provided with zone interlocking features, shunt trips, provisions for annunciation of status and auxiliary devices.

B. Motor Starters

1. Magnetic

a. Magnetic motor starters shall be provided complete with fused control power transformer, pilot devices, auxiliary contacts and accessories as shown on the Contract Drawings or stated in the Detailed Specifications.

b. Magnetic motor starters shall be enclosed in NEMA type enclosures in accordance with the requirements specified under this Section. The starter shall be combination type. The enclosure shall be equipped with an external operable, pad lockable handle, arranged so that it is impossible to open the door unless the breaker is open.

c. The starter shall be magnetic coil operated, and shall include a magnetic or solid state motor circuit protector with trip unit range adjustable from 700 to 1300 percent of full load.

d. The combination starters shall be suitable for interrupting the available low-voltage short circuit infeed at the line terminals of the enclosure.

e. Magnetic contactors shall be 3 pole, single throw, 60 Hz with auxiliary contacts for under-voltage protection. Contactors shall be

mounted upon steel bases with insulated mountings or upon bases of insulating material. Contactors shall be provided with necessary barriers and arc chutes.

f. Contactors shall be NEMA rated as follows:

NEMA Size of Contactor	Motor Horsepower	
	208-240 Volts	480Volts
1	¼ to 71/2	¼ to 10
2	Over 71/2 to 10	Over 10 to 25
3	Over 15 to 25	Over 25 to 50
4	Over 30 to 40	Over 50 to 100
5	Over 40 to 75	Over 100 to 200

g. Contactors in Sizes 1 through 4 shall have double break, silver to silver main contacts. Contactors in Size 5 shall have silver plated tips which close with rolling action and which have self-aligning and self-cleaning features. Auxiliary and interlocking contacts for all sizes shall be of the silver button type. All contact tips shall be easily renewable. Flexible shunts shall be tinned copper braid or tinned extra flexible copper cable.

h. Overload relays shall be of the ambient temperature compensated bi-metallic or solid state type with interchangeable sensors and manual reset feature. Relay shall include a normally open auxiliary contact for remote alarm purposes. Sensors for overload relays shall be selected to match full load currents of the motors to allow motor operation at maximum safe loads without damage to equipment. Full load current data shall be obtained from nameplates of motors actually installed.

i. Pilot devices shall be heavy duty type, rated 10 amp continuous. Pushbuttons, selector switches, indicating lights, and other devices shall be located on the starter enclosure. Indicating lights shall be push-to-test, LED, transformer type with 12-volt secondaries.

j. Relays shall be standard, latching type and pneumatic or solid state time delay type. Relays shall be provided with contacts rated 10 amp with number as required.

k. Special overload protection shall be provided where definite purpose motors cannot be protected by standard thermal overload relay applications.

2. Manual

a. Manual motor starters shall be provided complete with pilot devices as shown on the Contract Drawings.

b. Manual motor starters shall be enclosed in NEMA type enclosures in accordance with the requirements specified under this Section.

c. Manual motor starters shall be toggle operated, NEMA horsepower rated, single phase type with thermal overload protection unless shown otherwise on the Contract Drawings. Pilot devices when required shall be in accordance with the requirements specified under this Section.

d. Where shown on the Contract Drawings, manual motor starters shall be low-voltage, three phase type without overload protection for use as manual starting disconnect switches. The switches shall be horsepower rated, as required for the application intended.

3. Control Stations

a. Control Stations shall be provided in accordance with the details on the Contract Drawings.

b. Control Stations shall be enclosed in NEMA type enclosures in accordance with the requirements specified under this Section.

c. Control stations shall be industrial, heavy duty, oil tight construction with clearly marked legend plates. Stations shall have operating devices as shown on the Contract Drawings.

d. Contact ratings shall be 10 amp minimum. All indicating lights shall be LED, transformer type, lens color shall be as shown on the Contract Drawings.

4. Enclosures

a. Enclosures shall be provided for the enclosed controllers.

b. Enclosures located indoors in dry, dusty areas shall be gasketed and shall be constructed of 14-gauge sheet steel.

c. Cabinet type enclosures shall include hinged and gasketed front doors.

d. Enclosures shall be provided in accordance with NEMA requirements as required for the area classifications indicated on the Contract Drawings.

1) For dry, dusty locations, enclosures shall meet NEMA 12 requirements.

2) For wet and corrosive locations, enclosures shall meet NEMA 4X requirements. NEMA 4X enclosures shall be fabricated from 316 stainless steel.

3) Enclosures within hazardous locations shall meet Class 1, Division 1, Group D requirements. Hazardous enclosures shall be fabricated from cast metal.

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. Equipment shall be mounted so that sufficient access and working space is provided for ready and safe operation and maintenance.

B. Equipment shall be securely fastened to walls or other surfaces on which they are mounted.

C. Independent supports shall be provided where no wall or other surface exists.

D. Enclosed controllers shall be installed in conformance with the NYCEC.

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

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing Variable-Frequency Motor Controllers known as Variable Frequency Drives (VFD/s). VFDs shall be provided in accordance with the requirements specified under this Section, the Specifications and the Contract Drawings.

B. The VFDs required under this Section shall be the low-voltage, voltage source pulse -width modulated inverter types. The VFDs shall include full bypass capability when shown on the Contract Drawings.

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 53 – Identification for Electrical Systems

C. Section 26 05 91 – Low-Voltage Electric Motors

1.04 REFERENCES

A. Definitions

1. All references to the Electric Utility or the Utility shall mean the Local Electric Utility having jurisdiction.

2. The Electric Utility is Con Edison.

3. Low-voltage as used in this Section and the Specifications shall mean all equipment, conductors, insulation systems and accessories intended for operation at less than 1000 volt and within the 600 V Class

B. Reference Standards. VFD shall comply with the latest applicable provisions and recommendations of the following:

1.	NYCEC	-	New York City Electrical Code.
2.	NEMA ICS 2	-	Industrial Control and System Controllers, Contactors and Overload Relays Rated 600 volts.
3.	NEMA ICS 7	-	Adjustable Speed Drive Systems.
4.	NEMA MG-1	-	Motors and Generators.
5.	NETA ATS	-	NETA Acceptance Testing Specification.
6.	NIST	-	National Institute of Standards and Technology.
7.	IEEE 519	-	Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
8.	ANSI/UL 508	-	Industrial Control Equipment.
9.	UL 489	-	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures.
10.	BWT Design Guideline	-	Motor Starting for Low-voltage applications.

1.05 DESCRIPTION

A. VFD General

1. Each VFD unit shall consist of an adjustable frequency controller with contactor bypass and associated controls for continuous speed adjustment and protection of the driven equipment.

2. The adjustable frequency controller shall be a microprocessor-based, pulse-width modulated design, suitable for operation on a low-voltage, 3 phase, 60 Hz supply.

3. The controller shall consist of

   a. a power factor /harmonic filter unit (if required)

   b. 6 pulse, minimum, diode-bridge converter fed by rectifier-grade phase-shifting transformer

   c. a fixed DC bus section

   d. a 3 percent DC bus reactor or input line reactor

   e. and an IGBT based power transistor inverter output section.

4. The controller shall produce an adjustable AC voltage/frequency output to vary the speed of the driven equipment and maintain the drive motor V/Hz rating.

1.06 QUALITY ASSURANCE

A. VFDs shall be designed, built and tested in accordance with the latest applicable editions of ANSI/IEEE, NEMA, and UL.

B. The VFD shall be UL listed.

C. The VFD manufacturer shall have 10 years' experience in the design and be regularly engaged in manufacturing and servicing equipment for installations of the type and size specified under this Section.

D. Each VFD shall be totally compatible with the driven equipment and motors. The VFD shall be matched to the driven equipment specific load requirements for each system specified in this Section or as shown on the Contract Drawings.

E. Output speed control of the controlled motor shall be continuous throughout speed range of 2 to 60 Hertz under variable torque load or constant torque load as specified for the driven equipment.

F. Operation of the variable frequency drive shall not over stress the driven motor insulation system.

G. Each and multiple VFD/s installation/s shall meet the requirements in IEEE 519 for individual and total harmonic voltage and current distortion on both the utility and emergency generator.

H. In order to centralize responsibility and to ensure that all equipment is properly coordinated, the VFDs specified under this Section shall be obtained from the driven equipment suppliers.

I. All VFDs that comprise a given system shall be similarly equipped. Similar components of each system shall be the product of a single manufacturer.

J. All materials, equipment and parts comprising the each VFD shall be new, of current manufacture and of the highest grade. All components shall be covered by the manufacturer's standard warranty on new VFDs.

K. The VFD manufacturer shall have complete parts and service facilities and a factory-trained serviceman, located within a hundred miles of the project site, available on a 24-hour basis. Services shall be readily available so to avoid long periods of interruption or require extensive spare parts inventory.

L. Unless otherwise authorized by the Engineer, the manufacturer's service representative shall be direct employee of the equipment manufacturer, with at least five (5) years of experience in the installation, testing and startup of equipment specified herein.

M. Manufacturer's sales and marketing representatives shall not be accepted as manufacturer's service representative

N. The VFD manufacturer shall use a shop test facility that has recently calibrated testing apparatus and qualified, experienced technicians, for all shop tests.

O. Calibration of testing apparatus shall be within one year.

P. All test equipment and instrument calibration shall be in accordance with the latest edition of the accuracy standard of the NIST.

Q. Field Tests:

1. VFDs shall be field tested. Field testing shall be performed in accordance with the requirements specified under this Section.

2. Retain the services of the VFD manufacturer for field service. 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 technical information which shall include:

a. Dimensional information and construction details of enclosures. Enclosure details shall consist of exterior and interior front door with nameplate legends, interior door front and rear views and terminal block layout.

b. Three-line power and control schematic diagrams.

c. Technical specifications.

d. Catalog cuts.

e. Wiring diagrams showing the interconnection of conductors to remote devices with terminal assignments.

f. Harmonic analysis which shall include all voltage and current harmonics up to the 49th.

3. Description of shop and field testing methods and procedures, and apparatus with calibration dates shall be submitted.

4. Testing methods and procedures shall be submitted at least 90 days in advance prior to conformation of witness testing dates and actual testing.

5. Qualifications of proposed service firm who will perform the service and maintenance agreement. Five recent references with phone numbers shall be submitted.

B. Certificates of Compliance

1. Certification letters from the VFD and motor manufacturers that the approved driven equipment has been reviewed and that the VFDs and motors are compatible and shall be provided in accordance with the requirements specified.

C. Reports

1. Manufacturer's written determination as to whether reforming of DC bus capacitors is required before the commencement of Field Tests

2. Shop test and field test reports shall be submitted.

3. Manufacturer's site visit report shall be submitted.

D. Software

1. Software shall be submitted and provided to permit the Engineer or other selected authorized personnel:

a. To set or modify VFD parameters

b. Perform analysis of VFD operation

c. View and analyze VFD faults.

E. Operation and Maintenance Manuals

1. Operation and Maintenance Manuals shall be submitted in accordance with this Section and the Specifications.

1.08 DELIVERY, STORAGE, AND HANDLING

A. VFDs shall be delivered, stored and handled in accordance with this Section and the Specifications, the manufacturer's instructions and the following:

1. VFD equipment shall be inspected for shipping damage or loose parts when received.

2. Evidence of water which may have entered equipment during transit shall be checked for.

3. VFD equipment shall be stored in a clean, dry location in which a uniform temperature is maintained. Equipment shall be protected with coverings and air circulation shall be maintained.

4. Where dampness or condensation may be encountered, heaters shall be provided for equipment to prevent moisture damage.

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 the VFD 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. Spare parts shall be furnished and shall include one set for every four drives installed per horsepower rating. Each spare part set shall consist of the manufacturer's recommended spare parts inventory and shall include at a minimum the following:

1. One set of transistor and diode modules with accessories

2. One power supply module

3. One set of fans

4. One set of power fuses of each size and type used.

5. Two sets of control power fuses of each type and size used.

6. Two per ten of pilot lights of each type used.

D. A rugged portable microprocessor based viewer shall be provided to run software provided to set or modify VFD parameters, perform analysis of VFD operation and view and analyze VFD faults.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. VFDs shall be as manufactured by:

1. Siemens-Robicon, Alpharetta, GA;

2. Schneider Electric, Andover, MA;

3. ABB, New Berlin, Wisconsin;

4. Eaton Corporation;

5. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Enclosure

1. Each VFD shall be mounted within a Vendor Control Panel enclosure in accordance with the requirements of Section 46 21 12 Mechanically Cleaned Bar Screens.

2. Each enclosure shall provide adequate cooling for the components within and shall include positive ventilation.

3. Each enclosure shall include a circuit breaker disconnect switch. The switch handle shall be suitable for padlocking and shall be through-the-door type. Operation of the switch shall remove the service supply from all internal components. Power devices shall be suitable for the interrupting capacity shown on the Contract Drawings. Include current limiting semi-conductor fuses where required for protection of solid state components.

4. Each enclosure door shall include an operator interface for access to controller's digital keypad and display.

5. The enclosure shall have identifying nameplates in accordance with the requirements of Section 26 05 53 Identification for Electrical Systems.

6. Each enclosure shall be equipped with phenolic type terminal blocks suitably labeled for all internal and remote wiring requirements plus 20 percent spare.

B. Adjustable Frequency Controller

1. General

a. The adjustable frequency controller shall be microprocessor-based, pulse width modulated design, suitable for operation on a low-voltage, 3 phase, 60 Hz supply.

b. The controller shall produce an adjustable AC voltage/frequency output to vary the speed of the driven equipment and maintain the drive motor V/Hz rating.

c. The controller shall consist of

1) A power factor /harmonic filter unit (if required)

2) 6 pulse, minimum, diode-bridge converter fed by rectifier-grade phase-shifting transformer.

3) A fixed DC bus section

4) A 3 percent DC bus reactor or input line reactor.

5) An IGBT based power transistor inverter output section.

d. The controllers' solid state converter input section switching devices shall have a 1600-volt PIV rating.

e. The controller shall have an overload rating of 110 percent variable torque, 150 percent constant torque for one minute.

f. The VFD shall be sized to provide, indefinitely, motor load current equal to 125 percent of the screen motor's direct on line (DOL) motor nameplate full load current and shall be suitable for use with constant torque loads.

g. RMS harmonic content of output current shall be less than 5 percent of fundamental current.

h. Controller shall be able to withstand output terminal line-to-line short circuits without component failure.

2. Operating Criteria

a. The controller's operating criteria shall be in accordance with the following:

1) Ambient temperature range shall be 0 degrees C to 40 degrees C.

2) Operational humidity shall be up to 90 percent non-condensing.

3) Altitude shall be below 3,300 feet above sea level.

4) Nominal input voltage variation shall range from plus 10 percent to minus 10 percent.

5) The controller shall include an undervoltage feature to permit trip-free operation down to 35 percent undervoltage.

6) Nominal frequency shall be 60 Hertz plus or minus 3 Hz.

7) Input power factor shall be 95 percent displacement power factor at all operating speeds.

8) Efficiency shall be a minimum of 96 percent at full speed and full load.

9) Losses in the efficiency calculations shall include those of the input transformer, harmonic filter and power factor correction if applicable, convertor, output filter if applicable, auxiliary controls, internal boards and cooling equipment.

3. Features

a. The controller shall have features in accordance with the following:

1) Digital keypad and display module shall provide parameter setting, adjustments and monitoring of control functions and faults. Display messages shall be in English.

2) Serial communication port shall allow connecting to a programmable logic controller interface.

3) Independent acceleration/deceleration rates shall provide 2 to 600 seconds minimum. When called to stop, the motor shall decelerate to minimum speed before stopping.

4) Power loss feature shall allow ride through capability.

5) Time delay automatic restart shall allow restart after controller fault conditions with programmable attempts.

6) Coasting motor restart shall permit the controller to restart into a coasting motor without damage or tripping.

7) The coasting motor restart feature shall allow switching from bypass mode to VFD mode while operating without shutdown.

8) Control inputs and outputs shall be isolated.

4. Protection and Logging of faults

a. The controller shall have protective functions in accordance with the following:

1) Input line surge protective device shall provide transient protection.

2) Electronic over-current trip shall provide instantaneous and inverse time overload protection.

3) Over-temperature trip shall provide temperature protection.

4) Current limit trip shall provide current protection.

5) Input line over and under voltage trip shall provide voltage protection.

6) Ground fault trip shall provide ground protection.

b. The controller shall have a built-in fault log in accordance with the following:

1) All faults shall be retained indefinitely in the log.

2) The date and time of each fault shall be part of the information describing the fault.

3) It shall be possible to download the complete fault log into a CSV file for off controller analysis.

C. Output Filter

1. General

a. An output filter shall be provided to prevent overstressing the motor insulation system. An output filter shall be included for each VFD, whenever the cable length between the motor and VFD exceeds the following based upon the noted switching frequencies.

1) 1 KHZ switching frequency, 200 feet cable length.

2) 3 KHZ switching frequency, 175 feet cable length.

3) 12 KHZ switching frequency, 100 feet cable length.

b. Output filters shall be provided in all other cases, based upon the recommendations of the VFD and motor manufacturer's, whenever the actual voltage peaks at the motor terminals exceed the NEMA-MG1 limits.

2. Filter Design:

a. The filter shall be three phase, low-voltage class motor-protecting type consisting of suitable values of inductance, capacitance and resistance to form a damped, low pass filter.

b. The filter shall be a low-loss type specifically designed to reduce the voltage wave form dV/dT. The filter shall allow cable lengths at minimum exceeding the actual application distances with a waveform resulting in voltage spikes at the motor terminal which are within the NEMA-MG1-Part 31 voltage stress levels.

c. The filter shall be suitable for mounting within the VFD enclosure.

D. Bypass Contactors

1. General

a. Each VFD shall be provided with contactor bypass capability. The bypass equipment shall be suitable for mounting within the VFD enclosure.

b. The bypass configuration shall consist of output and bypass contactors, as well as a line side isolation contactor.

c. The bypass arrangement shall permit full speed operation of the driven equipment while maintaining complete isolation of the adjustable frequency controller.

2. Contactors

a. Contactors shall be single-speed full voltage, electrically operated, 600-volt, 3-pole, industrial duty with ampere ratings as required for the driven equipment.

b. Contactors shall have removable main contacts, 120-volt magnetic coil and interlocking contacts. Interlocking contacts shall be arranged to prevent the output and bypass contactors from being closed at the same time.

c. The bypass contactor shall include a VFD/bypass selector switch and associated controls for manual selection of operating mode. The bypass contactor shall also include a transfer timer. The timer shall

provide an adjustable off delay whenever switching from VFD to bypass.

3. Overload Relays

a. Overload relays shall be provided to monitor each phase and neutral of the bypass circuit of each VFD.

b. Overload relays shall be solid-state, multichannel, multifunction type for use with or without current sensors.

c. Overload relays shall include ambient temperature compensation and shall be sized for the full load amperes and service factor of the actual motors furnished.

d. Overload relays shall have the capability to manually reset its functions and shall include a normally open and normally closed auxiliary contacts for alarm indication.

E. Controls

1. General

a. Each VFD control system shall be equipped with all control and pilot devices and other components required for a complete functional system.

b. Each VFD control shall be powered from a suitably sized and protected control power transformer.

c. Each VFD control shall include status indicators, controller and system fault condition displays and operating controls.

d. Status indicators and operating controls associated with the drives control shall be installed on the front door of the enclosure.

e. The control arrangement shall be such that the VFD internal electronic supply voltage is isolated from all field wiring.

2. Control and Pilot Devices:

a. Relays shall be standard, latching type and solid state time delay type.

b. Relays shall be provided with contacts rated 10 amp with number as required.

c. Pilot devices shall be heavy duty type, rated 10 amp continuous.

d. Indicating lights shall be push-to-test transformer type with 12-volt secondaries.

F. Auxiliary Features:

1. Each VFD shall be provided with the following auxiliary features.

a. Status indicators shall include separate pilot lights for indication of

1) Motor run – Red.

2) Control power on - White.

3) Bypass mode - Blue.

b. Shutdown and alarm indicators shall include separate pilot lights

1) Amber for each of the shutdown and alarm condition.

c. Shutdown indication circuitry shall be arranged such that when activated, the indicator will require manual reset.

d. Contact outputs shall include separate dry contacts for remote indication of motor run, each shutdown condition and controller faults.

e. Speed output shall include a 4-20 MA signal for remote indication of motor speed.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Finishes

1. All metal surfaces of the VFD shall be thoroughly cleaned and given one coat of zinc chromate primer.

2. All interior surfaces shall then be given one shop finishing coat of a nitro-cellulose lacquer enamel.

3. All exterior surfaces shall be given three coats of the same lacquer. The color of the exterior finishing coats shall be light gray ANSI No. 61.

4. All printed circuit boards shall be coated with a conformal coating to provide protection for all components.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Certified Shop Tests:

1. Shop testing shall be performed at the VFD manufacturer's plant prior to shipment.

2. Shop test shall demonstrate that the equipment tested conforms to the requirements specified.

3. Manufacturers standard factory tests shall be performed on each VFD and shall in addition include:

a. Operating the VFD with a motor of ratings similar to the driven equipment motor through all of the speed and load ranges in a heated environment for a minimum of two hours.

b. Simulation of each control signal and each alarm function to verify proper and correct drive action.

4. The Contractor shall provide a Shop Test Report. The report shall identify the tests performed and the results obtained.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

Not Used

3.02 INSTALLATION

A. VFD equipment shall be installed in accordance with manufacturer's instructions and recommendations, the approved working drawings, and the requirements specified in Section 01 73 17 – Installation of Equipment.

B. VFD equipment shall be installed so that sufficient access and working space is provided for ready and safe operation and maintenance.

C. VFD equipment shall be mounted within a Vendor Control Panel in accordance with Section 46 21 12 – Mechanically Cleaned Bar Screen.

D. Install nameplates for identification of equipment.

3.03 FIELD TESTING / QUALITY CONTROL

A. After installation, VFD shall be field tested for operation and conformance. The Contractor shall perform field tests in accordance with this Section and Specifications.

B. VFD testing shall be performed by the manufacturer's representative, prior to energizing equipment.

C. Equipment shall not be energized without the permission of the Engineer.

D. The testing shall be in accordance with the recommendations of the manufacturer's representative and shall consist at a minimum of the following:

1. Manufacturer’s determination of whether the reforming of DC bus capacitors is required,
2. Device settings and drive adjustments shall be verified.
3. Mechanical and electrical interlocks shall be inspected and controls shall be checked for proper operation.
4. Each drive shall be tested through the specified speed ranges and loads for a minimum of two hours.
5. Each drive shall be tested by using the actual control signal for remote and local operation.
6. Each drive alarm function shall be tested.
7. Tests to verify the Harmonic analysis submitted. Test shall be conducted at the input to the drive and shall be conducted with and without the VFD operating.

E. 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 generator sets, check the generator set 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 City's operations and maintenance staff in the care, operation and maintenance of the generator sets.

2. The Contractor shall provide equipment start-up services and training in accordance with this Section, the Specifications and the Contract Drawings and the following requirements:

   a. Minimum number of manufacturer's representative site visits per type of generator set:

Construction Phase	No of Visits	Person-days per visit
Installation	5	2
Field Tests	3	2
Training	3	2

3. Any additional time required to achieve a successful installation shall be at the expense of the Contractor.

4. The Engineer shall have the right to reallocate any unused person-days.

5. 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.

6. 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.

3.04 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 TI-181

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 33 - Raceways and Boxes for Electrical Systems

1.04 REFERENCES

A. Reference Standards

B. 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 844	-	Electric Lighting Fixtures for Use in Hazardous Locations.
12.	UL 894	-	Switches for Use in Hazardous Locations.
13.	UL 924	-	Emergency Lighting and Power Equipment.
14.	UL 1010	-	Electrical Receptacle - Plug Combinations for Use in Hazardous Locations.
15.	UL 1598	-	Luminaires
16.	UL 8750	-	Light Emitting Diode (LED) Equipment for Use in Lighting Products.

17. CBM - Certified Ballast Manufacturers, CBM.

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 and ballasts.

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 or ballasts 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. Ballast type and technical information.

6. Driver type for LED luminaires and technical information including input voltage, power factor, Crest Factor and THD.

7. Scaled Shop drawings showing the locations of all fixtures and devices. The Drawings shall include the proposed routing of the branch circuits.

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. 10 percent lamps, lamp module or array shall be provided of each wattage of each type of lamp, lamp module or array but not less than the requirement for two luminaires.

2. Where the lamp, lamp module or array is an integral part of the luminaire and the lamp, lamp module or array is not normally replaceable provide spare luminaires instead.

3. 5 percent ballasts or drivers shall be provided of each type of type of ballast or driver, but not less than two.

4. 5 percent total fuses for each luminaire type and size but not less than one set for each size.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Lamps shall be as manufactured by:

1. Cree, Durham, NC;
2. Nichia America Corporation, Wixom, WI;
3. GE Lighting, Cleveland, OH;
4. Osram Sylvania, Wilmington, MA;
5. Or approved equal.

B. Drivers and Ballasts shall be as manufactured by:
1. Osram Sylvania, Wilmington, MA;
2. Universal Lighting Technologies Inc., Nashville, TN;
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. Lutron Electronics Company, Coopersburg, PA;
4. Or approved equal.

D. General use switches shall be as manufactured by:
1. Hubbel Incorporated, Shelton, CT;
2. Arrow-Hart Incorporated, Chicago, IL;
3. Lutron Electronics Company, Coopersburg, PA;
4. Or approved equal.

E. Hazardous location switches shall be as manufactured by:
1. Crouse-Hinds Company, Syracuse, NY;
2. Appleton Electric Company, Rosemont, IL;
3. Or approved equal.

F. Plates shall be as manufactured by:
1. Hubbel Incorporated, Shelton, CT;
2. Arrow-Hart Incorporated, Chicago, IL;
3. Lutron Electronics Company, Coopersburg, PA;
4. Or approved equal.

G. Covers shall be as manufactured by:
1. Crouse-Hinds Company, Syracuse, NY;

2. Appleton Electric Company, Rosemont, IL;
3. Southwire Company, Carrollton, GA;
4. 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. Explosion-proof type luminaires shall comply with the requirements of the NYCEC for the hazardous locations indicated on the Contract Drawings.
7. 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.
8. 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 ballasts or 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.

C. Drivers and Ballasts

1. General:

a. Ballasts and Drivers shall be matched for proper operation of lamps and shall meet the requirements for luminaire light output, reliable starting and operation.

b. Ballasts and 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.

c. Ballasts shall be UL listed and certified by approved Nationally Recognized Testing Laboratories (NRTL). Testing Laboratories and shall conform to CBM.

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. 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.

3) Unless specifically shown otherwise or stated in the Detailed Specifications explosion proof devices in hazardous locations shall comply with the requirements of the NYCEC for Class I, Division 1, Group D locations.

4. 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.

5. 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.

b. Switches for hazardous locations shall be factory sealed tumbler type. The switch body and cover shall be cast gray iron alloy or cast malleable iron with zinc electroplate finish.

6. 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. Pendant 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. 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, except in hazardous locations where receptacles shall be mounted 4 feet-6 inches 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. 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. Not Used

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

SECTION 27 13 23.21 – MULTI MODE FIBER OPTIC PROCESS CONTROL NETWORKS
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. This section specifies requirements for indoor/outdoor rated multi-mode fiber optic data communication cables including installation, terminations, termination cabinets, testing, and accessories.

2. Provide tools, supplies, materials, equipment, test equipment and the labor for the raceways system, cable installation, and testing of a complete and operable fiber optic cabling system as specified herein on the Cable Specification Sheets.

3. Provide fiber optic cable with each fiber usable and tested as specified herein.

4. Provide the fiber optic cable splices and appurtenances required to complete the fiber optic cabling system. Appurtenances are specified herein.

5. Refer to the Contract Drawings and Contract Drawing notes for specific requirement for the project, since not all specified products, methods, and procedures are applicable to the project.

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 33 00 – Submittal Procedures

B. Section 03 30 00 – Cas-in-Place Concrete

1.04 REFERENCES

A. Not used.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. Manufacturer:

1. Equipment and cabling shall be the product of firms regularly engaged in the design and manufacturer of equipment and cables for a minimum of five years. Manufacturer shall have minimum of seven years experience and shall be ISO 9001 certified.

B. Installer:

1. Installation, termination, and testing of equipment and cabling provided under this section shall be performed by qualified, skilled technicians regularly engaged in fiber optic cabling system work of similar complexity and who possess the licenses or certificates required to perform such work.

C. References:

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI/ICEA S-87-640	Standard for Optic Fiber Outside Plant Communications Cable
BELLCORE GR-20-CORE	Generic Requirements for Optical Fiber and Optical Fiber Cables
BELLCORE GR-409-CORE	Generic Requirements for Intrabuilding Fiber Cable
BELLCORE GR-487-CORE	Generic Requirements for Electronic Equipment Cabinets
BELLCORE GR-771-CORE	Generic Requirements for Fiber Optic Splice Closures
ISO-9001	Quality Management Systems
ANSI/NECA 301	National Electrical Contractors Association – Standard for Installing and Testing Fiber Optic Cables
NFPA 70	National Electric Code (NEC)
TIA/EIA-455-86	FOTP-86 Fiber Optic Cable Jacket Shrinkage
TIA/EIA-455-107A	FOTP-107 Determination of Component Reflectance or Link/System Return Loss Using a Loss Test Set

TIA/EIA-492AAAC	Detail Specification for 850 nm Laser-Optimized, 50μm Core Diameter/125 μm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers
TIA/EIA-526-14	Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
TIA/EIA-598-B	Standard for Optical Fiber Cable Color Coding

D. Factory Test:

1. Manufacturer's factory testing shall be conducted for all fiber optic cable reels provided for this Contract. Test documentation shall include the following:

   a. Optical Time Domain Reflectometer (OTDR) measurement of the fiber length.

   b. OTDR measurement of average attenuation.

   c. Traces of OTDR measurements taken.

   d. Visual Tracer for short distance cable fault detection.

E. Certification:

1. Splicing, terminating, and testing shall be conducted by Fiber Optics Association Certified Fiber Optic Technicians (CFOT).

1.07 SUBMITTALS

A. The following information shall be submitted for review in accordance with Section 01 33 00 – Submittal Procedures:

1. Product Literature:

   a. A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.

   b. A check mark (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Construction Manager shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up

specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

2. A copy of the contract document, fiber-optic network system block diagrams, cabinet and panel drawings, control single-line diagrams, and process and instrumentation diagrams that apply to the equipment in this section marked to show specific changes necessary for the supplied equipment.
   a. If no changes are required, the Contract Drawings shall be marked "No Changes Required."
3. Manufacturer's specifications, data sheets, and catalog literature for the indoor/outdoor rated fiber optic cable that clearly and unambiguously shows that the cable meets all the requirements specified herein.
4. Manufacturer's catalog literature and catalog data sheets for the following items, marked to indicate products proposed, as applicable to the project:
   a. Fiber optic cables including manufacturers' maximum recommended pulling tension.
   b. Fiber optic cable termination connectors
   c. Fiber optic patch cords
   d. Fiber optic termination panels
   e. Fiber optic adapter plug-in
   f. Fiber optic patch cord storage
   g. Fiber optic cable clamp kit
   h. Connector/Adapter cleaning kit
   i. Protective tubing for fiber optic patch cords
   j. Cable pulling grips, swivel, and lubricant
5. Shop drawings:
   a. Termination panel fabrication and layout drawings with complete list of materials and nameplate engraving list.
   b. Interconnection cable diagrams for the complete system, showing each fiber in each cable. Each termination point shall be clearly marked.

B. Qualifications:

1. Contractor's experience and resumes for the personnel installing and testing the fiber optic system including factory training certifications.

2. Information on five successfully performed cable installations of comparable size and complexity with name, address, and telephone number of facility owner, name of project and completion date, and type of conduit system and length of cable pulled.

3. Proof of certification for splicing, terminating, and testing personnel per paragraph 1.06 E Certification.

C. Fiber cable pulling plan as specified in Part 3.

D. Test plan as specified in Part 3.

E. Submit cable samples for review that include the specified cable marking.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not used.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not used.

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Not used.

2.02 MATERIALS / EQUIPMENT

A. Not used.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

2.05 GENERAL

A. Provide fiber optic cable jacket free of holes, splits, and blisters with no metal elements and of a consistent thickness.

2.06 CONDUIT

A. Provide 2-inch diameter PVC Schedule 40 conduit

2.07 PULL BOXES

A. Unless otherwise shown, provide pull boxes with the approximately dimensions of 36 inches wide by 48 inches long, by 18-inches deep with hollow bottoms, designed for H-20 traffic loading.

B. Pull box covers shall be galvanized steel with the words "FIBER OPTICS" in raised letters on the upper surface. Covers shall have locking devices and form a watertight seal to prevent surface water from entering. Knockouts in the sidewalls shall permit underground conduit side entry and exit.

C. Pull boxes shall by George Ingraham, Vikamatic, or equal.

2.08 CONDUIT SEALANT

A. Conduit sealant shall be Semco duct sealing compound, or equal.

2.09 IDENTIFICATION TAPE

A. Provide a 6-inch wide magnetically detectable warning tape with orange protective polyethylene jacket. Provide polyethylene tape continuously imprinted "CAUTION-FIBER OPTIC CABLE".

B. Warning tape shall be Teletrace by George Ingraham, Vikamatic, or equal.

2.10 TRACER WIRE

A. Provide a #12 AWG XHHW insulated green stranded copper wire with a multi-pin terminal block for termination of the tracer wire in concrete manhole / pullbox for tracer wire access.

2.11 PULL ROPE

A. Provide a low friction, polyethylene jacketed, polypropylene rope with 1,800 psi of tensile strength.

B. Pull rope shall be Vikamatic "Fiber Glide" or equal.

2.12 SLACK ENCLOSURES

A. Provide slack enclosure with minimum inside dimensions of 30 inches x 24 inches x 9-1/2 inches.

B. Slack enclosure shall be Carlon SLK 12 or approved equivalent.

2.13 DUCT PLUGS

A. Duct Plugs shall be Jackmoon or equal.

2.14 CABLE IDENTIFICATION TAGS

A. Provide identification tags:

“From: _____ To:_____Circuit:_____Purpose:_____”.

B. Cable identification tags shall be manufactured by Brady or Thomas & Betts, or equal.

2.15 FIBER OPTIC BUFFERED CABLE CONNECTORS AND PATCH CORDS

A. General:

1. Provide preparation for the connections including polishing, connectors, hardware, cleaving tool, continuity tester, visual fault locator, and supplies for installation of connectors. Multimode terminations shall be LC type. Fusion-spliced pigtails are not acceptable.
2. Fiber optic cable connections shall be Unicam-type with ceramic ferrules, polycarbonate not acceptable.

B. Connector Characteristics:

1. Connectors shall be specifically designed for fiber optic buffered cables specified herein.

C. Patch Cord Characteristics:

1. Patch cords shall be 3.0 mm single coated duplex fiber with jacket and connectors on both ends. Attenuation shall be a maximum of 0.3 dB. Provide length required for connection from patch panel to equipment.
    a. Color:
        1) Orange.

2.16 FIBER OPTIC PANELS

A. General:

1. Fiber optic patch panels shall consist of a system of components for routing, supporting, and terminating the fiber optic cables specified herein.

B. Description:

1. Provide the following:
    a. Wall-mounted type fiber optic patch panels constructed of aluminum or steel with removable hinged metal doors, slide rails that permit the patch panel to slide in and out of the unit while being fully supported.
    b. Mounting hardware, cable clamps and grommets, cable routers, storage decks, connector racks, and items for a complete system.
    c. Machine printed port labeling system.
    d. Cable routers and storage decks to retain cables' minimum bending radius.
    e. Sufficient quantity of ports to terminate the number of fiber strands specified and blank covers for unused port spaces.
    f. One port for each fiber in accordance with the specified cable type.

2.17 PRODUCT DATA

A. The following information and product data specified shall be provided in accordance with Section 01 33 00 – Submittal Procedures.

1. Factory test results as specified in paragraph 1.02.

2. Cable pull records as specified in Part 3.

3. Results of all tests specified in Part 3.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not used.

3.03 FIELD TESTING / QUALITY CONTROL

A. General:

1. Perform field tests on each fiber of each cable and tested for breaks, abnormalities, and attenuation characteristics for the attenuation specifications specified herein.

2. Construction Manager shall witness testing and final checkout of the fiber optic system to determine fiber-optic cable system acceptability.

3. Submit the test results in accordance with paragraph 1.06 D.

B. Test Equipment:

1. Test equipment shall have a calibration sticker indicating the equipment has been calibrated within the preceding 6 months.

2. Equipment for testing of the fiber optic cable; testing equipment shall be supplied and will remain the property of the Contractor unless otherwise specified:

a. Fiber Optic Test Set:

1) Corning Cable Systems Multimode MD55, LTK-400MD, or equal.

b. Optical Time Domain Reflector (OTDR):

1) GNNettest Mini-OTDR Model 7500, Corning Cable Systems OTDR Plus 838-MD55-SRSD55 with plug-in module for multi-mode cable, or equal.

c. Fiber Optic Telephone Set:

1) Corning Cable Systems FTS-110, or equal.

d. Jumpers, connectors, adapters, 1-km backscatter suppression kit, attenuators, and miscellaneous items.

C. Pre-Installation Test:

1. After delivery and before cable installation, generate an end-to-end OTDR trace for each multimode fiber at 850 Nm wavelengths using the index of refraction for that fiber.

2. Use a 1-kilometer backscatter suppression fiber with a splice index-matching gel and submit traces that for the total optical length.

3. Submit test documentation within 5 days after the delivery test.

4. Replace cables that do not meet the performance levels of the manufacturer's factory tests at no additional cost or change in the completion schedule.

D. Post-Installation Tests:

1. Fibers shall be tested end-to-end after cable installation with an end-to-end OTDR trace made at 850 Nm wavelengths and record total optical length.

2. Use a 1-kilometer backscatter suppression fiber for OTDR testing.

3. For each 850 nm installed multimode optical fiber, the measured optical power loss in dB shall not exceed the following:

4. Measured loss less than: (0.0030)L + (0.30)N + (0.4)C + 3.00 dB

5. Fiber optic cables containing fibers not meeting the specified power loss shall be repaired or replaced.

E. End-To-End Olts Attenuation Verification:

1. Test each optical fiber for end-to-end attenuation with an Optical Loss Test Set (OLTS) after the cable is installed with a stabilized optical source and power meter.

2. Test shall be conducted per TIA/EIA 526-14 Method "B."

3. Measured loss: Value of the reference measurement minus the algebraic average of the separate measurements.

4. Fiber optic cables containing fibers not meeting the specified optical power loss shall be repaired or replaced.

F. Site Acceptance Inspection: Perform inspection of the following:

1. Fiber splices:

a. Neatly organized.

2. Connectors:

a. Capped and undamaged.

3. Cabling:

a. Organized with no excessive bending.

4. Cable entrances to the cabinets secured.

5. Unused cable delivered to the City.

G. Identify cables with the directories installed in each fiber cabinet. Discrepancies found during the inspection of the fiber installation shall be noted. Inform the Construction Manager upon resolution and completion of the noted items.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not used.

3.06 RACEWAY SYSTEM

A. Conduit Installation:

1. Conduit bends shall have a radius of 24 times the conduit diameter. Conduit sections shall be joined in accordance with the manufacturers' recommendations and shall be watertight.

2. Conduits entering pull boxes shall be capped or sealed watertight. Conduits entering access concrete manholes and vaults shall be terminated with flush end bells. Provide bushings on ends of conduits entering pull boxes.

3. Annular spaces around the conduit and precast unit walls shall be grouted. Bedding and backfill shall be as specified for the pipeline trench.

4. Concrete encasement shall be red concrete in accordance with Section 03 30 00 – Cast-in-Place Concrete placed at least 4 inches thick below and above the conduit.

5. Provide identification tape above underground conduit along the entire length of the conduit route.

6. Provide duct plugs to seal the ducts and to seal empty or spare conduit at the entrance of each pullbox/concrete manhole/vault.

7. Provide blank duct plugs to seal empty or spare conduit and innerduct in each pullbox/concrete manhole/vault.

8. Provide and install fiber cable identification tags in each access vault, pullbox, and/or vault

9. Tracer wire shall be installed in the trench with fiber optic cable conduit and at pullbox / manholes with ten feet of tracer wire coiled and secured as specified herein.

B. Pull Box Installation:

1. Pull boxes shall be installed on a compacted level foundation consisting of 4 inches of granular material. Backfilling around pull boxes shall not be done until mortar sealant has thoroughly set.

2. Install the pull box covers with the top of the cover flush with the finished grade. Install pull boxes in soil areas with top of the cover 3 inches above the final grade level of the restored surface to prevent accumulation of dirt, silt and debris on the top of the cover. Perform conduit integrity tests for each section between the pull boxes after backfilling and compaction using the test and procedures described in this Section, prior to installation of the pull rope.

3. Pull boxes shall be free of debris and water, ready for cable installation upon final acceptance of the conduit system. Pull box conduit entries shall be sealed with grout to prevent the intrusion of water and debris into the pull boxes. Use red urethane: Greybar catalog #02044 or equal.

C. Conduit System Cleaning And Testing:

1. Conduits shall be cleaned of loose material by brush and compressed air following the backfill placement and compaction. Provide a test mandrel approximately 3/8 inch smaller than the inside diameter to be passed through conduits to detect alignment and deformation problems. Remove and replace conduit that fails the mandrel test. The replacement conduit shall then be cleaned and tested as described herein.

2. Cleaning and testing of the conduit shall be witnessed by the Construction Manager for conduit sections between adjacent pull boxes or manholes for the entire conduit route. Provide 5-day advance notice of the schedule and test location to the Construction Manager.

3.07 FIBER OPTIC CABLE INSTALLATION

A. Fiber Optic Cable Installation Pulling Plan:

1. Submit 30 days prior to cable installation.

B. Air assisted cable placement method using high speed air blowing, push-pull, cable jetting plan with the procedure, the equipment setup, and a work plan.

C. Work plan shall include the following:

1. Pull tension calculations.

2. Indicate additional pull boxes required, including station number and a written description of the location.

3. Detailed description of pull operation methods for raceways.

4. Tools and equipment for cable installation and testing

5. Physical location of equipment setup and type
6. Safety Plan and cable pulling operations
7. Detailed schedule for pulling and testing cables

D. Fiber Optic Cable Installation:

1. The installation of the fiber optic cable shall be performed and supervised by workers each possessing a minimum of three years experience in the installation, termination, and testing of fiber optic cable systems of the type specified herein. Installation shall be in accordance with cable manufacturer's recommendations. Prior to installation, perform delivery testing on fiber optic cables.
2. Notify the Construction Manager 5-days prior to fiber optic cable pull. Installation equipment and methods shall be reviewed and approved prior to installation.
3. Provide woven grips to pull the cable with minimum length of 18 inches and applied to the cable in conformance to the cable manufacturer's standard recommendations. Provide swivels between the pulling line and cable pulling grip to prevent twisting under strain. Provide shear or tension pins with a breaking strength of 600 pounds. Install cable using a hydraulic capstan or winch equipped with a recording dynamometer to measure the pulling tension to maintain a constant pulling force.
4. Pulling equipment shall be equipped with a hydraulic bypass set for 600 pounds pulling force. The dynamometer shall be connected and operational before pulling operation. Provide bull wheels, blocks, split wheels, cable feeders, and equipment for clean and safe operation.
5. Cable reel shall be positioned at the feed point in alignment with the raceway so the cable passes from the top of the reel in a long, smooth bend into the raceway system using a cable feeder.
6. Place a rim roller with a wheel radius greater than the minimum cable bending radius at the manhole or vault opening to prevent the cable from dragging on the manhole rim or steps.
7. Cable pull records shall be documented by a graph which is annotated with the following information:
    a. Reel number.
    b. Station or pullbox from and station or pullbox to.
    c. Date and time.
    d. Explanations for abnormalities in readings or interruptions.
    e. Sign-off by Contractor and Construction Manager.

f. Submit fiber optic pull records as specified herein.

8. Racking shall conform to the following:

a. Loosely secure innerduct/cables in racked position with Ty-Raps or equal.

b. Attach imprinted plastic coated cloth identification/warning tags to the innerduct/cable in at least two locations in each pullbox/concrete manhole/vault.

c. Provide tags manufactured by Brady or Thomas & Betts.

E. Protect coiled cable to prevent damage to the cable and fibers with racking securing cables to brackets and racking hardware that extend from the sidewalls of the handhole. When cables are securely racked, unused conduits and void areas around conduit containing cables shall be sealed. In concrete manholes and vaults, coiled cable shall be placed into a slack enclosure to prevent damage to the cable and fibers.

F. A minimum of 20 feet fiber optic cable service loop shall be used at each end of termination. Cable ends shall be sealed with temporary caps during installation, up to the time when they are terminated. Each end of the cable shall be clearly labeled.

3.08 FIBER OPTIC CABLE TERMINATIONS

A. Prior to beginning the splicing, provide a work area to protect the cable splices from physical damage.

B. Work shall be performed by trained and qualified technicians in accordance with the manufacturer's recommendations in the performance of installation, splicing and termination work.

C. Active and spare fiber optic cables fibers shall be provided with a breakout kit, and terminated with ST type terminations.

D. Active and spare fiber optic cables fibers shall be provided with a breakout kit, terminated with ST type terminations, and connectors finished with an automatic polishing machine such as Corning SP500 Automatic Polisher or equal.

3.09 CABLE SPECIFICATION SHEETS (CABLESPEC)

A. General:

1. Cable types for different locations, service conditions, and raceway systems are specified on individual cable specification sheets. Cables that are scheduled herein shall be installed in accordance with the CABLESPEC SHEETS.

2. Multi-mode fiber optic cables shall meet the requirements of the referenced ANSI, ICEA, ITU, TIA, and EIA standards for outside plant data communications cable.

B. Cablespec Sheets:

1. The following CABLESPEC sheets are included in this section:

Type	Volt	Product	Purpose
FOC-MM	300	FIBER OPTIC CABLE INDOOR/OUTDOOR	DATA COMMUNICATION

3.10 CABLE SPECIFICATION SHEET CABLESPEC – FOC-MM

A. Cable System Identification:

1. FOC-MM

B. Description:

1. Multimode Fiber Optic Data Cable; 6-pair fiber conductor.
2. Outdoor; Heavy Duty-MFPT; Cable Tray Rated.
3. Loose tube construction. Optical fibers shall not adhere to the inside of the buffer tube.
4. Fibers and buffer tubes shall be color coded with distinct and recognizable colors in accordance with EIA/TIA-598-B.

C. Material:

1. 62.5/125/250 micron.

D. Jacket:

1. Chlorinated Polyethylene (CPE); Color: Orange or Black
2. Mark the exterior sheathing with the manufacturer's name, month and year of manufacture, and sequential meter or foot markings for easily determining the length of the cable at all points along the cable run.
3. Provide a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code® (NESC®), fiber count, and fiber type.

E. Type:

1. OFNR with industrial cable tray rating and IEEE flame test rated: 802.3Z
2. Fiber Type: Multimode
3. Clad Diameter: 125 ± 2.0 µm
4. Coating Diameter: 245 ± 5 µm
5. Core Diameter: 62.5 ± 2.5 µm
6. Attenuation:

a. ≤ 3.5 db/km @ 850 nm

b. ≤ 1.0 db/km @ 1300 nm

7. Maximum Bandwidth: 200 MHz-km @ 850 Nm

8. Operating Temperature Range: -40 to +70 Deg C

9. Maximum Tensile Loading: 180 lbf

10. Minimum Cable Bending Radius: 10 x diameter

F. Manufacturers:

1. Alcoa Fujikura

2. Optical Cable Corporation

3. Corning Cable Systems

4. or approved equal

G. Execution:

1. Application: Data Communications.

2. Installation: Install in accordance with manufacturers instructions and as specified.

3. Testing: Test as specified.

END OF SECTION

SECTION 40 05 05 – EXPOSED PIPING INSTALLATION
CONTRACT TI-181

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:

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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 05.30 – Leakage Testing for Exposed Piping.

B. Section 40 05 07 – Hangers and Supports for Process Piping.

C. Section 40 05 97 - Identification for Process Equipment

D. 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.

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.

1.07 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

2. Layout and Installation Drawings:

a. Shall include plans, sections, and details showing location, elevations, and clearly marked dimensions.

b. Piece numbers which are coordinated with the tabulated pipe layout schedule shall be clearly marked.

c. The scale used shall be the greater of the following two (2):

1) The scale used on the Contract Drawings that depict the process pipe for which the submittal pertains, or

2) A minimum scale of ¼-in = 1-ft - 0-in.

d. When special designs or fittings are required, the work shall be shown in large detail and the special or fitting completely described and dimensioned.

e. Include a north arrow.

f. Information on pipe supports, including:

1) Pipe support location.

2) Pipe support type.

3) hanger rod size.

4) Insert type.

5) All loads on the support (in either lbs. or kips.)

g. Locations where pipe and valve identification signs will be placed.

h. Location of pipe couplings, specials, and adapters.

i. Location of expansion joints.

j. Locations of pipe hangers and supports.

k. Extent of pipe insulation and heat tracing.

l. Extent of lining, wrapping, and coatings.

3. 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:

   a. Service.

   b. Pipe size.

   c. Working pressure.

   d. Weight (in lbs.)

   e. Joint type.

   f. Wall thickness.

   g. Piece number.

   h. Laying length.

4. Calculations for the design of the support structures.

   a. Design calculations shall be signed and sealed by a Professional Engineer registered in the State of New York.

   b. Calculations shall include a summary of design criteria used in the design, including a description of each load case and load combination considered.

   c. A tabulation shall be provided indicating vertical and horizontal deflections for the supports and individual members, determined for each load combination identified above.

   d. A tabulation shall be provided giving the column vertical and horizontal reactions for each load combination.

5. 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.

6. 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:

   a. Valve tag number.

   b. Valve size.

c. Whether the valve is manual or actuated. If actuated, the type of actuator.

d. 100% open Cv value for control valves.

e. Upstream pressure (units of psig).

B. Information Submittals:

1. Certified Letters of Compliance:

a. Certificate of compliance with the requirements of the Contract Documents for pipe, fittings, couplings, sleeves, cleanouts and harnessing.

b. Certificate from an independent testing laboratory, approved by the City, for each welder assigned to the welding of pipe, fittings, and pipeline equipment.

c. Linings and Coatings:

1) 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.

d. Materials Certificates of Conformance: Submit certificates of conformance with Referenced Standards specified in the corresponding piping specification section.

e. 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.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Identification:

1. Provide in accordance with Section 40 05 97 - Identification for Process Equipment.

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.

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 12-in. between pipe and other work.

      3) 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.

   h. For coated pipe, care shall be exercised in laying and cradling the pipe to prevent injury to the coating.

6. 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. Pipe 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.

7. 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. 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.

8. 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.

9. Plugs:

a. Shall match the materials, linings, and coatings of the process piping, and shall have a square head.

10. 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.

11. 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.

12. 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.

13. Restraints, Supports, and Thrust Blocks:

    a. Provide concrete and metal cradles, collars, kickers, and blocks as shown on the Contract Drawings.

14. 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.

15. 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. Application guide and anchor requirements for expansion joints shall be in accordance with the recommendations of the manufacturer or the Standards of the EJMA.

    c. 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.

16. 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.

17. 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.

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. 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.

c. 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.

C. 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.

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 TI-181

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. Informational Submittals:

1. Certificate signed by manufacturer of each product certifying that product conforms to applicable referenced standards.

2. 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 - Schedule for Exposed Piping:

a. Test all pipelines not listed in Section 40 06 01 - Schedule for Exposed Piping 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.

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 40 05 06 – COUPLINGS, ADAPTERS, AND SPECIALS FOR PROCESS PIPING
CONTRACT TI-181

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 40 05 22 – Steel and Stainless Steel Process Pipe

B. 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.

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 ductile iron pipelines:

a. Groove Type Coupling:

1) Flexible Type:

a) Style 31, with flexible radius grooves, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

2) Rigid Type:

a) Style 31, with rigid radius grooves, as manufactured by Victaulic Co., Easton, PA.

b) Or approved equal.

b. Shoulder Type:

1) Style 31, as manufactured by Victaulic Co., Easton, PA.

2) Or approved equal.

2. For stainless steel pipelines:

a. Grooved Type Coupling:

1) Flexible type:

a) ¾-in. to 18-in.:

(1) Style 77S, as manufactured by Victaulic Co., Easton, PA

(2) Or approved equal.

2) Rigid Type:

a) 1 ½-in. through 12-in.:

(1) Style 489, as manufactured by Victaulic Co., Easton, PA

(2) 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. 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.

B. Couplings shall be either one of the following two 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.

C. Sleeve Type Couplings:

1. General:

a. The maximum working pressure of the sleeve-type couplings shall be 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

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

NO TEXT ON THIS PAGE

SECTION 40 05 07 – HANGERS AND SUPPORTS FOR PROCESS PIPING
CONTRACT TI-181

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 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 09 91 00 – Painting.

1.04 REFERENCES

A. Reference Standards:

1.	ASTM A 36	Standard Specification for Carbon Structural Steel.
2.	ASTM A 48	Standard Specification for Gray Iron Castings.
3.	ASTM A 276	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 A 123	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 is required to 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, 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.

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. 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.

13. 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. 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

Pipe Size (in.)	Single Rod (in.)	Double Rod (in.)	Max. Load per Hanger (lbs.)
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
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 13.01 - 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. 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

NO TEXT ON THIS PAGE

SECTION 40 05 19 – DUCTILE IRON PROCESS PIPE
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for providing ductile iron pipe and fittings.

1. 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.

2. Ductile iron pipe and fittings shall be furnished and installed complete with all necessary joining materials, wall castings, wall sleeves, specials, coupling, hangers, supports, identification signs and other appurtenances as shown on the Contract Drawings and required for the 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 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, and joint type are specified in 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, and other appurtenances as shown on the Contract Drawings, as specified herein, and/or as necessary and required for a complete installation.

a. 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.

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. Flanged Adapters shall be Models 912 as manufactured by:
   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 60-42-10 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.

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. Flanges shall be tapped where tap or stud bolts are required.

4. 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.

5. 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.

6. 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. Push-On Type Joints

1. Shall be in accordance with AWWA C111.

F. 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.

G. 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.

H. 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.

I. 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.

J. 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.

K. 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.

L. 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. Ceramic Epoxy Linings:

a. All ductile-iron pipe and fittings exposed to wastewater shall be ceramic epoxy lined with Protecto 401 Ceramic Epoxy, or approved equal. The material shall be an amine cured novalac epoxy containing at least twenty percent (20%) by volume of ceramic quartz pigment. Lined pipe and fittings shall be as manufactured by the manufacturers listed under Section 2.01 A

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. Epoxy and Urethane Coatings:

a. Epoxy and urethane coatings shall be applied in accordance with Section 09 91 00 - Painting.

8. 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.

9. 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 22 – STEEL AND STAINLESS STEEL PROCESS PIPE
CONTRACT TI-181

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 steel and stainless steel 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 05 05 13. 01 – Galvanizing.

B. Section 09 91 00 – Painting.

C. Section 33 06 01 – Schedule for Buried Piping.

D. Section 40 05 05 – Exposed Piping Installation.

E. Section 40 05 06 – Couplings, Adapters, and Specials for Process Piping.

F. Section 40 05 07 – Hangers and Supports for Process Piping.

G. Section 40 05 19 - Ductile Iron Process Pipe

H. Section 40 06 01 – Schedule for Exposed Piping.

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.	ANSI B16.9	-	Standard for Factory Made Wrought Steel Butt Welding Fittings
2.	ASTM A53	-	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
3.	ASTM A105/A105M	-	Forgings, Carbon Steel, for Piping Components
4.	ASTM A126	-	Gray Iron Castings for Valves, Flanges and Pipe Fittings
5.	ASTM A139	-	Electric-Fusion (ARC)-Welded Steel Pipe (NPS4 and Over)
6.	ASTM A193/A193M	-	Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
7.	ASTM A197	-	Cupola Malleable Iron
8.	ASTM A240	-	Heat-Resisting Chromium and Chromium Nickel Stainless Steel plate, Sheet and Strip for Pressure Vessels
9.	ASTM A269	-	Seamless and Welded Austenitic

			Stainless Steel Tubing for General Service
10.	ASTM A276	-	Stainless and Heat-Resisting Steel Bars and Shapes
11.	ASTM A283/A283M	-	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
12.	ASTM A307	-	Carbon Steel Bolts and Studs, 50,000 psi Tensile
13.	ASTM A312/A312M	-	Seamless and Welded Austenitic Stainless Steel Pipes
14.	ASTM A380	-	Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems
15.	ASTM A403/A403M	-	Wrought Austenitic Stainless Steel Piping Fittings
16.	ASTM A530	-	General Requirements for Specialized Carbon and Alloy Steel Pipe
17.	ASTM A774	-	As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures
18.	ASTM A778	-	Welded, Unannealed Austenitic Stainless Tubular Products
19.	ASTM B98	-	Copper Silicon Alloy Rod, Bar, and Shapes
20.	ASTM B117	-	Standard Practice for Operating Salt Spray (Fog) Apparatus
21.	ASTM D714	-	Standard Test Method for Evaluating Degree of Blistering of Paints (Fog) Apparatus
22.	ASTM E96	-	Standard Test Method for Gravimetric Determination of water Vapor Transmission Rate of Materials
23.	ASTM F491	-	Specification for Poly (Vinylidene

			Fluoride) (PVDF) Plastic-Lined Ferrous Metal Pipe and Fittings
24.	ASTM F492	-	Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe and Fittings
25.	ASTM F599	-	Specification for Poly (Vinylidene Chloride) (PVDC) Plastic-Lined Ferrous Metal Pipe and Fittings
26.	ASTM G22	-	Antibacterial Test
27.	ASTM G95	-	Standard Test Method for Cathodic Disbondment Test of Pipeline Coatings (Attached Cell Method)
28.	ASME B1.1	-	Unified Inch Screw Threads (UN and UNR Thread Form)
29.	ASME B16.1	-	Cast Iron Flanges and Flanged Fittings, Class 25, 125, 250, 800
30.	ASME B16.3	-	Malleable-Iron Screwed Fittings, Classes 150 and 300.
31.	ASME B16.4	-	Gray Iron Threaded Fittings Classes 125 and 250
32.	ASME B16.5	-	Pipe Flanges and Flanged Fittings
33.	ASME B16.9	-	Factory-Made Wrought Buttwelding Fittings
34.	ASME B16.11	-	Forged Fittings, Socket-Welding and Threaded
35.	ASME B16.21	-	Non-Metallic Gaskets for Pipe Flanges
36.	ASME B18.2.1	-	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)
37.	ASME B31.1	-	Power Piping
38.	ASME B36.19M	-	Stainless Steel Pipe
39.	AWWA C200	-	Steel Water Pipe 6-in. and Larger

40.	AWWA C203	-	Coal-Tar Protective Coatings and Linings for Steel Water Pipelines Enamel and Tape Hot-Applied
41.	AWWA C205	-	Cement-Mortar Protective Lining and Coating for Steel Water Pipe 4-in. and Larger - Shop Applied
42.	AWWA C207	-	Steel Pipe Flanges for Waterworks Service Size 4-in. Through 144-in.
43.	AWWA C210	-	Liquid Epoxy Coating Systems for Interior and Exterior of Steel Water Pipelines
44.	AWWA C214	-	Tape Coating Systems for the Exterior of Steel Water Pipelines.
45.	AWWA M11	-	Steel Pipe A Guide for Design and Installation
46.	CEN-EN-598	-	Ductile iron pipes, fittings, accessories and their joints for sewerage applications – Requirements and test methods
47.	ISO 14025	-	Environmental labels and declarations Type III environmental declarations
48.	NSF 61	-	Drinking Water System Components Health Effects
49.	New York City Building Code		

1.05 DESCRIPTION

A. This Section includes requirements for providing steel and stainless steel process pipe and accessories in accordance with applicable standards and regulations. In addition:

1. The scope of this Section shall include all steel and stainless steel process pipe, fittings, and specials.

2. The extent of steel and stainless steel process piping is shown on the Contract Drawings. Steel and stainless steel process pipe service, pipe diameter, material, coating, pressure rating, joint type, and testing requirements are specified in the following section(s):

a. Section 40 06 01 - Schedule for Exposed Piping.

3. Steel and stainless steel 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 steel and stainless steel process pipe shall be provided as specified in Section 40 05 06 - Couplings, Adapters, and Specials for Process Piping.

   b. Hangers and support for steel and stainless steel 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 steel and stainless steel process pipe and existing lines(s) installed under other contracts, including all specials required to connect steel and stainless steel 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 steel and stainless steel 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. Qualifications of Welder:

   a. Certified welders, having current certificates conforming to the requirements of the ASME code, shall be utilized to perform all welding on steel pipes. Welders shall be qualified under the requirements of Section IX Welding Qualifications of the ASME Boiler and Pressure Vessel Code.

B. Supply and Compatibility:

1. All steel and stainless steel process pipe, fittings, appurtenances, and specials included in this Section shall be provided by the Contractor through a single, qualified steel and stainless steel process pipe manufacturer
2. The pipe and fittings shall be designed, fabricated, and installed in accordance with the standards referenced herein.
3. The manufacturer shall bear responsibility for the quality of all factory-applied linings and coatings, regardless of the location of application.
4. The manufacturer shall verify compatibility between the steel and stainless steel process pipe, fittings, appurtenances, specials, and other Work.
5. Inscription:
    a. The following shall all be rolled or permanently inscribed on each and every pipe surface:
        1) manufacturer's name or trademark,
        2) the year of manufacture and
        3) the ASTM or API specification number.
    b. As an alternate to rolling or permanent inscription, the information required herein may be stencilined on each and every pipe surface.
    c. Pipe 1½ in. and less in nominal diameter shall be bundled and tagged.
6. Foreign products and materials:
    a. Steel and stainless steel pipe and fittings manufactured outside of the continental United States shall meet all the requirements of the latest ASTM standards referred to hereinbefore and, unless waived in writing by the City, shall undergo physical tests and chemical analyses to prove compliance therewith.
        1) Such tests and analyses shall be performed by an independent testing laboratory approved by the City.
        2) If the testing laboratory is located outside the United States, then the Contractor shall pay all costs for two DEP personnel to witness such tests.
        3) The test samples shall be selected and tested in conformance with ASTM requirements.
        4) The City may at its discretion visit the test facility and witness the tests.
        5) The cost of all physical tests and chemical analyses shall be borne by the Contractor.

C. Regulatory Requirements:

1. Steel and stainless steel process pipe shall conform to the applicable provisions of the Code for Pressure Piping, ASME B31.1 and its Supplements and specifically to Chapters 2, 4, and 5 of Section 6 - Fabrication Details except for plumbing and low pressure (15 psig maximum) heating lines.

2. Steel and stainless steel process pipe and fittings shall conform to the New York City Building Code in respect to plumbing and other applications covered by these codes.

3. Use only NSF61-approved materials in potable water lines.

1.07 SUBMITTALS

A. Submittals for all steel and stainless steel process pipe shall comply with the requirements of Section 40 05 05 - Exposed Piping Installation.

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.

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. When required for maintaining its circular shape and preventing 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. Ceramic Epoxy Lining:

1. Ceramapure PL 90, as manufactured by Induron Protective Coatings, Birmingham, AL.

2. Or Approved Equal.

2.02 MATERIALS / EQUIPMENT

A. Steel Pipe:

1. Wall thicknesses for steel pipe shall be in accordance with ASME B36.10M and as specified in Table 40 05 22-1:

TABLE 40 05 22-1
WALL THICKNESS FOR STEEL PIPE

Nominal Pipe Diameter: (in.)	Schedule/ Thickness:	Shall comply with the following additional standards:
≤ 12	Sch. 40	ASTM A53
14 - 24	⅜ in.	ASTM A53
30	⅜ in.	ASTM A139
≥ 36	½ in.	ASTM A139

2. Steel pipe 30-in. in diameter and larger may be in accordance with the requirements of AWWA C200 and fabricated of plates meeting the requirements of ASTM A283/A283M Grade D, fusion welded in accordance with the Code for Pressure Piping, ASME B31.1, so as to develop full plate strength. Such fabricated steel pipe shall be shop tested as specified for fabricated fittings.
    a. Pipe shall be fabricated with straight-seam welds or spiral-seam welds.
    b. Welds shall be provided with a smooth uniform cross section to provide pipe with a neat external appearance.
    c. Pipe shall be fabricated with not more than two longitudinal seams and with girth seams not less than 7 ft apart.
    d. The pipe and fitting diameters of 30-in. and larger, as shown or specified, are inside diameters.
3. Carbon steel pipe, including fabricated pipe shall be provided in lengths of approximately 20 ft unless otherwise specified.

B. Steel Fittings:
1. General:
    a. Fittings shall be manufactured to standard dimensions, suitable for the pressures specified.
    b. Fittings shall be provided of the same or heavier wall thickness as the pipe of which they are a part.
    c. Strength, physical and chemical requirements, shall meet or exceed the requirements specified for the pipe.
2. Fittings used in pipelines 2-in. diameter or smaller shall be of the screwed pattern, except as shown or specified otherwise.
3. Fittings used in pipelines 2½-in. diameter or larger shall be of the seamless steel welded type or flanged type, except as shown or specified otherwise.
4. Unions:

a. Screwed unions shall be used on all steel pipelines 2-in. diameter and smaller.

b. An adequate number of unions of the screwed or flanged type shall be provided in each main pipe and each branch to facilitate the dismantling or removal of any branch line or any part thereof or the section of the main pipe to which it connects, without disturbing adjacent branch lines or their related main pipeline.

c. Where sleeve-type (harnessed) groove-type or shouldered-end flexible pipe couplings, are specified, they may be considered as substitutes for pipe unions.

5. Screwed Fittings:

a. Screwed fittings 2-in. and smaller shall be malleable iron flat band fittings, ASME B16.3, Class 150. For high pressure service, conform to ASME B16.3, Class 300. Malleable iron shall conform to the requirements of ASTM A197.

b. Where shown or specified, screwed end fittings of cast iron, conforming to the requirements of ASME B16.4, Class 125 standards for general service and Class 250 for high pressure service shall be provided. Cast iron shall meet the requirements of ASTM A126.

c. All threads shall be clean cut and smooth conforming to the American Standard for Pipe Threads, ASME B1.1. Fittings shall be with right and/or left hand threads as required.

d. Unions and railroad unions and union elbows and tees shall be malleable iron fitted with brass to iron seats unless otherwise specified.

6. Socket Welding Fittings:

a. Where shown or specified, steel socket welding fittings shall be provided on 3-in. and smaller services for high pressure gas, oil or where otherwise shown. Steel socket fittings shall conform to the requirements of ASME B16.11 with steel conforming to ASTM A105/A105M, Grade 2. Fittings shall be rated at Class 2000 (minimum).

b. Socket welding fittings shall be welded in conformity with the applicable provisions of the Code for Pressure Piping, ASME B31.1.

7. Butt Welding Fittings:

a. Butt welding fittings shall meet the requirements of ASME B16.9.

b. Outlets for welded connections that are made with welded half coupling shall be of the butt welding type.

c. Outlets for threaded connections shall be made with threaded half couplings.

d. Where welding fittings are approved for assembly in the cement lined pipelines, fittings shall be provided with a plain end, grooved end or shouldered end section welded on each end of the fitting and assembled with sleeve-type, groove-type or shouldered-end couplings as required. Long tangent welding fittings may be submitted for approval as a substitute for welded-on spool piece fittings provided that they can accommodate flexible pipe couplings.

8. Flanged Fittings:

a. Where shown on the Contract Drawings or where specified, cast iron or steel flanged fittings shall be provided.

b. Cast iron flanged fittings for general service shall conform to the requirements of ASME B16.1.

c. Steel flanged fittings shall utilize forged steel slip-on flanges. Fittings shall be Class 125 and Class 250 fittings conforming to the requirements of ASME B16.5, Class 150 or Class 300, respectively, as specified, except flanges that are plain faced shall be provided. Provide Class 125 fittings conforming to AWWA C207, Class B.

d. Cast steel flanged fittings shall be assembled with forged steel flanges of the same pressure rating, conforming to the requirements of ASME B16.5.

C. Fabricated Steel Fittings:

1. Unless otherwise shown or specified, fittings 24-in. and larger shall be fabricated in accordance with the Code for Pressure Piping, ASME B31.1 and the requirements specified hereinafter.

2. Fittings shall be shop fabricated from a segmental welded steel section of a plate thickness not less than that specified for pipe connected thereto. The minimum radii of the centerlines of the bends shall be 1.5 times the nominal pipe diameter unless otherwise specifically shown on the Contract Drawings. The included angle between the points of tangency of the bend and connecting straight pipe shall contain not less than the number of bend segments called for in Table 40 05 22-2:

TABLE 40 05 22-2
MINIMUM NUMBER OF EGMENTS FOR FABRICATED STEEL FITTINGS

Bend Angle:	Minimum No. of Full Segments:	Minimum No. of Part Segments:
75° - 90°	4	2
60° - 74°	3	2
45° - 59°	2	2
30° - 44°	1	2
0° - 29°	0	2

a. In Table 40 05 22-2:

1) Full segments shall consist of sections with ends cut to form included angles of 15°.

2) Part segments shall consist of sections up to 7½°.

3) Depending on the angle, additional full segments may be required beyond the minimum number specified in Table 40 05 22-2 to make the bend angle.

b. The following examples are offered demonstrating conformance to table 40 05 22-2:

1) A 90° bend would require four (4) 15° full segments, two (2) 7½° segments at the ends of the fitting, plus one (1) additional 15° segment to make 90°. The additional 15° (full) segment is required to make an angle of 90°.

2) A 45° bend would require two (1) 15° segments and two (2) 7½° segments.

3. Fittings for cement-lined pipelines shall be lined after fabrication of the fittings.

4. Cement-lined fabricated fittings shall be installed with flexible pipe couplings. Such fittings shall be provided with extra-long end segments extending past the point of tangency of the radius to the segment centerline to accommodate the couplings.

5. Fabricated fittings installed with couplings shall be provided with extra-long end pieces to suit the coupling. Sleeve-type or shouldered-end couplings provided shall meet the requirements of Section 40 05 06 - Couplings, Adapters, and Specials for Process Piping . Collared end pieces shall be provided for shouldered-end couplings.

6. Reducers and increasers shall be provided with the same laying length as American Standard Class 125.

7. Fabricated steel fittings shall be provided with plain ends or welded flanges.

8. Tees, wyes, laterals and outlets shall be reinforced in accordance with AWWA Manual M11.

D. Flanges And Flanged Joints:

1. Flanges: Unless otherwise shown, all flanges for steel pipe, except blind flanges shall be of the slip-on welding type with hubs meeting the requirements of ASME B16.5. Where specifically captioned on the Contract Drawings or where explicitly required by the Contract Documents, furnish and install steel pipe flanges complying with AWWA Standard C207 as required. Welding neck steel flanges, ASME B16.5, may be submitted to the Engineer for approval in place of slip-on flanges.

   a. Slip-on flanges shall be welded to the steel pipe at the hub and at the pipe end in conformity with the Code for Pressure Piping, ASME B31.1 Section 6.

   b. Plain faced blind flanges in accordance with ASME B16.5 shall be provided.

   c. Standard raised faces flanges shall be provided for the sizes specified except for cast iron-to-steel joints which shall be plain faced.

   d. Steel Class 150 welding flanges shall be used for assembly with Class 125 cast iron flanged fittings, steel Class 300 flanges with Class 250 cast iron flanged fittings, and AWWA Class B steel hub flanges with Class 25 cast iron flanged fittings.

2. Flanged Joints: Flanged joints shall be made with bolts or bolt studs with a nut on each end. Stud bolts shall be used for all bolting sizes 1¾-in. and larger.

   a. Bolts, stud bolts, and nuts shall meet the requirements of ASTM A307 Grade B, except for high temperature service where alloy steel bolts, ASTM A193/A193M, Grade B5, shall be used. Bolts and stud bolts shall conform to the dimensional requirements of ASME B18.2.1 with rolled threads conforming to ASME B1.1, Coarse Series, Class 2 fit. Bolts and stud bolts and nuts shall be of American Standard heavy unfinished hexagonal type.

   b. On sludge lines requiring disassembly for cleaning and where otherwise shown or specified, bolts and nuts shall be of silicon bronze, ASTM B98, Alloy A, with sizes and dimensions equal to steel bolts and nuts.

c. Bolts shall be provided with a ¼-in. projection beyond the nut when joint with gasket is assembled.

3. Gaskets: Ring type gaskets shall be provided for pipe larger than 12-in. in diameter, and full face gaskets for pipe sizes 12-in. in diameter and smaller with dimensions in conformity with the requirements of ASME B16.21, unless specified otherwise. Gaskets shall be as thin as the finish and accuracy of the surfaces will permit.

a. For general service, rubber gaskets shall be ⅛-in. thick and meet the requirements of AWWA C207 as modified and supplemented herein.

b. Gasket material which is provided shall be specifically recommended for the service by the gasket manufacturer and as approved by the Engineer.

4. Insulation: Insulated flanged joints shall be provided as required. Flange insulation kits shall include flange insulating gasket, flange bolt insulating sleeves, and flange bolt insulating washers.

E. Couplings:

1. Where shown on the Contract Drawings, specified, or required for the convenience of installation, pipe couplings conforming to the requirements of Section 40 05 06 - Couplings, Adapters, and Specials for Process Piping, shall be furnished and installed.

2. Harnessed sleeve-type couplings shall be used close to the connecting point for pipe connections to pumps and other equipment handling fluids or gases under 200°F susceptible to damage or binding due to pipe strain unless other types of flexible connections are shown or specified.

3. Cement-lined fabricated fittings shall be assembled with flexible pipe couplings. Where butt welding fittings are approved for assembly in cement lined pipes, fittings shall be provided with spool pieces welded on each end and, assembled with flexible pipe couplings after cement lining. Where harnessed joints are required on lined pipe, the harnessing lugs shall be welded before lining.

4. Where pipelines pass from a concrete structure into earth, flexible couplings shall be installed at the face of the structure and at a point about four feet from the structure to protect the pipe against damage by displacement or settling.

F. Expansion Joints:

1. Where shown on the Contract Drawings, specified, or required, the Contractor shall provide internally guided, packed sleeve type expansion joints, in which the traverse slip section functions correctly without leakage at the maximum estimated expanded position at full operating pressure.

2. Unless specified otherwise, on pipes 3-in. nominal diameter and smaller, expansion joints with screwed ends, of all bronze or brass construction shall be provided.

3. On pipelines 4-in. and larger, expansion joints with ANSI Class 125 flanged ends, cast semi-steel bodies and brass sleeves shall be provided.

4. Ample space shall be provided for packing, with packing material suitable for the service and pressure specified. Where specified or shown, integrally cast anchor bases suitable for anchor bolting shall be provided.

5. Expansion joints shall be installed so that the traverse can move only in a direction parallel to its center line in conformity with the requirements of the Code for Pressure Piping, ASME B31.1, Paragraph 612.

G. Wall Sleeves:

1. Suitable ductile iron or steel pipe sleeves shall be provided at all points where pipes pass through the walls or floors of structures, and where wall castings are not provided.

   a. Ductile iron sleeves shall be provided as specified in Section 40 05 19, Ductile Iron Process Pipe.

2. Steel sleeves 12-in. in diameter and larger shall be provided with a minimum wall thickness of 0.375-in.. Steel sleeves smaller than 12-in. in diameter shall be provided not less than Schedule 40. Steel sleeves shall be provided with an intermediate collar located at the center of the wall. The O.D. of the collar shall be four inches greater than the O.D. of the sleeve, fabricated from steel plate with a minimum thickness equal to the sleeve thickness and double welded to the sleeve.

3. Modular mechanical-type seals consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall sleeve shall be provided. The elastomeric element shall be of the size, quantity, type and material that the manufacturer recommends for the intended service and that will provide an effective hydrostatic seal.

H. Cleanouts:

1. Where shown on the Contract Drawings or specified, flanged cleanouts shall be provided as specified in Section 40 05 19, Ductile Iron Process Pipe.

I. Stainless Steel Pipe and Fittings For Low Pressure Air Service:

1. General:

   a. Low pressure air service pipe is limited to air lines with a maximum working pressure of 15.0 psig.

   b. For air piping nominal pipe sizes 3-in. and above shall be fabricated in accordance with ASTM A778 from Type 316L stainless steel.

c. The pipe shall be subjected to hydrostatic and flattening tests as specified in ASTM A530.

d. All welds shall be free from burrs, snags or rough projections.

2. Wall Thickness:

a. Wall thicknesses for stainless steel pipe for low pressure service shall be as specified in Table 40 05 22-3, unless a greater wall thickness is specified in the following piping schedule:

1) Section 40 06 01 - Schedule for Exposed Piping.

TABLE 40 05 22-3
WALL THICKNESS FOR STAINLESS STEEL PIPE FOR LOW PRESSURE SERVICE

Nominal Pipe Diameter: (in.)	Schedule/ Thickness:	Shall comply with the following additional standards:
≤ 18	Sch. 10S	ANSI B36.19
20 - 36	$^{3}/_{16}$-in.	N/A
42 - 48	¼-in.	N/A
54 - 60	$^{5}/_{16}$-in.	N/A
66 - 72	⅜-in.	N/A
78 - 96	½-in.	N/A

3. Joints:

a. Joints for low pressure air service shall be butt weld or flanged only – pipe couplings for joining plain end, grooved end, and shouldered end pipe and fittings are not acceptable.

b. No welding in the field shall be permitted.

4. Fittings:

a. General:

1) Fittings shall be manufactured to standard dimensions and suitable for the pressures specified.

2) Fittings shall be provided of the same or heavier wall thickness as the pipe of which they are a part.

3) Strength, physical and chemical requirements, shall meet or exceed the requirements specified for the pipe.

4) Fittings shall be subject to the same hydrostatic test as the pipe.

b. Materials and Construction:

1) Fittings shall be fabricated from Type 316L stainless steel in conformance with ASTM A774 of the same wall thickness as specified for the pipe.

2) Fittings shall conform to the dimensional requirements of ANSI B16.9, Standard for Factory Made Wrought Steel Butt Welding Fittings.

a) Elbows shall be long radius.

c. Flanged Ends:

1) Where shown on the Contract Drawings or where specified, stainless steel flanged fittings shall be provided.

2) Flanged pipe ends shall be made up of 316L stainless steel slip-on type rolled angle face rings and 316 stainless steel back-up flanges drilled to ANSI 16.1 class 125 standard.

3) The angle face ring thickness shall be equal to or greater than the wall of the pipe or fitting to which it is welded and it shall be continuously welded on both sides to the pipe or fitting.

4) Van stone style flanges are not acceptable for low pressure air service.

5) The angle leg shall not interfere with the flange bolt holes.

6) The backup flanges shall be supplied per ASTM A240 with thicknesses specified in Table 40 05 22-4.

TABLE 40 05 22-4
BACKUP FLANGE THICKNESS FOR STAINLESS STEEL PIPE FOR LOW PRESSURE SERVICE

Nominal Pipe Diameter: (in.)	Flange Thickness (in.)
2½ - 3	½
4	9/16
6 - 10	⅝
12 - 16	¾
18 - 20	⅞
24 - 30	1
36	1⅛

Nominal Pipe Diameter: (in.)	Flange Thickness (in.)
42	1¼
48	1⅜
54	1⅜
60	1½
66	1⅝
72	1⅝
84	1¾
96	2

d. Gaskets shall be rated for 250°F service.

5. All stainless steel pipe and fittings shall be pre-cleaned, pickled and passivated after fabrication in accordance with the applicable sections of ASTM A380, except where otherwise specified.

J. Heavy Wall Stainless Steel Pipe and Fittings:

1. Heavy wall stainless steel pipe and fittings shall be Type 316L stainless steel fabricated in accordance with ASTM A312/312M for nominal pipe sizes up to 12-in.

2. Wall thickness shall be Schedules 40S or 80S pipe in accordance with ANSI B36.19 and as indicated on the piping schedule in the Contract Documents.

3. Flanges:

a. Where flanges are shown, specified or required for connection of stainless steel pipe and fittings to pipe equipment, forged stainless steel slip-on flanges conforming to ANSI 150 pound or 300 pound standards, shall be provided as specified, welded at the hub and at the face.

b. Flanges, flanged fittings and flanged joints shall conform to the applicable provisions specified herein for steel flanges, flanged fittings and flanged joints, except that steel bolting shall be cadmium plated to produce a uniform appearance.

4. Fittings:

a. For nominal pipe sizes 2½-in. and larger: Fittings shall be the butt-welding type conforming to the dimensional requirements of ASME B16.9.

5. All stainless steel pipe and fittings shall be pre-cleaned, pickled and passivated after fabrication in accordance with the applicable sections of ASTM A380, except where otherwise specified.

K. Stainless Steel Tubing and Fittings:

1. Tubing and fittings shall be of Type 316L stainless steel.

2. Tubing shall be seamless.

3. Tubing shall be in accordance with ASTM A269 for nominal tubing diameters less than 1½-in..

4. Wall Thickness and Service:

a. Tubing shall be as specified in Table 40 05 22-5:

TABLE 40 05 22-5
WALL THICKNESS AND PRESSURE RATING FOR STAINLESS STEEL TUBING AND FITTINGS

Nominal Tubing Diameter: (in.)	Wall Thickness: (in.)	Pressure Rating: (psi)
¼	0.035	3,000
⅜	0.035	2,500
½	0.049	2,500
⅝	0.049	2,500
¾	0.065	2,500
1	0.065	2,000

b. Provide Type 316 stainless steel, flareless tube fittings in conformance with ASTM A276.

c. Provide dielectric insulating joints or fittings at connections between exterior piping and interior piping.

d. All stainless steel tubing shall be pre-cleaned, pickled, and passivated after fabrication in accordance with the applicable sections of ASTM A380, except where otherwise specified.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Coatings and Linings:

1. General:

a. Steel and stainless steel 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. Tape Coating:

a. Where shown, specified, or required for exterior coating of buried piping multi-layered, cold-applied tape in accordance with AWWA C214 shall be provided.

3. Liquid Epoxy:

a. Where liquid epoxy lining and coating is shown, specified or required, lining and coating shall be in accordance with AWWA C210, at twice the standard thickness.

4. Cement-Mortar Lining:

a. The pipe and fittings shall be lined before installation in conformity with the requirements of AWWA C205. The lining shall be shop applied. A seal of asphaltic material shall be provided in conformity with AWWA C203.

b. Fabricated pipe and fittings shall be cement lined after fabrication.

c. Cement linings for steel pipe and fittings shall conform to the thicknesses as given in AWWA C205 and Table 40 05 22-6:

TABLE 40 05 22-6
CEMENT LINING THICKNESS AND TOLERANCES

Nominal Pipe Size: (in.)	Lining Thickness (in.)	Tolerance (in.)
1¼ - 1½	$^{3}/_{32}$	$\pm^{1}/_{64}$
2 - 2½	$^{1}/_{8}$	$\pm^{1}/_{32}$
3 - 3½	$^{5}/_{32}$	$\pm^{1}/_{32}$

d. Shop and field cutting of cement lined pipe will be permitted only by methods specifically approved by the Engineer, in each case; field cutting will only be permitted if witnessed by the Engineer.

e. Caps, plugs, sleeves and valve box castings shall not be cement lined but shall receive a liquid epoxy coating as specified under Paragraph C above.

5. 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 steel 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 E96, 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 8hrs elapses before application, repeat blasting procedure specified herein.

3) Lining:

   a) Pipe shall be lined within 8 hours of surface preparation.

   b) Apply 20 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 or over 120°F.

   d) Ensure surface is dry and dust free.

   e) Do not apply lining to flange faces.

   f) The substrate temperature must be 5°F above the dewpoint for a period of at least 2h after application to avoid condensation occurring on wet coating. Do not apply over wet or frozen surfaces.

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.

f) The interior of the bell shall be lined with 20 mils minimum and 25 mils maximum.

5) Lining of Welded Steel Pipe Joints

a) All welded steel pipe shall be lined as indicated with 20 mils dry film thickness minimum.

b) Each joint of pipe shall have the last 3-in. of the interior taped prior to lining to allow for bare pipe at the welded joints.

c) The interior of all pipe joints must be seal welded with no voids.

d) After the joints are welded and prior to placing the pipe in service, the welded joints and any adjacent areas shall be prepared to achieve a level of cleanliness equal.

(1) This will include a thorough cleaning to remove any weld smoke, anti-splatter, oil deposited on the surface or other foreign contamination.

e) The finished joint application shall be a minimum of 20 mils dry film thickness.

f) All joint repairs shall be performed as indicated by the specification including pinhole detection and inspected independent of the contractor to ensure compliance with the specification.

g) Holiday detection and inspection independent of the contractor shall insure compliance with the specification resulting in a finished, continuous lining equal in all respects to the original lining, as outlined in this specification.

6) 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 recoatable with itself without roughening of the surface.

7) 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 nondestructive 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 to records maintained by the applicator.

6. 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.

7. Painting:

a. Pipe and fittings shall be painted in accordance with the requirements of Section 09 91 00 - Painting.

8. Galvanizing:

a. Galvanizing shall be provided in accordance with ASTM A53.

9. Coating Exposed Threads of Buried Galvanized Pipe:

a. Where galvanized pipe is buried underground and joined by means of screwed fittings, a protective zinc dust coating in accordance with Section 05 05 13.10 - Galvanizing, shall be applied to the exposed threads in the field.

b. Do not leave any exposed metal uncoated.

10. Urethane Coating:

a. Urethane coating shall be provided in accordance with Section 09 91 00 - Painting, where shown, specified or required.

11. Plastic-Lined Steel Piping:

a. Polyvinylidene chloride (PVDC) lined steel pipe and fittings meeting the requirements of ASTM F599, shall be provided where shown or specified, except PVDC liner shall have a minimum elongation at yield of 5 percent.

b. Type I polypropylene lined steel pipe and fittings meeting the requirements of ASTM F492 shall be provided where shown or specified.

c. Polyvinylidene fluoride (PVDF) lined steel pipe and fittings meeting the requirements of ASTM F491 shall be provided where shown or specified.

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 steel and stainless steel 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. Cleaning:

1. 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.
2. Flush all process and potable water pipelines with clean water.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 05 53 – PROCESS VALVES FOUR-INCH DIAMETER AND LARGER
CONTRACT TI-181

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:

Article	Title	Section Page
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1.02	Payment	1
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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 09 91 00 – Painting.

B. Section 40 05 97 – Identification for Process Equipment.

C. 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 Plate.
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. Valves for digester gas and air service have been specifically identified in Schedule 40 05 53-1. .

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.

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 operating mechanisms with extension stems.

2) Sizing of gear actuators.

3) 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. Eccentric 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.

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)

1.10 WARRANTY

A. Not Used.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gate Valves (Resilient- Seated):

1. J & S Valves, Huffman, TX.
2. VAG USA LLC, Mars, PA
3. Or approved equal.

B. Thermoplastic Gate Valves:

1. Asahi/America, Inc., Lawrence, MA;
2. Or approved equal.

C. Eccentric Plug Valves:

1. DeZurik, as manufactured by DeZurik APCO Hilton, Inc., Sartell, MN;
2. VAG USA LLC, Mars, PA
3. 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. 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 (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.

C. Thermoplastic Gate Valves:

1. General:

a. Provide thermoplastic gate valves for exposed service only.

b. Design working pressure: The pressure rating of the valve shall be at least equal to the pressure rating of the pipe to which the thermoplastic gate valve is attached.

1) Refer to Section 40 06 01 - Schedule for Exposed Piping, for the pressure rating of the connecting pipeline.

c. Maximum Fluid Temperature: 100°F.

2. Materials:

a. Body: PVC

b. Disc: Polypropylene.

c. Shaft: Steel, encased completely in PVC.

d. Gaskets: The highest chemical compatibility rating with the service specified.

e. Bolts: Fiberglass reinforced plastic.

3. Construction:

a. End Connections: Flanged

b. Valves shall be designed with NRS extended, as shown.

D. Eccentric Plug Valves:

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. Butterfly Valves (Clean Water Service):

1. General:

a. Butterfly valves for clean water service shall conform to AWWA C504 Class 150B.

b. Design Working Pressure: 150 psig.

c. Maximum Fluid Temperature: 180°F.

d. Sizes:

1) For flanged butterfly valves: ≤ 72-in.

2) For mechanical joint butterfly valves: ≤ 48 in.

2. Materials:

a. All materials of construction shall conform to the requirements of AWWA C504.

b. The materials of construction for the various components of each valve shall be as follows:

1) Body: Cast iron, ductile iron, or alloy cast iron.

c. Shaft: Type 316 stainless steel.

1) Discs:

a) For valves < 30-in.: Cast iron.

b) For valves ≥ 30-in.: Ductile iron.

d. Seats: Acrylonitrile butadiene synthetic rubber, or other synthetic rubber suitable for the application.

1) Seating Surfaces: Type 316 stainless steel.

2) Bearings:

a) For valves < 24-in.: Nylon.

b) For valves ≥ 24-in.: Fiberglass with polytetrafluoroethylene lining.

3) Shaft Seals: Same as of seats.

4) Tapered Pins for Attachment of Shaft to Disc: Type 316 stainless steel.

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 butterfly valves shall be capable of being held in open, or partially open position for manual operation or for automatic operation.

1) When the disc is so held, there shall be no chatter or vibration of the disc or operating mechanism.

b. The butterfly valves shall provide drip-tight bidirectional shut-off at the design working pressure as well as operating pressures as specified herein.

c. Seals:

1) Shall be self-adjusting V-type chevron; and

2) Shall be mounted in the body.

d. Valve packing shall be replaceable without dismantling the valve.

e. Valve seats:

1) For valves ≥ 24-in.: rubber seats shall be field replaceable.

4. Appurtenances:

a. Gear Actuators for Manual Valves:

1) Gear actuators shall conform to the requirements of C504.

2) Size gear actuators as follows:

a) For butterfly valves ≤ 20-in.: 150 psi differential pressure and 16 ft/s velocity.

b) For butterfly valves > 20-in.: Shall be sized based on maximum differential pressures and velocities as specified in Schedule 40 05 53-1, located after the "End of Section" designation.

F. 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.

G. 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.

H. 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. Interior Glass Lining:

a. Provide interior glass lining for valves where:

1) Glass lining is specified herein; and/or

2) Glass lining is necessary and/or required for the service conditions; and/or

3) Glass lining is specified for the connecting pipe as specified in Section 40 06 01 - Schedule for Exposed Piping

4) Glass lining is specified in Schedule 40 05 53-1, located after the "End of Section" designation.

b. Glass lining shall be applied in two layers, each separately fired and matured at minimum 1,400°F.

c. The bond of glass lining with the cast iron body shall withstand a metal yield point of 0.001 inch/inch without causing any damage to the glass lining.

d. Total Thickness: 0.008-in. to 0.012-in.

e. Hardness: ≥ 5 MOHS.

f. Density: 2.5 to 3.0 g/cm^3.

g. Glass lining shall withstand an instantaneous thermal shock at 350°F without crazing, blistering, or spalling.

h. The lining shall be resistant to corrosion for solutions at 125°F over a pH range from 3 to 10 inclusive.

i. Visual appearance of the glass lining shall be similar to bright and clean opaque window glass. Surface gloss shall be maintained when immersed in an 8% sulfuric acid solution at 148°F for 10 min.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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 (Resilient 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. Eccentric Plug Valves:

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.

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. Eccentric Plug Valves:

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.

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. Installation of eccentric plug valves in sludge lines:

1. Eccentric 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.

E. 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)

Valve Tag (No.):	Service:	Size: (in.)	Type:	Material:	Actuator:	End Type:	Remarks:
TI1-08-08-1	PS	8	Plug	DI	Handwheel	Flg	PS supply to 18” Hydrogritter Classifier
TI1-08-10-1	Overflow	10	Plug	DI	Handwheel	Flg	Overflow from 18” Hydrogritter Classifier
TI1-08-08-2	PS	8	Plug	DI	Handwheel	Flg	PS supply to Wemclone no.1 of 24” Hydrogritter Classifier
TI1-08-08-3	PS	8	Plug	DI	Handwheel	Flg	PS supply to Wemclone no.2 of 24” Hydrogritter Classifier
TI1-08-10-2	Overflow	10	Plug	DI	Handwheel	Flg	Overflow from Wemclone no.1 of 24” Hydrogritter Classifier
TI1-08-10-3	Overflow	10	Plug	DI	Handwheel	Flg	Overflow from Wemclone no.2 of 24” Hydrogritter Classifier

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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:**	**Service:**	**Abbrev:**
Primary Sludge	PS	Degritted Primary Sludge	DPS
Screened Combined Sludge	SCS	Service Water	SW

B. The following valve type abbreviations are used in Schedule 40 05 53-1:

Valve Type:	**Abbrev:**
Gate Valve, Metal-Seated	GV
Gate Valve, Resilient-Seated	GV-RS
Thermoplastic Gate Valve	GVP
Plug Valve, Liquid Service	PV
Plug Valve, Digester Gas Service	PV-DG
Ball Valve, Rubber-Seated	BV
Thermoplastic Ball Valve	BVP
Butterfly Valve, Clean Water Service	BFV
Butterfly Valve, Air Service (Open/Close)	BFV-A-O/C
Butterfly Valve, High Performance for Air Service (Modulating Applications)	BFV-A-MOD
Butterfly Valve, Digester Gas Service (Open/Close)	BFV-DG-O/C
Butterfly Valve, High Performance for Digester Gas Service (Modulating Applications)	BFV-DG-MOD
Thermoplastic Butterfly Valve	BFVP
Check Valve, Liquid Service	CV
Check Valve, Air Service	CV-A
Check Valve, Digester Gas Service	CV-DG
Thermoplastic Check Valve	CVP
Thermoplastic Butterfly Check Valve	CVP-BF
Automatic Pressure Reducing Valve	PRV
Automatic Pressure Sustaining Valve	PSV
Automatic Electric Check Valve	CV-E
Telescopic Valve	Tel
Mud Valve	Mud

C. The following actuator type abbreviations are used in Schedule 40 05 53-1:

Actuator Type:	**Abbrev:**
Manual	Manual
Electric Actuators (Open/Close)	Elec(O/C)
Electric Actuators (Modulating)	Elec(Mod)
Pneumatic Actuators (Open/Close)	Pneu(O/C)
Pneumatic Actuators (Modulating)	Pneu(Mod)

D. The following valve material abbreviations are used in Schedule 40 05 53-1:

Pipe Material:	Abbrev:	Pipe Material:	Abbrev:
304L Stainless Steel	304L SS	Cast Iron	CI
316L Stainless Steel	316L SS	Chlorinated PVC	CPVC
Brass	Brass	Ductile Iron	DI
Carbon Steel	CS	Polyvinyl Chloride	PVC

E. The following valve end type abbreviations are used in Schedule 40 05 53-1:

Joint Type:	Abbrev:	Joint Type:	Abbrev:
Flanged	Flg	Shouldered End Coupling	SEC
Grooved End Coupling	GEC	Split-sleeve Coupling	SSC
Grooved/Shouldered End Coupling	GSEC	Solvent Weld	SW
Mechanical Joint	MJ	Restrained Mechanical Joint	RMJ
Push-on Joint	POJ	Restrained Push-on Joint	RPOJ

NO TEXT ON THIS PAGE

SECTION 40 05 56 – PROCESS VALVES SMALLER THAN FOUR-INCH DIAMETER
CONTRACT TI-181

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 smaller than four-inch diameter complete and operational.

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 09 91 00 – Painting.

B. Section 40 05 53 – Process Valves Four-inch Diameter and Larger.

C. Section 40 05 97 - Identification for Process Equipment

D. Section 40 06 01 - Schedule for Exposed Piping

E. Section 40 78 90 – PMCS Panel Mounted Instruments and Devices

1.04 REFERENCES

A. Definitions:

1. Non-ferrous Metals: Materials consisting of mixtures of copper, tin, zinc, lead, or other metals in which iron does not predominate.

B. Reference Standards:

1. ANSI B16.1 Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250
2. ASTM A126 Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings
3. ASTM A193 Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications
4. ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
5. ASTM A536 Standard Specification for Ductile Iron Castings.
6. AWWA C500 Metal-Seated Gate Valves for Water Supply Service
7. AWWA C508 Swing-Check Valves for Waterworks Service, 2 in. through 24 in.
8. AWWA C509 Resilient-Seated Gate Valves for Water Supply Service
9. AWWA C542 Electric Motor Actuators for Valves and Slide Gates
10. Naval Publications and Form Center (NPFC) A-A-59326D General Specification for Coupling Halves, Quick-Disconnect, Cam-Locking Type.

1.05 DESCRIPTION

A. The scope of this Section includes requirements for all process valves smaller than four-inches, in accordance with applicable standards and regulations. In addition:

1. Electric actuators for electrically actuated valves shall be provided by the valve manufacturers. Electric actuator motors shall conform to the requirements of Section 26 05 91, Low Voltage Electric Motors.

1.06 QUALITY ASSURANCE

A. 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.

B. 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.

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) Complete catalog information, descriptive literature, specifications, and identification of all materials of construction.

2) 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).

3) Power and control wiring diagrams, including terminals and numbers.

4) Complete nameplate data of electric actuators.

5) Spare parts list.

6) Special tools list.

c. Calculations:

1) Sizing of electric actuators, if applicable.

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 suitability of all valve materials for the specified service.

d. 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.

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. The quantities of spare parts sets to be furnished are given in Table 40 05 56-1, 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 56-1
QUANTITIES OF SPARE PARTS SETS TO FURNISH

Number of Valves Installed	Sets of Spare Valves 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.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solenoid Valves:

1. Automatic Switch Company, Florham Park, NJ;
2. Automatic Valve Corporation, Novi, MI;
3. Or approved equal.

B. Check Valves:

1. Stockham Valves and Fitting Company, Cullman, AL;
2. CVC Valves, former Lunkenheimer Company, Cincinnati, OH;
3. Or approved equal.

C. Gate Valves:

1. Stockham Valves and Fitting Company, Cullman, AL;
2. CVC Valves, former Lunkenheimer Company Cincinnati, OH;
3. Or approved equal.

D. Quick Connect Couplings - Chemical Service:

1. Banjo Corporation, Crawfordsville, IN;
2. Bee Valve, Inc., Elyria, OH;
3. Or approved equal.

E. Plug Valves:

1. DeZurik Plug Valves, Sartell, MN;
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 A126, Class A.

d. Non-ferrous Metals:

1) Non-ferrous Metals shall have standard composition and physical properties conforming to ASTM standards except as otherwise indicated.

e. Metal Castings:

1) All valves shall have manufacturer's name and rated pressure cast in raised letters on the valve body.

2) All valves shall have permanent markings for direction to open.

2. End Connections:

a. Shall be (at a minimum) suitable for the test pressure of the piping connected to the valve in question, as specified in:

1) For exposed valves: Section 40 06 01 - Schedule for Exposed Piping.

3. All valves shall be constructed such that operation at the lower range of operating pressures specified shall not result in any leakage.

4. All valves shall be blowout proof.

B. Metallic Valves:

1. Solenoid Valves:

a. Type: Packless construction with screwed end connections and threaded conduit connection.

b. Materials: Bronze body and wetted parts with type 304 stainless steel hardware.

c. Coil: Continuous duty, epoxy encapsulated.

d. Failure Mode: Fail open, energize to close.

e. Electrical Power: 120 volt, 60 Hz, single phase.

f. Each solenoid valve shall be protected with a strainer upstream.

2. Gate Valves:
    a. Type: Solid wedge, rising stem.
    b. Wetted Parts: 316 Stainless Steel
    c. Handle and Hardware: Type 316 stainless steel.
    d. Rating: 150 psig Water, Oil or Gas (W.O.G.).
    e. For Valves ≥ 3-in.: Provide resilient seated gate valves conforming to the requirements of Section 40 05 53 – Process Valves Four-inch Diameter and Larger, regardless of diameter.
    f. Bolts: Type 316 stainless steel, conforming to ASTM A193, Grade B.
3. Plug Valves:
    a. Type: Non-lubricated eccentric with rectangular port (one piece construction).
    b. Materials: Ductile iron, ASTM A536 Grade 65-45-12.
    c. Plug type: Plug faced with either neoprene for use with sewage or Hycar for use with digester gas at temperatures less than 180°F.
    d. Rating: 175 psig.
    e. Stem: Type 316 stainless steel.

C. Electric Motor Actuators:
1. General:
    a. Electric motor actuators shall conform to the requirements of AWWA C542.
    b. Type: Open-Close, reversing.
    c. Open-Close Time for Valves: 10 sec.
2. Materials and Construction:
    a. Housing: NEMA 4X with corrosion resistant epoxy coating.
    b. Power: 120 vac, 60 Hz, single phase.
    c. SPDT switches shall be provided for remote valve position indication.
    d. Space heater and thermostat shall be provided in the housing.
    e. Integral thermal overload protection shall be provided with automatic reset.

f. Limit switches shall be in accordance with the requirements for electric motor actuators specified in Section 40 05 53 - Process Valves Four-inch Diameter and Larger.

D. Appurtenances and Miscellaneous Items

1. Quick Connect Couplings - Water Service:

a. Type: Dual cam and groove, male end dimensionally meeting the requirements of A-A-59326D, with dust cap, Type 304 stainless steel chain and lock.

b. Body: Cast iron.

c. Cam Arms: Type 304 stainless steel.

d. Gaskets: Acrylonitrile butadiene synthetic rubber.

2. Dielectric Pipe Couplings:

a. Provide at every location where copper pipe connects to steel, stainless steel or ductile iron pipe or equipment.

b. Body: Steel with non-conducting bushings on each end.

c. End Connections: Screwed.

d. Rating: 200 psig at 225°F.

3. Valve Boxes, Floor Boxes and Operating Wrenches:

a. Provide in accordance with Section 40 05 53 – Process Valves Four-inch Diameter and Larger.

4. Valve Chain Operators:

a. All plug, and butterfly valves 1½-in. and larger located more than 6 ft.-0 in. above the operating floor level shall be equipped with a manual gear operator mounting assembly and a chain operator adapted to fit the gear operator, chain guide and sprocket wheel bolted directly to the valve operating wheel.

b. Aluminum or type 316 stainless steel chain shall be provided to hang three feet above the operating floor. All operators shall be equipped with a ½-in. hook bolt located to keep chain out of walking areas or to permit access to equipment.

c. Chain shall be of welded link type with smooth finish. Chain that is crimped and has links type with exposed ends that may scratch or cut the operator shall not be acceptable.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. General:

1. 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 the requirements of Section 09 91 00 – Painting.
2. 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.
3. Identification:
   a. The valves shall be provided with identification conforming to the requirements of Section 40 05 97 – Identification for Process Equipment.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Shop test all valves in accordance with the manufacturer’s standard test procedures. In addition:
   1. Shop test the following valves in conformance with the following, additional requirements:
      a. Test the following sizes of metal-seated gate valves in accordance with the requirements of AWWA C500.
         1) Metal-seated gate valve sizes: ≥ 3-in.
      b. Test the following sizes of resilient-seated gate valves in accordance with the requirements of AWWA C509.
         1) Resilient-seated gate valve sizes: ≥ 3-in.
      c. Test the following sizes of swing check valves in accordance with the requirements of AWWA C508.
         1) Swing check valve sizes: ≥ 2-in.

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 and secured.

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

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B. The following valve type abbreviations are used in Schedule 40 05 56-1:

Valve Type:	Abbrev:
Solenoid Valve	Sol
Ball Valve	BV
Globe Valve	GLV
Check Valve	CV
Gate Valve	GV
Needle Valve	NV
Pressure Reducing Valve	PRV
Hose Bib	HBib
Plug Valve	PV
Pinch Valve	PnchV
Thermoplastic Ball Valve	BVP
Thermoplastic Check Valve	CVP
Thermoplastic Diaphragm Valve	DVP
Thermoplastic Butterfly Valve	BFVP

C. The following actuator type abbreviations are used in Schedule 40 05 56-1:

Actuator Type:	Abbrev:
Manual	Manual
Electric Actuators (Open/Close)	Elec(O/C)

D. The following valve material abbreviations are used in Schedule 40 05 56-1:

Pipe Material:	Abbrev:	Pipe Material:	Abbrev:
304L Stainless Steel	304L SS	Cast Iron	CI
316L Stainless Steel	316L SS	Chlorinated PVC	CPVC
Brass	Brass	Ductile Iron	DI
Carbon Steel	CS	Polyvinyl Chloride	PVC

E. The following valve end type abbreviations are used in Schedule 40 05 56-1:

Joint Type:	Abbrev:	Joint Type:	Abbrev:
Flanged	Flg	Soldered	Sld
Grooved End Coupling	GEC	Solvent Weld	SW
Grooved / Shouldered End Coupling	GSEC	Threaded	Thd
Shouldered End Coupling	SEC	--	--

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, incidentals, and appurtenances to furnish, install, and test all stainless steel hydraulic slide gates, complete and operational.

B. The following index of this Section is included 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 40 05 59.05-1, Stainless Steel Slide Gates 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. Section 05 05 23.01 - Welding

B. Section 05 05 23.02 – Miscellaneous Metal Fastenings

C. Section 09 91 00 – Painting

D. Section 26 05 91 – Low Voltage Electric Motors

E. Section 40 05 97 – Identification for Process Equipment

1.04 REFERENCES

A. ASTM A29 Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought

B. ASTM A126 Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings

C. ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

D. ASTM A240 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

E. ASTM A276 Standard Specification for Stainless Steel Bars and Shapes

F. ASTM A320 Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service

G. ASTM A395 Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures

H. ASTM A536 Standard Specification for Ductile Iron Castings

I. ASTM A572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

J. ASTM A582 Standard Specification for Free-Machining Stainless Steel Bars

K. ASTM B98 Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes

L. ASTM B148 Standard Specification for Aluminum-Bronze Sand Castings

M. ASTM B584 Standard Specification for Copper Alloy Sand Castings for General Applications

N. ASTM D707 Standard Classification System and Basis for Specification for Cellulose Acetate Butyrate Molding and Extrusion Compounds (CAB)

O. ASTM D2000 Standard Classification System for Rubber Products in Automotive Applications

P. ASTM D3935 Standard Classification System and Basis for Specification for Polycarbonate (PC) Unfilled and Reinforced Material

Q. ASTM D5436 Standard Specification for Cast Poly (Methyl Methacrylate) Plastic Rods, Tubes, and Shapes

R. AWWA C561 Fabricated Stainless-Steel Slide Gates

S. AWWA C542 Electric Motor Actuators for Valves and Slide Gates

1.05 DESCRIPTION

A. This Section includes requirements for providing stainless steel hydraulic slide gates, including, but not limited to, gate operators, appurtenances, related controls, and accessories, in accordance with applicable standards and regulations. In addition:

1. Slide gate identification number, location, service, type, size, design pressure, type of operator and type of stem are listed in Schedule 40 05 59.05-1, located after the "End of Section" designation, and as shown on the Contract Drawings.

2. Stainless steel hydraulic slide gates and gate operators shall be constructed of materials suitable for use in the water and wastewater environment to which they will be exposed. The gate and gate operators are located in the National Electric Code (NEC) Class 1, Division D, Division 1 hazardous locations. Provide explosion proof electrical equipment and appurtenances that are UL listed or FM approved to use in the areas as noted on Schedule 40 05 59.05

3. Stainless steel hydraulic slide gates and gate operators shall meet the general design requirements set forth herein and the specific design and operating requirements listed in Schedule 40 05 59.05-1, located after the "End of Section" designation, and as shown on the Contract Drawings.

4. Design slide gates for specified seating or unseating pressures.

   a. Seating pressure shall be measured to the center of the slide gate.

   b. Unseating pressure shall be measured to the center of the slide gate.

   c. Structural design must consider the pressure difference from the invert.

5. Design the operating mechanisms based on the following loading:

   a. The minimum vertical load is fifty percent (50%) of the force, in pounds of force, on the gate resulting from the operating head acting on the horizontal centerline of the gate multiplied by the effective area of the gate, plus the weight of the slide and stem.

   b. The operating head is the distance from the centerline of the slide gate to the maximum water level of the channel within which the gate is located.

6. The equipment furnished under this Section shall be suitable for receiving primary and mixed sludge flow from the primary and secondary clarifiers. The sludge may be expected to contain, sand, silt, organic solids, fats and oils. The equipment will be located indoors and will be exposed to variable

concentrations of hydrogen sulfide and other gases associated primary and mixed sludge flow.

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 Contractor 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 no be limited to) the following activities:

a. Obtain representative material samples.

b. Verify traceability.

c. Obtain copies of Certified Materials Test Reports (both chemical and physical) and Manufacturer's Certificates of Conformance.

d. Perform visual inspection of welding, as per applicable welding code.

e. Perform visual and dimensional inspection of completed work.

f. Witness passivation of stainless steel parts and tests for free iron contamination, as applicable.

B. Qualifications of Manufacturer:

1. The manufacturer shall have a minimum of five (5) years of experience in the design and fabrication of stainless steel hydraulic slide gates of similar size, capacity, and type to those specified in Schedule 40 05 59.05-1, located after the "End of Section" designation, and shall show evidence of at least five (5) substantially similar installations in satisfactory operation.

C. Supply and Compatibility:

1. All components shall be traceable to the original heat and/or lot numbers unless otherwise approved.

2. All stainless steel hydraulic slide gates included in this section shall be provided by the Contractor through a single, qualified stainless steel hydraulic slide gate manufacturer. The manufacturer shall also supply the following as part of the Work:

a. Mounting plates.

b. Self-containing frames.

D. Regulatory Requirements:

1. If the stainless steel hydraulic slide gate requirements of this Section and referenced standards or manufacturer requirements are in conflict, the more stringent provision shall apply.

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) The Contractor shall submit all information necessary and required to substantiate approval of a stainless steel hydraulic slide gate manufacturer in accordance with the quality assurance requirements of this Section.

b. Schedule of deviations.

c. Shop Drawings:

1) Arrangement and erection drawings of the gates, operators and control equipment.

a) Clearly identify all materials for all components on all shop drawings.

2) Schematic control diagrams, electrical connection diagrams, and complete description of the control system;

3) Operating characteristics, including the conditions specified in Schedule 40 05 59.05-1, located after the “End of Section” designation.

d. Calculations:

1) All calculations shall be based on the hydraulic conditions specified in Schedule 40 05 59.05-1, located after the “End of Section” designation.

2) Submit the manufacturer's structural computations for approval, showing that stresses and deflections are within specified limits.

3) Submit calculations of anchor bolts, including concrete penetration. Indicate all forces on structures resulting from gate operation.

4) Submit computations for sizing of operator and stem and of bearing pressures on power screw threads.

5) Complete calculations for each size of motor operator indicating the force required to operate the gate, the operator force provided, full load and locked rotor current, and horsepower.

6) Submit leakage calculations or documentation based on the hydraulic conditions.

7) All required calculations listed above, shall be signed and sealed by a Professional Engineer licensed in the State of New York.

e. Operation and Maintenance Manuals.

2. Information Submittals:

a. The material supplier shall certify to the City the yield strength of the material from which the stem is to be fabricated.

b. Manufacturer's certified performance and material specifications, as specified.

c. Submit material test reports representing all major components of slide gates and operators. An affidavit of compliance of stainless steel hydraulic slide gate manufacture with all applicable provisions of AWWA C561 and additions as specified.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver all materials provided under this Section in accordance with the requirements of the Contract Document.

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. The Contractor shall furnish spare parts and special tools necessary to service, disassemble, repair, and adjust all stainless steel hydraulic slide gates, and as per the requirements of the Contract Documents. In addition, the Contractor shall furnish the following:

1. For slide gates:

a. Two (2) threaded lift nuts of each size and type.

b. Two (2) stem couplings of each size and type, where couplings are provided for the installed gate.

2. For each electric motor operators:

a. One (1) motor of each size.

b. One (1) torque switch of each size.

c. One (1) limit switch assembly of each size.

d. Six (6) pushbuttons.

e. Six (6) color caps of each color.

f. Twenty (20) indicating lamps.

g. One (1) reversing starter of each size.

h. One (1) overload relay of each size.

3. Supplies:

a. Where oil lubricated equipment is used, sufficient oil, of types approved by the equipment manufacturer, shall be supplied for one (1) year of operation.

b. For grease lubricated bearings sufficient grease shall be supplied for one (1) year of operation.

c. For explosion-proof enclosures with desiccant-type dehumidification, provide a 2-year supply of desiccant. Include instructions for renewal of the desiccant supply.

1.10 WARRANTY

A. Not Used.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Stainless Steel Hydraulic Slide Gates:

1. RW Gate Company, Troy, NY

2. Hydrogate, Denver, CO;

3. Waterman, Exeter, CA;

4. Whipps, Inc. Athol, MA;

5. Or approved equal.

B. Electric Motor Operators:

1. Limitorque Corp., Lynchburg, VA;

2. Rotork Control, Inc., Mullica Hill, NJ;

3. EIM as manufactured by Emerson Electric Co., St. Louis, MO;

4. AUMA Actuators, Inc., Canonsburg, PA;

5. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General:

1. Fabricated stainless steel slide gates shall meet or exceed the requirements of AWWA C561.
2. The working design stresses on the disc and frame, under maximum load conditions, shall not exceed the lesser of the following:
    a. 40% of the yield strength of the materials; or
    b. 25% of the ultimate strength of the materials.

B. Slide:

1. General:
    a. Design slide gate slides to limit deflection under maximum loading as specified in Schedule 40 05 59.05-1, located after the "End of Section" designation, to the lesser of the following two (2) values:
        1) $^{1}/_{720}$ of the span of the gate; or
        2) 0.25-in.
2. Materials and Construction:
    a. Shall be constructed of flat stainless steel (SS316) plate with a thickness as shown, specified, necessary, and/or required. In addition:
        1) Thickness of the slide plate: ≥ ¼ in.
    b. The gate slide shall be reinforced with structural formed members of stainless steel of thickness necessary and/or required to limit gate deflection to the values specified herein. In addition:
        1) Thickness of reinforcing members: ≥ ¼ in.
    c. Slide:
        1) Type 316L stainless steel meeting the requirements of ASTM A240.
    d. Slide reinforcing members:
        1) Type 316L stainless steel meeting the requirements of ASTM A276.

C. Frame:

1. General:
    a. Frame shall be constructed of welded structural members that are formed from plate, and then welded together to form rigid, one-piece construction.
    b. The gate frame shall be of a flat back design to allow wall mounting without a box-out into the concrete opening.
2. Materials:

a. Frame and gate frame guides: Type 316L stainless steel meeting the requirements of ASTM A276.

D. Invert:

1. Shall be a stainless-steel angle welded to the bottom of the guides to form the seating surface for the flush-bottom seals attached to the frame invert.

E. Yoke:

1. General:

a. Provide a yoke for all slide gates.

b. Design shall allow removal of the slide without removal of the yoke.

c. The yoke shall be designed so that the deflection under full operating load shall not exceed whichever is less of the following two values:

1) $^{1}/_{720}$ the width of the gate; or

2) 0.25-in.

a. Materials and Construction: Yoke shall consist of two (2) structural formed channel members welded to the top of the guides.

b. Type 316L stainless steel meeting the requirements of ASTM A276.

F. Seals:

1. General:

a. All gates shall be provided with a self-adjusting seal system to restrict leakage in accordance with the requirements listed in this specification.

b. All gates shall be equipped with Ultra-High Molecular Weight (UHMW) Polyethylene seat and seals to restrict leakage and to prevent metal to metal contact between the frame and slide. Seat contact pressure shall not exceed 600 psig at the design head.

c. The seat/seals shall extend to accommodate 1.5 times the height of the slide when the slide is in the fully closed or fully opened position.

d. All upward opening gates shall be provided with a resilient seal to seal the bottom portion of the gate. The seal shall be attached to the invert member or the bottom of the slide and it shall be held in place with Type 316 stainless steel attachment hardware.

e. The seal system shall be durable and shall be designed to accommodate high velocities and frequent cycling without loosening or suffering damage.

f. All seals must be bolted or otherwise mechanically fastened to the frame or slide.

1) Arrangements with seals that are force fit or held in place with adhesives are not acceptable.

g. The seals shall be mounted so as not to obstruct the water way opening.

h. Gates that utilize rubber “J” seals or “P” seals are not acceptable.

i. The seal system shall have been factory tested to confirm negligible wear (less than 0.01-in.) and proper sealing. The factory testing shall consist of an accelerated wear test comprised of a minimum of 25,000 open-close cycles using a well-agitated sand/water mixture to simulate fluidized grit.

2. Materials and Construction of Seals:

a. Ultra-High Molecular Weight Polyethylene ASTM D4020 and Neoprene ASTM D2000 Grade AA625.

3. Seals shall be self-adjusting.

G. Slide Gate Operators and Lifting Stems:

1. General:

a. Provide slide gate operators and lifting stems.

b. Provide all slide gates with rising stems, except as otherwise specified in Schedule 40 05 59.05, located after the "End of Section" designation, or as shown on Contract Drawings.

1) Where non-rising stems are permitted, design the gate such that the bottom of the stem is above the waterway.

c. The stem diameter shall be based on the following modified Euler's equation (Using the AWWA equation to calculate the stem diameter will not be approved.):

$$\frac{P}{a} = \frac{571{,}000{,}000}{\left(L/R\right)^2}$$

where:
P = The maximum force applied to stem, resulting from manual or power operation (lbf)
a = Cross sectional area of stem, at root of thread, if any (in^2).
L = Unrestrained length (in.)
R = Radius of gyration.

1) The value of P/a shall not exceed two thirds of the yield stress of the stem material.

2) To determine stem diameters, force P shall be set to the following values:

a) For electrical operators: Force P shall be based on twice the stalled (locked) rotor force.

b) For hydraulic cylinder operators: Force P shall be twice the maximum hydraulic pressure on the full piston area.

c) For manual operation: Force P shall be based on a manual force of 250 lbf applied to the operating crank or handwheel.

2. Materials and Construction:

a. Design stems for the maximum operating torque of the operator and the weight and service of the gate.

b. Limit the length over radius of gyration ratio of the stem to 200.

c. The minimum stem diameter shall be 2.00-in.

d. Bronze components shall conform to the requirements of ASTM B98.

e. Stainless steel components shall be ASTM A276 Type 316.

f. Slide Gate Operators:

1) Operator housings and pedestal handwheels:

a) Ductile iron:

(1) ASTM A395

(2) A536, Grade 65-45-12

2) Operator worms, steel: ASTM A29/A 29M Grade Designation 8620

3) Operator gears, steel: ASTM A572/A572M

4) Worm gears, bronze:

a) ASTM B148, Alloy UNS No. C95400/C95500

b) ASTM B584, Alloy UNS No. C86300

5) Lift Nut: Manganese bronze, ASTM B584, Alloy UNS No. C86500

6) Pinion Shaft: Stainless steel, ASTM A276, Type 304

7) Floorstand Support Brackets:

a) Cast Iron, ASTM A126, Class B; or

b) Fabricated Stainless Steel, ASTM A167, Type 304.

8) Stem:

a) Stainless Steel, ASTM 276 Type 316.

9) Stem Protection, Bottom:

a) Stainless steel, ASTM A240/A 240M, Type 304, Schedule 20 pipe (minimum).

10) Stem Cover, Top:

a) Clear polycarbonate, ASTM D3935, ASTM D707; or

b) Cast methacrylate plastic, ASTM D5436, Clear plastic butyrate pipe.

3. Appurtenances:

a. Support:

1) Provide an operator supporting structure capable of supporting the operator and all appurtenances. The maximum deflection of the operator supporting structure shall not to exceed the lesser of the following under full operating load, when a 40-lbf. effort is placed on the handwheel or hand crank:

a) $^{1}/_{720}$ of the span of the gate; or

b) 0.25-in.

2) Design the structure with a factor of safety of 5 based on the ultimate tensile, compressive, and shear strength of the material.

b. Handwheel and Cranks:

1) Mount manually operated handwheels or cranks directly on the lifting mechanism to maximum height of 3.5 above the operating floor level.

2) Where the lifting mechanism is above this elevation, mount the handwheel or crank on the side of the head frame.

3) Connect side-mounted wheel and crank operators to the lifting mechanism with bronze or cadmium-plated gearing and stainless steel shafting supported on roller bearing mounts. Limit operator to a maximum pull of 40 lbf. on the handwheel or crank at design load.

c. Bench Stand Hoist:

1) Provide a bench stand hoist equipped with roller bearings above and below the operating nut and with mechanical seals around the operating nut.

d. Rising Stems:

1) Provide rising stem operators, unless otherwise specified.

2) Securely fasten stems to the gate by means of a casting, mounting block or angles secured to the gate.

3) Acme-threaded stem to have 63 micro-inch finish or better.

4) Gate stem attachment to be provided with provisions for keying or pinning the stem to the gate attachment.

e. Stem Guides:

1) Provide stem guides where required to limit the unsupported stem length

2) Stem guides shall be polymer or bronze bushed.

f. Stem Covers:

1) The stem cover shall have a rain cap, vent holes to prevent condensation and clear biaxially-oriented polyethylene terephthalate travel indicating tape.

a) Travel indicating tape shall have markings in increments of every one inch.

2) The tape shall be field applied to the stem cover after the gate has been installed and positioned.

3) Stem covers shall be as shown in contract drawing.

H. Electric Operators (Open/Close)

1. General:

a. Electric operators for open/close service shall conform to the requirements of AWWA C542.

b. Provide operators that hold the gate in any position from fully open to fully closed, without vibration.

c. Application Criteria:

1) Temperature Range: -20°F to +140°F.

2) Ambient Humidity: 100%.

3) Maximum design seating and unseating heads:

a) Refer to Schedule 40 05 59.05-1, located after the "End of Section" designation.

4) Opening and closing speeds: 12-in./min

   a) Shall be for both open and close directions.

   b) Speed hall be when the differential pressure is the maximum specified and the voltage at the terminals is 15% below the nominal voltage.

5) Power Supply: 480 V, 3-phase, 60-Hz.

6) Control voltage: 120 V, single phase, 60-Hz.

7) Integral Transformer:

   a) Provide an integral 480V/120V control transformer with fused secondary.

8) Torque:

   a) Design the operator to exert an unseating torque of ≥ 50% in excess of the required slide seating torque at the specified voltage, neglecting hammer-blow effect.

9) Duty Cycle:

   a) Provide a motor rated for 15 min. cycle or three (3) complete cycles opening and closing gate, whichever is longer, during a 60-minute period.

   b) Duty cycle shall be measured under maximum operating head, as specified in Schedule 40 05 59.05-1, located after the "End of Section" designation, and at 40° C ambient temperature.

10) Each gate operator shall be equipped with a hand wheel for manual operation:

   a) Rim pull: ≤ 40 lbf.

   b) The handwheel shall be connected such that operation by the motor will not cause the handwheel to operate.

   c) Provide an operator that is arranged so that motor or motor gearing failure does not prevent manual operation.

   d) Arrange the operator to automatically change from manual operation to electrical operation when its motor is energized and to continue electric operation until the operator is reset to manual operation.

   e) Provide a means for locking the drive in either manual or motor operation.

f) Handwheel shall be removable.

11) The operator shall be operable with handwheel even after the electric motor has been disengaged and removed for repairs.

d. All electrical shall conform to the area classification shown on the Contract Drawings and conform to the area classification specified in Schedule 40 05 59.05-1, located after the "End of Section" designation.

2. Materials and Construction:

a. Electric Motor:

1) General:

a) Motor shall be in accordance with the requirements of Section 26 05 91 - Low Voltage Electric Motors.

b) Motor shall be specifically designed for gate operator service.

c) Motor shall have high torque characteristics.

d) Motor shall have a maximum continuous total temperature rating of 70° C.

e) The motor shall be sized for at least 1.5 times the operator torque requirement.

b. Operator Mounting:

1) Design the operator to be mounted on the floor stand, unless otherwise shown or specified.

c. Power Gearing:

1) Provide power gearing consisting of:

a) Worm gear; and

b) One (1) of the following two (2) gear types:

(1) Helical gear; or

(2) Spur gears.

2) Worm Gear:

a) Shall be of either:

(1) hardened alloy steel with threads ground and polished after heat treating; or

(2) Nickel or manganese bronze.

3) Helical and spur gears:

a) Shall be of accurately machined hardened alloy steel.

4) Use antifriction bearings throughout.

5) Provide grease pack or oil bath lubrication.

d. Lost-Motion Device:

1) Provide a lost-motion device that will permit the motor to attain full speed, and then impart a hammer blow to the stem nut to start movement of the slide in both the opening and closing directions.

e. Declutching Mechanism:

1) Provide a declutching mechanism to disengage the motor mechanically but not electrically from motor to handwheel operation.

2) If the clutch is of the external lever type, arrange it such that the lever does not move when the motor is energized.

f. Position Indication:

1) Provide an operator-mounted gate position indicator of either:

a) The mechanical; or

b) The indicating light type.

2) Indicate the following:

a) Fully open position; and

b) Fully closed position; and

3) Provide electrical contacts as required for remote indication of gate position.

g. Housing:

1) Provide housings for controls, gears, and motors with integrally cast flanges.

2) Fully machine and template drill the flanges and their mating surfaces.

3) Provide joints which are metal-to-metal or gasket or O-ring sealed as required.

h. Control and Motor Enclosures:

1) Provide the controller with mechanical interlocks and mount as an integral part of the operator.

2) For explosion-proof enclosures which are dependent upon metal-to-metal faces for weatherproofing, either:

a) Provide explosion-proof breathers and drains with desiccant type dehumidification.

(1) Desiccant shall be silica gel and enclosure shall have sufficient desiccant capacity for 6 mo. service without requiring renewal.

b) Provide actuators that are hermitically sealed which do not require breathers and drains or desiccant.

i. Electrical Compartment Heater:

1) Provide electrical compartment heaters.

j. Reversing Controller, Overload Protection and Internal Wiring:

1) Provide a reversing controller, complete with mechanical interlocks and controls as an integral part of the operator.

2) Provide adequate overload protection in the controller or embedded in the motor windings.

3) Install an overload device in each phase.

4) If overload devices are installed in the motor windings, provide devices of the bimetallic automatic reset type with the contacts in the control circuit.

5) Arrange the internal wiring in the operator so that the opening and closing coils cannot be energized simultaneously at any time, regardless of external wiring conditions.

k. Push Buttons and Selector Switches:

1) Where operators are 6 feet or closer to the floor and in an accessible location, mount OPEN-STOP-CLOSE push buttons or a selector switch.

2) Where the operators are located over 6 feet from the floor or in an inaccessible location, connect all internal control and indication wiring to a terminal block within the operator enclosure and provide a separate control station for remote mounting.

l. Limit and Torque Switches:

1) Provide the operator with limit and torque switches, either direct or gear driven.

2) Provide adjustable limit and torque switches with auxiliary contacts that are operative in either direction of travel.

3) Provide limit switches that are "in step" with torque switches at all times, whether in motor or manual operation.

4) Equip the operator with limit switches to stop movement in each direction and torque switches for protection against mechanical overload and to stop movement in either direction if an obstruction is encountered.

5) Provide the number, function and arrangement of limit switches as shown, specified or required.

m. Directional Valves:

1) Provide 2-way or 4-way solenoid operated, spring return, directional valves selected for satisfactory performance at the specified gate operating speed, taking into account pressure losses through the valves.

3. Appurtenances:

a. Operator Mounting:

1) All mounting brackets, structural supports and other accessories necessary for a complete installation of each actuator, control enclosure and push-button station shall be supplied by the actuator manufacturer.

2) The mounting bracket shall be fabricated of Type 316 stainless steel.

3) All welding shall be a continuous Type 316 stainless steel weld on both sides of the plates and shall have predrilled holes to match the holes on the base.

4) The brackets shall be secured to the base with Type 316 stainless steel through bolts, double nuts and oversized washers (two double nuts and two washers per bolt assembly).

5) All fasteners and hardware shall be stainless steel ASTM A276, Type 316 and ASTM A320, B8 or B8F.

b. Electrical Connections:

1) All field connections shall be made to a factory-installed external NEMA 4X terminal box suitable for accepting the conduit and conductor connections.

c. Portable Operator:

1) Provide portable operators of the electric drill type with a reversing switch and safety hold-down ON-OFF switch incorporated in the handle.

2) Provide a heavy-duty electric drill that drives through an overload release clutch of the positive, spring loaded, hand type which instantly releases at a preset torque.

3) Provide adaptors to fit the pinion shafts on the floor stands and other operators.

4) Furnish a heavy-duty cord at least 20-ft long with an explosion-proof plug that is compatible with the convenience outlets. Mount the unit on a tripod which has an adjustable height.

5) Provide a unit that operates using 120 V, 60 Hz current. Provide equipment rated for the area classification of the gate.

4. Controls:

a. Provide each operator with controls:

1) Electrical controls shall include all necessary disconnect switches, motor starter and circuit breakers plus control power transformer to provide a complete system requiring only a single input power connection.

2) A panel-mounted disconnect switch shall be provided.

a) The door of the enclosure shall be mechanically interlocked with the disconnect switch such that the door cannot be opened with the switch in the ON position without using a tool-operated defeater.

3) Each motor circuit shall be protected with:

a) A properly sized, adjustable, magnetically-tripped, three-pole motor circuit protector; and

b) A motor starter with manual reset thermal overload relay.

4) All indicating lights, push buttons, and other devices shall be of the heavy-duty, full-size, oil-tight type.

a) They shall be NEMA rated in conformance with the requirements pertaining to the location of the control as shown on the Contract Drawings or specified herein.

5) Each door-mounted device shall have its own lamicoid plastic legend plate custom engraved by the actuator manufacturer.

6) A means shall be provided to test all indicating lights either using Push-to-Test lights or via a single Lamp Test push button.

a) Testing of lights shall not interrupt or affect the control functions.

7) Each actuator shall also be equipped with a safeguard to shut off the actuator on failure of essential electrical or hydraulic components and shall be set for plus 25% of the normal operating time.

b. Control Circuits:

1) All ladder-logical controls shall be performed through the use of either relays and timers, or a programmable logic controller (PLC).

2) When a PLC is provided for logical control, a programming unit shall be provided with the controller for adjusting and revising timer and counter constants. It shall be possible to modify and monitor the control program using the programming unit. A means shall be available for back-up downloading and recovering the program.

3) Spare PLC inputs and outputs shall be provided and factory wired to terminals. The minimum number of spares shall be ten percent of each of the total inputs and outputs, but in no case shall there be less than three spare inputs and three spare outputs.

4) The PLC shall be supplied with two user's manuals which shall be shipped in the power unit control panel.

5) The actuator manufacturer shall be responsible for the programming of the PLC to accomplish all required control functions.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Seat/Seal:

1. All sealing surfaces shall be Type 316L stainless steel.

B. Frames:

1. Non-shrink grout shall be used to seal the gate frame against the concrete wall.

2. Adhesive anchors meeting the requirements of Section 05 05 23.02 - Miscellaneous Metal Fastening shall be used for all anchoring to existing concrete.

C. Seals:

1. All gates shall be provided with a self-adjusting seal system to restrict leakage in accordance with the requirements specified herein.

2. The gate leakage shall not exceed the following rates, when subjected to the design seating and unseating hydrostatic heads specified in Schedule 40 05 59.05-1, located after the “End of Section” designation:

a. For seating head conditions: ≤ 0.1 gpm/ft of seating perimeter.

b. For unseating head conditions (up to a maximum head as of 20 ft, measured for the purpose of this calculation from the gate invert): ≤ 0.1 gpm/ft of seating perimeter.

D. Operator:

1. Lifting Stem:

a. Provide thread contact surfaces with a minimum 63×10^{-6}-in. finish.

2. Mounting:

a. Mount operators on a structural yoke.

E. Anchorage Devices:

1. Provide anchorage devices in accordance with Section 05 05 23.02 - Miscellaneous Metal Fastenings.

2. Contractor shall furnish anchor bolts and nuts of Type 316 stainless steel, of ample size and strength for the purpose intended, sized by the equipment manufacturer. Anchor bolts for installation in new concrete shall be hooked and provided for direct embedment during placement of concrete.

3. All hardware for mounting of motor drives and control panels shall be Type 316 stainless steel.

F. Identification:

1. Provide in accordance with Section 40 05 97 - Identification for Process Equipment.

G. Shop Painting:

1. Clean and prime coat ferrous metal surfaces of equipment in the shop in accordance with the requirements of Section 09 91 00 - Painting.

2. Finish paint ferrous metal surfaces in the shop using the manufacturer's approved standard finish system. Finish system shall be compatible with the primer specified in Section 09 91 00 - Painting and herein in this Section.

3. Motors shall be painted in accordance with Section 26 05 91 - Low Voltage Electric Motors.

4. Coat machined, polished, and non-ferrous metal surfaces and similar un-painted surfaces with corrosion prevention compound which shall be maintained during storage and until equipment begins operation.

5. Stainless Steel: Do not paint stainless steel.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Shop tests shall be performed and certified at the factory for all stainless steel hydraulic gates in accordance with the requirements of the Contract Documents.

B. All slide gates shall be shop tested for leakage at the seating and unseating hydrostatic heads specified in Schedule 40 05 59.05-1, located after the "End of Section" designation.

C. Witnessing of shop tests:

1. Shop tests for the stainless steel hydraulic slide gates shall be witnessed in accordance with the requirements of the Contract Documents.

2. Quantity of shop tests that shall be witnessed:

a. Refer to Schedule 40 05 59.05-1, located after the “End of Section” Designation.

b. Should the leakage rates specified herein be exceeded for any one gate during a shop test, each and all gates of the same size and type shall be witness shop tested.

1) Gates that exceed the specified leakage rates shall be rejected.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Install equipment in complete accordance with the manufacturer's printed instructions and the approved shop drawings.

3.03 FIELD TESTING / QUALITY CONTROL

A. Furnish the services of a qualified manufacturer representative to check and approve all installations before operation as well as conduct field testing, in accordance with the requirements of the Contract documents. In addition:

1. Contractor shall verify that all work furnished and installed conforms to the requirements the Contract Documents.

B. Preliminary Field Test:

1. The manufacturer representative shall inspect the installation of equipment, make any necessary adjustments, and field calibrate the equipment upon completion of the installation of each actuator and gate.

C. Final Field Tests:

1. Subject all stainless steel hydraulic slide gates to a field running test under actual operating conditions as required herein and in the Contract Documents.

2. Test slide gates for leakage, strength, and opening and closing against the maximum heads practicable to obtain under operating conditions.
    a. Adjust and repair the seating and sealing surfaces as necessary to stop any noticeable leaks around the frames or gates.
    b. Provide an installation for which the amount of seepage through any slide gate does not exceed the maximum allowable amounts specified herein for the seating and unseating conditions specified in Schedule 40 05 59.05-1, located after the "End of Section" designation.
3. Slide Gates and Operators:
    a. Field test all slide gates and operators by having each operator open and close the gate through the full range of travel at least four times.
        1) The field tests shall demonstrate that all equipment, controls and monitoring operate as specified and within the allowable leakage rates.
    b. Field test all gates with associated operators.
        1) For electro-operated gate, field test the gate separately from each local control panel, remote control panel or push-button station.
        2) Field test the manual overrides for electro-operators to demonstrate that they can seat and unseat each gate by operating the gate through a travel of at least 12 inches.
4. Test slide gates for leakage, strength, and opening and closing against the maximum heads specified in Schedule 40 05 59.05-1, located after the "End of Section" designation, unless otherwise approved by the Engineer.
5. Each slide gate shall be operated through all modes of operation.
6. Repair any leaks around the frames and adjust the gate wedging devices as necessary to reduce leakage to within allowable limits.
    a. Leakage around slides shall not exceed the maximum amount specified herein.

D. At a minimum, the services of the manufacturer's representative shall be provided as indicated below. The number of visits and person-days per visit, indicated below refers to the total required services for the slide gates provided under this Section.

Visit:	Purpose:	No. of Visits:	Person-days per visit:
1	Installation Checkout	1	1
2	Field Testing	1	1

3.04 STARTUP / DEMONSTRATION

A. Furnish the service of a qualified manufacturer representative to assist in the start-up of the equipment and train the plant operations and maintenance staff in the care, operation, and maintenance of the equipment in accordance with the requirements of the Contract Documents. In addition:

1. Contractor shall make all adjustments required to place all Work in proper operating condition.
2. Contractor shall include in training of plant personnel instruction on care and maintenance of the materials and equipment.
3. In the event of trouble with the equipment during startup/initial operation, the manufacturer's representative shall revisit the site as often as required until all troubles are corrected and the installation is entirely satisfactory.

B. At a minimum, the services of the manufacturer's representative shall be provided as indicated below. The number of visits and person-days per visit indicated below refers to the total required services for the slide gates provided under this Section.

Visit:	Purpose:	No. of Visits:	Person-days per visit:
3	Startup/Initial Operation	1	1
4	Training	1	1

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Provide field touch up painting of scratched or damaged surfaces, using primer, intermediate and finish paints provided by the manufacturer, in accordance with the requirements of Section 09 91 00 - Painting.

END OF SECTION

SCHEDULE 40 05 59.05-1
STAINLESS STEEL SLIDE GATE SCHEDULE

Name:	Upstream Bypass Channel Gate	Downstream Bypass Channel Gate
Type:	Slide Gate	Slide Gate
Quantity:	1	1
Seal:	Flush [Bottom]	Flush [Bottom]
Size (W × H):	39-in. × 30-in.	44-in. × 24-in.
Design Seating Head:	2.5 ft	2.0 ft
Design Unseating Head:	2.5 ft	2.0 ft
Operating Head:	2.50 ft	2.0 ft
Operator:	Electric Motor Actuator with Manual Hand Wheel	[Electric Motor Actuator with Manual Hand Wheel
Area Classification:	Class 1, Div. 1	Class 1, Div. 1
Power:	480 V, 3 Ø, 60 Hz	480 V, 3 Ø, 60 Hz
Stem:	Rising	Rising
Minimum Quantity of Gates that shall be Witness Shop Tested:	0	0
Tag Numbers:	###### ######	###### ######
Bottom Mount	Surface/Channel Wall	Surface/Channel Wall
Side Mount	Surface/Channel Wall	Surface/Channel Wall
Frame	Self- Contained	Self- Contained
Operator Type	Open/Close	Open/Close

NO TEXT ON THIS PAGE

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required, to furnish and install aluminum stop log planks, guides, and stop log plank pullers, with all appurtenances and accessories, complete and operational.

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

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3.05	Adjusting / Protection / Cleanup	5

C. The following schedule, attached after the end of section designation, is a part of this Section:

1. Schedule 40 05 59.16 01-1, Stop Logs (Aluminum) 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. Reference Standards:

1. ASTM A276 Stainless and Heat Resisting Steel Bars and Shapes.
2. ASTM B308 Aluminum-Alloy 6061-T6 Standard Structural Profiles.
3. ASTM D2000 Classification System for Rubber Products in Automotive Applications.

1.05 DESCRIPTION

A. The aluminum stop log planks shall be designed for flow in either direction and seals shall be provided for this condition.

1.06 QUALITY ASSURANCE

A. In accordance with the procedures and requirements set forth in the General Conditions of the Contract and Division 1, General Requirements, the following provisions shall pertain to work under this section.

B. Manufacturer's Qualifications:

1. The Contractor shall provide evidence to the Engineer that the Manufacturer has a minimum of ten (10) years of experience, in the design, manufacturing, and supervision of installation of the equipment of the type required under this Section.
2. The Contractor shall provide evidence to the Engineer that equipment which was designed and manufactured by the Manufacturer, and which is similar to the equipment required under this section, has been in continuous and successful operation in at least five (5) separate facilities for the past five (5) years.

C. All welds shall be performed by welders with AWS Certification.

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. Detailed dimensional drawings.
   b. Assembly and installation drawings.
   c. Location and details of stop log plank storage facilities.
   d. Records of Operational Tests and Load Tests.
2. Information Submittals:

a. Material certification and specifications.

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. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. RW Gate Company, Troy, NY;

B. Whipps, Inc of Athol, MA

C. Rodney Hunt, Orange, MA

D. Or approved equal;

2.02 MATERIALS / EQUIPMENT

A. Materials:

1. Stop log planks shall be fabricated of aluminum plate reinforced with extruded or structural aluminum horizontal and vertical members.

2. Stop log planks, lifting lugs and appurtenances shall conform to the requirements of ASTM B308 and to aluminum alloy and temper AA-6061-T6 provided with a mill finish.

3. Guides, anchor bolts and miscellaneous hardware and lifting devices shall be of Type 304 stainless steel conforming to ASTM A276.

4. All component parts shall be protected from dissimilar metals.

5. Lip-type seals shall be extruded neoprene conforming to ASTM D2000, Grade 2BC515, Durometer 50 ± 5.

B. Details of Construction:

1. The stop log planks shall not deflect more than 1/360 of the span of the plank under the design head specified in Schedule 40 05 59.16 01-1, Stop Logs (Aluminum) Schedule, located after the "End of Section" designation of this Section.

2. End caps will not be allowed on the stop log planks. Planks will be of sufficient weight to be submerged under their own weight.

3. Two lifting lugs shall be provided for each stop log plank. Lifting lugs shall be capable of withstanding the lifting load necessary to remove the stop log plank under the field design head.

4. Lip-type Seals:

   a. Each stop log plank shall be provided with uninterrupted seals along the bottom of the plank and up both sides. The seals shall be attached to the plank with Type 304 stainless steel bars and fasteners.

   b. The shape of the seal shall provide a seating surface having a minimum width of 1 inch. The vertical face of the seal shall be in contact with the seating surface of the guide to provide a proper seal at the corners.

   c. As indicated on the Contract Drawings, the bottom of the plank shall seal flush with the invert of the finished concrete channel or the stainless steel guide.

   d. Maximum guaranteed leakage: 0.1 gpm/ft of seal length.

5. Guides:

   a. The guides for the stop log planks shall be either surface mounted or embedded in the concrete, as shown on the Contract Drawings.

   b. Guides and all necessary attaching bolts and anchor bolts shall be furnished by the stop log plank manufacturer.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Stop Log Plank Storage:

1. The Contractor shall fabricate and install brackets, chains, angles, etc., on handrail or exterior walls, near the stop log plank installation locations for storage of the planks.

2. Storage brackets and stop log planks shall not overstress the structure to which they are attached for storage.

3. Location and details of storage facilities shall be submitted to the Engineer for approval prior to installation.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Examination of Stop Log Plank Locations:

1. Contractor shall examine the locations of the stop log planks to verify all pertinent dimensions prior to fabrication of the stop log planks.
2. Contractor shall have full responsibility for the proper fit of the furnished stop log planks at the locations designated on the Contract Drawings.

3.02 INSTALLATION

A. Number, size and location of stop log planks, guides and lifting devices shall be provided as shown on the Contract Drawings or called for in the Contract Documents.

B. The completely assembled stop log planks shall be tested for the manufacturer's guaranteed leakage criteria.

3.03 FIELD TESTING / QUALITY CONTROL

A. Testing of Stop Log Planks:

1. Contractor shall demonstrate, using a stop log puller and lifting device, the ease of installation, removal and the proper fit of the stop log planks at their locations of use in the presence of and to the satisfaction of the Engineer.
2. Stop log planks assembly shall be tested for conformance to manufacturer's maximum guaranteed leakage.

Any stop log planks that bind, do not fit, or do not meet leakage requirements shall be repaired and retested all at no additional cost to the City.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Stop Log Plank Storage

1. The Contractor shall fabricate and install brackets, chains, angles, etc., on handrail or exterior walls, near the stop log plank installation locations for storage of the planks.
2. Storage brackets and stop log planks shall not overstress the structure to which they are attached for storage.
3. Location and details of storage facilities shall be submitted to the Engineer for approval prior to installation.

B. Following successful completion of field tests, the Contractor shall store the stop log planks and stop log plank pullers at the locations designated by the Engineer.

END OF SECTION

SCHEDULE 40 05 59.16 01-1
STOP LOGS (ALUMINUM) SCHEDULE

Location:	Chan. Dimensions		Invert Elevation:	Water Surface Elevations:			
	Width	Height		Upstream Side:		Downstream Side:	
	(in.)	(in.)	(ft)	Min. (ft)	Max. (ft)	Min. (ft)	Max. (ft)
Upstream of Screen, Main Screening Channel, Grit Bldg.	4’6”	5’6”	28.50	0’4”	1’9”	0’0”	0’0”
Downstream of Screen, Main Screening Channel, Grit Bldg.	4’6”	5’6”	28.50	0’0”	0’0”	0’4”	1’9”

SECTION 40 05 97– IDENTIFICATION FOR PROCESS EQUIPMENT
CONTRACT TI-181

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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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 300 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.

3. In addition to the identification requirements listed above, for all gas piping at pressures above ½ psig, show the maximum pressure level within the piping as required by New York City Local Law 30.

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.

4. In addition to the tagging requirements listed above, provide tags at all gas valves at pressures above ½ psig with the operating pressure within the valve shown as required by New York City Local Law 30.

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. UTILITY GAS		
a. High Pressure	Black	Orange
b. Low Pressure	White	Orange
3.		
4.		
5.		
6. a. b. c. d. e. f. g. h. i.		
7.		
8. a. b. c.		
9. LIQUIDS THICK IN SOLIDS a. Primary Sludge	White	Black

Service Line:	Colors:	
	Letters:	Background:
b. Digested Sludge 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

Service Line:	Colors:	
	Letters:	Background:
14. CITY WATER	White	Blue
15. STEAM, DANGEROUSLY HOT WATER	Blue	Orange
16.		
17.		
18.		
19. PLANT SERVICE (COMPRESSED) AIR	White	Green
20. PROCESS (BLOWER) AIR	Gray	Green
21. HIGH PRESSURE AIR	Orange	Green
22.		

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

Legend:		Color Code:	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
DIESEL TANK	**	Orange	White
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

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
HEAT EXCHANGER	STEAM-WATER **	Blue	Orange
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

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
PLANT WATER	MAKEUP **	Yellow	Gray
PLANT WATER	TANK **	Yellow	Gray
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

Legend:		**Color Code:**	
First Line(1):	**Second Line(2):**	**Lettering:**	**Background:**
STANDBY GENERATOR	**	Red	Green
STARTING AIR	COMPRESSOR **	Orange	Green
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

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
DG(H)	High Pressure Digester Gas	Orange 22510
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

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
PW	Plant Water	Blue 15092
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

Abbr.:	Process/Service Line:	Fed. Std. 595B Color:
VCS	Vacuum Service	Green 14062
WAS	Waste Activated Sludge	Tan 13596
WDGS	Waste Digester Gas	Orange 22510
WML	Waste Mixed Liquor	Tan 12648
WO	Waste Oil	White 17925
WSC	Washed/Compacted Screenings	Black 14084

NO TEXT ON THIS PAGE

SECTION 40 06 01 – SCHEDULE FOR EXPOSED PIPING
CONTRACT TI-181

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
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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	2
3.01	Examination / Preparation	2
3.02	Installation	2
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. 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. 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
Primary Sludge (PS)	DI	150 psi	FLG	40 psi	Hyd	60 psi	CL	Paint	--
Degritted Primary Sludge (DPS)	DI	150 psi	FLG	40 psi	Hyd	60 psi	CL	Paint	

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B. The following service abbreviations are used in Schedule 40 06 01-1:

Service:	Abbrev:	Service:	Abbrev:
Primary Sludge	PS	Degritted Primary Sludge	DPS
Mixed Flow	MS	--	--
--	--	--	--
--	--	--	--

C. The following pipe material abbreviations are used in Schedule 40 06 01-1:

Pipe Material:	Abbrev:	Pipe Material:	Abbrev:
304L Stainless Steel	304L SS	Ductile Iron	DI
316L Stainless Steel	316L SS	Fiber-Reinforced Plastic	FRP
Brass	Brass	High Density Polyethylene	HDPE
Carbon Steel	CS	Polytetrafluoroethylene	PTFE
Chlorinated PVC	CPVC	Polyvinyl Chloride	PVC
Copper	Cu	Stainless Steel	SS

D. The following joint type abbreviations are used in Schedule 40 06 01-1:

Joint Type:	Abbrev:	Joint Type:	Abbrev:
Bell and Spigot	BS	Push-on Joint	POJ
Brazed	Brz	Shouldered End Coupling	SEC
Butt Weld	BW	Split-sleeve Coupling	SSC
Flanged	Flg	Soldered	Sld
Flexible Tube Connector	Flex	Solvent Weld	SW
Grooved End Coupling	GEC	Restrained Mechanical Joint	RMJ
Grooved / Shouldered End Coupling	GSEC	Restrained Push-on Joint	RPOJ
Lap Welded	LW	Threaded	Thd
Mechanical Joint	MJ	Welded	Wld

E. The following interior coating abbreviations are used in Schedule 40 06 01-1:

Interior Coating	Abbrev:	Interior Coating:	Abbrev:
Asphalt Coated	AC	Cement Lined	CL
Basalt Coated	BC	EPDM (M-class) Rubber	EPDM
Ceramic Epoxy Coated	CEC	Glass Lined	GL
Ceramic Epoxy Lined	CEL	Polyethelene Lined	PEL

F. The following exterior coating and treatment abbreviations are used in Schedule 40 06 01-1:

Exterior Coating, Treat.:	Abbrev:	Exterior Coating, Treat.:	Abbrev:
Asphalt Coated	AC	Galvanized	Galv
Epoxy	Epx	Insulate	I
Heat Trace	HT	Paint	P

G. The following testing abbreviations are used in Schedule 40 06 01-1:

Test Type:	Abbrev:	Exterior Coating, Treat.:	Abbrev:
Hydrostatic	Hyd	--	--

SECTION 40 42 13 – PROCESS PIPING INSULATION
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish, install, and test all insulation and jacketing for process piping systems, including piping, valves, and accessories, complete and operational.

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

Article	Title	Section Page
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3.03	Field Testing / Quality Control	10
3.04	Startup / Demonstration	10
3.05	Adjusting / Protection / Cleanup	10

C. The following schedule(s), attached after the end of section designation, are a part of this Section:

1. Schedule 40 42 13-1, Process Piping Insulation and Jacketing 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. Section 09 91 00 – Painting

B. Section 40 05 07 – Hangers and Supports for Process Piping.

C. Section 40 06 01 – Schedule for Exposed Piping.

D. Section 40 42 13 - Process Piping Insulation

1.04 REFERENCES

A. Referenced Standards:

1.	ANSI B16.9	Standard for Factory Made Wrought Steel Butt Welding Fittings.
2.	ASTM C240	Standard Test Methods of Testing Cellular Glass Insulation Block.
3.	ASTM C411	Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
4.	ASTM C534	Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
5.	ASTM C552	Standard Specification for Cellular Glass Thermal Insulation.
6.	ASTM C547	Standard Specification for Mineral Fiber Pipe Insulation
7.	ASTM C1136	Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
8.	ASTM D1056	Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber.
9.	ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials.
10.	ASTM E96	Standard Test Method for Water Vapor Transmission of Materials.
11.	NFPA255	Surface Burning Characteristics of Building Materials.

12. Building Code of the City of New York.

13. New York State Energy Conservation Code.

1.05 DESCRIPTION

A. This Section includes requirements for providing insulation and jacketing for process pipe, valves, and accessories in accordance with applicable standards and regulations. In addition:

1. This Section also includes requirements for providing insulation and jacketing for HVAC and Plumbing System piping.

2. Refer to Schedule 40 42 13-1, Process Piping Insulation and Jacketing Schedule, for the extent of piping insulation and jacketing.

1.06 QUALITY ASSURANCE

A. Qualifications of Manufacturers:

1. The manufacturer(s) shall have a minimum of five (5) years of experience in the manufacture of process piping insulation products of similar size and type to those specified herein, and shall show evidence of at least five (5) substantially similar installations in satisfactory operation.

B. Supply and Compatibility:

1. Qualifications of Installer:

a. Use a single firm with at least five (5) years of successful installation experience on projects with insulation similar to that required for this project.

2. The process pipe insulation and jacketing shall be fabricated and installed in accordance with the standards referenced herein.

3. The installer shall bear responsibility for the quality of all process pipe insulation and jacketing, regardless of the location of application.

4. The installer shall verify compatibility between the process pipe insulation and jacketing, and other Work.

C. Regulatory Requirements:

1. Process pipe insulation and jacketing shall conform to the New York City Building Code in respect to plumbing and other applications covered by these codes.

2. Flame/Smoke Ratings:

a. Piping insulation shall have a composite (insulation, jackets, coverings, sealers, mastics and adhesives) flame-spread index of 25 or less, fuel-contributed rating of 50 or less, and smoke-developed index of 50 or less, as tested by ASTM E84 (NFPA255) method.

b. Any treatments of jackets or facings to impart flame and smoke safety shall be permanent.

c. The use of water-soluble treatments shall be prohibited.

3. Building Code Compliance:

a. Process piping insulation and jacketing shall comply with the New York City Building Code and with the New York State Energy Conservation Code.

1.07 SUBMITTALS

a. Schedule: For each individual piping system requiring insulation as specified in Schedule 40 42 13-1, Process Piping Insulation and Jacketing Schedule, submit a schedule including the following:

1) Insulation type (e.g., Type A, etc.) as specified herein;

2) Manufacturer name;

3) Thickness; and

b. Stainless Steel Jacketing:

1) Submit the manufacturer technical data for all jacketing and related materials.

c. Installation Drawings: for each individual piping system requiring insulation as per Schedule 40 42 13-1, Process Piping Insulation and Jacketing Schedule, submit complete installation drawings including:

1) Assembly and installation details;

2) Layout, including plan and section views;

3) Details for installation at valves and appurtenances;

4) All drawings and details shall have clearly marked dimensions, distances, offsets, and an arrow indicating north;

5) Callouts showing the type of installation as specified herein;

6) Callouts indicating stainless steel jacketing (if applicable);

7) Clear demarcation of the extents of insulation, as well as the extents of stainless steel jacketing (if applicable);

8) Critical clearance distances with insulation and jacketing installed. Clearances shall be to other, nearby and potentially conflicting pipelines, appurtenances, and structures, as shown on the Contract Drawings; and

9) Details for jointing insulation (and if applicable, stainless steel jacketing) butt joints and longitudinal seam.

2. Information Submittals:

a. Manufacturer instructions for handling, storing, installing, and adjusting of products.

b. Qualifications of process piping insulation installer.

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. Protect the insulation against dirt, water, and chemical and mechanical damage.

2. Remove damaged materials from the project site.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Style “A” Insulation:

1. Johns Manville Corp., Denver, CO;

2. Owens Corning Co., Toledo, OH;

3. Or approved equal.

B. Style “B “Insulation:

1. NH Armaflex as manufactured by Armacell® LLC, Chapel Hill, NC;

2. Or approved equal.

C. Style C Insulation:

1. Pittsburgh Corning Corp., Port Allegany, PA;

2. Or approved equal.

D. Style D Insulation:

1. Johns Manville Corp., Denver, CO;

2. Owens Corning Company, Toledo, OH;

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Style "B" Insulation – Flexible Elastomeric Cellular Insulation

1. General:

a. Insulation shall be flexible elastomeric type, closed cell, cylindrical or sheet type as required by the application.

b. The insulation shall meet the requirements of ASTMC534 and ASTM D1056.

2. Materials and Construction:

a. The thermal conductivity shall not exceed the following:

1) 0.27 Btu/hr/ft^2/°F/in.-thickness at 75°F mean temperature.

b. Water absorption: Shall be less than 5% (ASTM D1056).

c. Water vapor permeability: Shall not exceed 0.10 perms/in. in accordance with ASTM E96 Procedure A.

d. Joints and Seams:

1) All joints shall be cut straight and butted with no gaps. Seal all joints with the manufacturer's recommended adhesive.

e. Fittings, flanges, and valves:

1) Seams and mitered joints shall be adhered using the manufacturer's recommended adhesive. Screwed fittings shall be sleeved and adhered with a minimum one-inch overlap onto the adjacent insulation.

2) Flanges, strainers, couplings and valves shall be insulated using donuts, then covered with sheet or oversize tubular insulation.

f. Coating:

1) Where insulation is installed outdoors, coatings shall be provided to protect the insulation from ultraviolet radiation.

2) Coatings shall be as recommended by the insulation manufacturer and approved by the Engineer.

B. Style "C" Insulation – Cellular Glass:

1. General:

a. The insulation shall meet the requirements of ASTM C552.

b. Where field-applied stainless steel jacketing is not required over the insulation, the insulation shall be provided with a factory-applied facing of aluminum foil laminated to glass fiber reinforced white vinyl facing.

c. Insulation shall be rated for use at temperatures from 0°F to 220°F, at a minimum.

d. Mechanical Properties:

1) Minimum density: 8.0 lbs/ft^3.

2) Compressive strength: 100 psi.

2. Materials and Construction:

a. The thermal conductivity shall not exceed the following:

1) 0.32 Btu/hr/ft^2/°F/in.-thickness at 75°F mean temperature.

b. Water absorption: Shall be less than 0.2% (as per ASTMC240).

c. Water vapor permeability: Shall not exceed 0.20 perms/in. in accordance with ASTM E96.

d. Joints and Seams:

1) Insulation joints shall be sealed with the insulation manufacturer's recommended vapor-resistant joint sealant.

2) Factory-applied facing shall have its longitudinal seams sealed with vapor-resistant adhesive and butt joints shall be wrapped with 3-in. width joint sealing tape, all as recommended by the insulation manufacturer and approved by the Engineer.

e. Fittings, flanges and valves:

1) Fittings, flanges and valves shall be insulated with preformed cellular glass insulation.

2) Fitted insulation segments shall be used on sizes for which preformed shapes are not manufactured, of the same material and thickness and applied in the same manner as for pipe insulation.

f. Coating:

1) Where indicated on the Contract Drawings or in the Contract Documents, the interior bore of the insulation shall be coated to prevent abrasion of the pipe.

2) For pipe operating near ambient temperature, the coating shall be a gypsum cement molding plaster.

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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. Install process piping insulation in complete accordance with the manufacturer's printed instructions and the approved shop drawings. In addition:

a. Install piping insulation products in accordance with the Building Code of the City of New York.

b. Install all products in accordance with the recognized industry practices so that insulation serves its intended purpose.

c. Insulated thermal hangers shields shall be installed at all support points, except where otherwise indicated.

B. Installation of Process Piping Insulation:

1. Order of Installation:

a. Install insulation on pipe systems subsequent to the installation of heat tracing, painting, testing, and acceptance tests.

b. Piping shall be field tested and approved by the Engineer prior to installation of insulation.

2. Cleaning and Drying:

a. Pipe surfaces shall be cleaned and dried prior to insulating.

3. Insulation Surfaces:

a. Install the insulation materials with smooth, even and flush adjoining surfaces.

b. Butt insulation joints firmly together to form a complete and tight fit over the surfaces to be covered.

c. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete the run.

d. Do not use cut pieces or scraps abutting each other.

4. Vapor Barrier:

a. Maintain integrity of the vapor-barrier jackets on pipe insulation and protect to prevent puncture or other damage.

b. Vapor barrier materials shall be applied to form a complete, unbroken vapor seal over the entire insulated piping system.

5. Insulating Fittings:

a. Cover valves, fittings and similar items in each piping system with an equivalent thickness and composition of insulation as applied to the adjoining pipe run.

b. Install factory molded, precut or job fabricated units except where a specific form or type is indicated.

6. Installation through Walls, Floors, and Similar Piping Penetrations:

a. Unless indicated otherwise, piping insulation shall be extended without interruption through interior walls, floors and similar piping penetrations.

1) Annular spaces between pipe and pipe sleeves shall be thoroughly packed with fibrous glass blanket and caulked with mastic so as to be soundproof and vermin-tight.

2) Provide fibrous glass blanket with properties equivalent to the insulation Style installed on the piping.

b. Do not extend insulation through walls or floors that are fire rated or are required to be gas-tight.

7. Pipe Hangers:

a. Butt pipe insulation against pipe hanger insulation inserts.

b. For hot pipes, apply a 3-in. wide vapor barrier tape or band over the butt joints.

c. For cold piping apply a wet coat of the vapor barrier lap cement on butt joints and seal the joints with a 3-in. wide vapor barrier tape or band. Pipe hangers and supports shall be installed outside of the vapor seal.

8. Removable Items:

a. Install removable insulation sections on the following:

1) Devices that require access for maintenance of equipment

2) Items that can be removed, such as unions, screwed joints, flanges, strainers, etc.

C. Stainless Steel Jacketing:

1. Install jacketing in accordance with the manufacturer's recommendations and approved shop drawings.

2. Jacketing shall be secured with ¾-in. wide, 0.015-in. thick stainless steel bands at a maximum spacing of twelve inches.

3. All edges of strapping shall be factory deburred.

D. Pipe exposed to weather:

1. Pipe hangers and supports shall be on the outside of the stainless steel jackets and shall not penetrate the jacketing.

2. Do not install thermal hanger shields on pipelines using cellular glass insulation.

a. At each such location, a preformed Type 316 stainless steel insulation shield shall be provided.

b. The insulation shield shall envelope at least the lower half of the insulated pipe and shall limit the compressive load on the insulation to 33 psig or less.

E. Sealing:

1. All jacket openings (such as at overlaps of jackets with thermal hanger shields, around valve stems and similar projections) shall be sealed with non-hardening, clear or white, waterproof sealing compound, so that upon completion the insulation is essentially watertight.

F. Painting:

1. Paint piping insulation in accordance with Section 09 91 00, Painting.

G. Cleaning:

1. Clean and remove all debris, waste materials, and loose foreign matter resulting from installation.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Protection and Replacement:

1. Protection:

a. Insulation shall be protected against dirt, water, chemical or mechanical damage before, during and after installation.

b. Follow methods which are required for protection of the insulation work during the remainder of construction period, to avoid damage and deterioration.

2. Replacement:

a. Any insulation or covering damaged prior to final acceptance of the work shall be satisfactorily repaired or replaced, including units with vapor barrier damage and moisture saturated units.

3. Repair of Existing Insulation:

a. The Contractor shall repair sections of existing insulation as specified herein in the event Contractor damages sections of existing installation while performing the Work.

1) Use insulation of same thickness as the existing insulation.

2) Install a new jacket lapping and sealer over the existing insulation.

3) If existing insulation is painted, paint new insulation to match the existing surface color.

4) If existing insulation is jacketed, replace damaged jacketing with new jacket.

END OF SECTION

NO TEXT ON THIS PAGE

SCHEDULE 40 42 13-1
PROCESS PIPING INSULATION AND JACKETING SCHEDULE

A. General:

1. The Contractor shall provide piping insulation and jacketing for mechanical, HVAC, and Plumbing piping in accordance with the requirements of Schedule 40 42 13-1.

   a. Section 40 06 01 - Schedule for Exposed Piping, identifies additional mechanical piping that requires insulation and jacketing, and is not referenced in this Schedule 40 42 13-1.

   b. For mechanical piping, in the event of a discrepancy between insulation requirements identified by this Schedule 40 42 13-1 and insulation requirements specified in Section 40 06 01 - Schedule for Exposed Piping, the Contractor shall provide the more stringent of the requirements.

   c. For all piping, in the event of a discrepancy between insulation requirements identified by this Schedule 40 42 13-1, and insulation requirements shown on the Contract Drawings or specified elsewhere in the Contract Documents, the Contractor shall provide the more stringent of the requirements.

B. Mechanical Piping System Insulation Schedule:

1. General:

   a. In addition to the requirements specified in Section 40 42 13 - Process Piping Insulation, the Contractor shall provide piping insulation on the mechanical piping systems specified hereinafter.

2. Thickness: Where not indicated otherwise, the Contractor shall provide the following minimum insulation thicknesses:

   a. Insulation shall be 1-in. thick for pipe sizes up to and including 6 in. nominal diameter.

   b. Insulation shall be 1½-in. thick for pipe sizes greater than 6-in. nominal diameter.

3. Cold Piping Systems:

   a. Style: Insulation shall be Style A.

   b. Install on the following for the purpose of eliminating sweating:

      1) City water systems

      2) Service water systems

4. Hot Piping Systems (up to 250°F)
   a. Style: Shall be as follows:
      1) Insulation shall be Style A for pipe sizes up to and including 30-in. nominal diameter.
      2) Insulation shall be Style D for pipe sizes greater than 30-in. nominal diameter.
   b. Thickness: The Contractor shall provide the following minimum thicknesses for the purpose of reducing heat loss and preventing injury to workers:
      1) Insulation shall be 1½-in. thick for pipe sizes up to and including 2-in. nominal diameter.
      2) Insulation shall be 2-in. thick for pipe sizes 2½-in. through 6 in. nominal diameter, inclusive.
      3) Insulation shall be 2½-in. thick for pipe sizes 8-in. through 30-in. nominal diameter, inclusive.
      4) Insulation shall be 3-in. thick for pipe sizes greater than 30-in., nominal diameter.
   c. Provide insulation on the following hot (up to 250°F) mechanical piping systems:
      1) Heated sludge piping systems
      2) Hot water piping systems
      3) Hot air piping systems
      4) Digester gas piping systems
      5) Interior heat-traced piping systems
5. Steam and condensate piping systems:
   a. Provide insulation for steam and condensate piping systems, as specified hereinafter, for the following piping systems, based on the temperature of the fluid:
      1) Hot Low Pressure (up to 250°F) HVAC Piping Systems
      2) Hot Fluids (251°F to 350°F) HVAC Piping Systems.
6. Exterior Piping Systems:
   a. Style: Insulation shall be Style C.
   b. Thickness: Insulation shall be a minimum 2-in. thick.
   c. Install on the following:

1) Exterior piping systems that are heat-traced for freeze protection.

C. HVAC Piping System Insulation Schedule:

1. General:

a. In addition to the requirements specified in Section 40 42 13 - Process Piping Insulation, the Contractor shall provide piping insulation on HVAC piping systems as specified hereinafter.

2. Sub-Freezing (0°F to 39°F) HVAC Piping Systems:

a. Style: Insulation shall be Style B.

b. Thickness:

1) Insulation shall be 1-in. thick for pipe sizes up to and including 1-in. nominal diameter.

2) Insulation shall be 1½-in. thick for pipe sizes greater than 1-in. nominal diameter.

c. Install on the following for the purpose of eliminating sweating:

1) Refrigerant suction lines systems between evaporators and compressors.

3. Cold (40°F to ambient) HVAC Piping Systems:

a. Style: Insulation shall be Style A.

b. Thickness:

1) Insulation shall be 1-in. thick for pipe sizes up to and including 4-in. nominal diameter.

2) Insulation shall be 1½-in. thick for pipe sizes greater than 4-in.

c. Provide insulation on the following cold (40°F to ambient) HVAC piping systems for the purpose of eliminating sweating:

1) HVAC chilled water supply and return piping systems.

2) HVAC make-up water piping systems.

3) Air conditioner condensate drain piping systems.

4. Hot Low Pressure (up to 250°F) HVAC Piping Systems:

a. Style: Insulation shall be Style A.

b. Thickness:

1) Insulation shall be 1½-in. thick for pipe sizes up to and including 2–in nominal diameter.

2) Insulation shall be 2-in. thick for pipe sizes 2½-in. through 6–in. nominal diameter, inclusive.

3) Insulation shall be 2½-in. thick for pipe sizes greater than 6-in. nominal diameter.

c. Provide insulation on the following hot low pressure (up to 250°F) HVAC piping systems for the purpose of reducing heat loss and preventing injury to workers:

1) HVAC hot water (glycol solution) supply and return piping systems

2) Hot gas refrigerant piping systems

3) Low pressure steam and condensate piping systems

5. Hot Fluids (251°F to 350°F) HVAC Piping Systems:

a. Style: Insulation shall be Style A.

b. Thickness:

1) Insulation shall be 2-in. thick for pipe sizes up to and including 1-in. nominal diameter.

2) Insulation shall be 2-½-in. thick for pipe sizes 1¼-in. through 4-in. nominal diameter, inclusive.

3) Insulation shall be 3½-in. thick for pipe sizes greater than 4-in. nominal diameter.

c. Provide insulation on the following hot fluids (251°F to 350°F) HVAC piping systems for the purpose of reducing heat loss and preventing injury to workers:

1) High pressure steam and condensate piping systems

6. Exterior Piping Systems:

a. Style: Insulation shall be Style C.

b. Thickness: Insulation shall be a minimum 2-in. thick, and greater if necessary and required to prevent freezing of the piping.

c. Install on the following:

1) Exterior piping systems that are heat-traced for freeze protection.

7. Insulation Omitted: For HVAC piping systems, omit insulation for the following:

a. Hot piping within radiation enclosures or unit cabinets,

b. Cold piping within unit cabinets provided that the piping is located over a drain pan and on heating piping beyond a control valve,

c. Piping located within heated space(s).

D. Plumbing Piping System Insulation Schedule:

1. General:

a. In addition to the requirements specified in Section 40 42 13 - Process Piping Insulation, the Contractor shall provide insulation for plumbing piping systems as specified hereinafter.

2. Cold Plumbing Piping Systems:

a. Style: Insulation shall be Style A

b. Thickness: Insulation shall be 1-in. thick.

c. Provide insulation on the following cold plumbing piping systems for the purpose of eliminating sweating:

1) Potable cold water piping systems

2) Interior above-ground storm water piping systems

3) Plumbing vents within 6 lineal ft of a roof opening

4) Drain piping systems from drip pans

3. Hot Plumbing Piping Systems:

a. Style: Insulation shall be Style A

b. Thickness:

1) Insulation shall be 1-in. thick for pipe sizes up to and including 6-in. nominal diameter.

2) Insulation shall be 1½-in. thick for pipe sizes greater than 6-in. nominal diameter.

c. Provide insulation on the following hot plumbing piping systems for the purpose of reducing heat loss and preventing injury to workers:

1) Potable hot water piping systems

2) Potable hot water recirculating piping systems

3) Hot drain piping systems

4) Tempered water piping systems

4. Insulation Omitted: For plumbing piping systems, omit the insulation for the following:

a. Chrome-plated exposed piping (except for handicapped fixtures).

b. Air chambers.

c. Unions.

d. Strainers.

e. Check valves.
f. Balance cocks.
g. Flow regulators.
h. Drain lines from water coolers.
i. Drainage piping located in crawl spaces or tunnels.
j. Buried piping.
k. Fire protection piping.
l. Pre-insulated equipment.

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate and place in operation a complete PMCS. The PMCS shall be as specified in this Section, the Sections listed in the Related Sections of this Section, and as shown on the Contract Drawings.

B. PMCS shall be designed to control, monitor, store, display and log process and equipment operating information and alarms and to perform various control functions and generate various alarms.

C. The unit processes which the PMCS shall control, and monitor are shown on the Contract Drawings and described herein.

D. Contractor shall coordinate with all PMCS equipment manufacturers to ensure that all control and instrumentation signals are incorporated properly.

E. P&IDs, Specifications of Division 40 and the Related Sections of this Section illustrate and describe the overall PMCS functional and operational requirements.

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 78 25	–	Operation and Maintenance Manuals
B.	Section 01 78 40	–	Final Record Documents
C.	Section 40 61 26	-	PMCS Training
D.	Section 40 61 93	-	PMCS Input Output List
E.	Section 40 61 95	-	PMCS Monitoring and Control Criteria
F.	Section 40 61 96	-	PMCS Control Strategies
G.	Section 40 63 43	-	PMCS Programmable Logic Controllers
H.	Section 40 67 16	-	PMCS Panels and Enclosures
I.	Section 40 78 90	-	PMCS Panel Mounted Instruments and Devices
J.	Section 40 80 81	-	PMCS Factory Test
K.	Section 40 80 82	-	PMCS Startup and Field Testing

1.04 REFERENCES

A. Definitions

1.	AI	-	Analog Input
2.	AO	-	Analog Output
3.	Area Process	-	A number of unit processes grouped either because of their similar equipment operation or similar function in a Plant. Area Process also comprise groupings of dissimilar unit processes designated a single group function.
4.	CPU	-	Central Processing Unit
5.	CS	-	Control Strategy
6.	DEP BIT	-	DEP Bureau of Business Information Technology.
7.	DI	-	Digital Input
8.	Distributed I/O	-	Hardware specifically designed to function as Remote I/O.
9.	Distributed		

10.	Control System	-	A control system comprising Unit and Area Process connected by a communication network which facilitates control and monitoring of the entire system from a central point such as a Plant control room.
11.	DO	-	Digital Output
12.	Fixed PLC	-	PLC whose hardware configuration comprises a fixed number of I/O, a CPU and power supply all in one enclosure.
13.	HMI	-	Human Machine Interface are electronic displays and windows providing operator access to monitor access, and set parameters of a Unit Process control system.
14.	I/O	-	Input/Output
15.	Modular	-	A style of PLC assembly where I/O, CPU and power supply are each mounted in cards which are insertable to a mounting chassis or backplane.
16.	OAD	-	Operational Availability Demonstration
17.	OIT	-	Operator Interface Terminal; another name for HMI.
18.	Control Panel	-	Control Panel includes any enclosure provided to house electrical equipment, instrumentation, controls wiring terminations, network hardware or connections, indicators, displays, computer hardware, panels of packaged systems etc. provided under any Section of this Contract
19.	P&ID	-	Process and Instrumentation Diagrams or included in the Contract Documents.
20.	Plant	-	Wastewater Resource Recovery Facility.
21.	PLC	-	Programmable Logic Controller
22.	PMCS	-	Plant Monitoring and Control System
23.	Remote I/O	-	Any I/O that functions physical remote from the location of the CPU and I/O located on its backplane.
24.	SFT	-	Start-up and Field Testing
25.	Unit Process	-	Any standalone equipment or process operation such as a pump in which all the logic for

control of the equipment or process resides in the local installation.

26. URT - Upset and Recovery Testing

27. WFAT - Witnessed Factory Acceptance Tests

B. Reference Standards

C. The following organizations have generated standards that are to be used as guides in assuring quality and reliability of components and systems; govern nomenclature; define parameters of configuration and construction, in addition to specific details in this Section and the Contract Drawings:

1. BWT PDS - BWT Design Guideline, Program Development Standards.

2. BWT PLC - BWT Design Guideline, Programmable Logic Controllers.

3. BWT SCADA - BWT Design Guideline, SCADA Software.

4. ISA 5.1 - Instrumentation Symbols and Identification

5. ISA 5.2 - Binary Logic Diagrams for Process Operations

6. ISA 5.3 - Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.

7. ISA 5.4 - Instrument Loop Diagrams.

8. ISA 5.5 - Graphic Symbols for Process Displays.

9. ISA 18.1 - Annunciator Sequences and Specifications.

10. ISA 18.2 - Management of Alarm Systems for Process Industries.

11. ISA TR20.00.01 - Specification Forms for Process Measurement and Control Instruments Part1: General Considerations.

12. ISA 51.1 - Process Instrumentation Terminology.

13. ISA RP60.3 - Human Engineering for Control Centers.

14. ISA 101 - Human Machine Interfaces for Process Automation Systems.

15. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Minimum).

16. NEMA ICS 1 - Industrial Control and Systems General Requirements.

17.	NEMA ICS 2	-	Industrial Control and System Controllers, Contactors and Overload Relays Rated 600V.
18.	NEMA ICS 4	-	Terminal Blocks.
19.	NFPA 79	-	Electrical Standard for Industrial Machinery.
20.	NYCEC	-	New York City Electrical Code.
21.	MIL-STD -1916	-	DOD Preferred Methods for Acceptance of Product.
22.	UL 508	-	Industrial Control Equipment.
23.	UL 1059	-	Terminal Blocks.

1.05 DESCRIPTION

A. The PMCS in this Project includes the expansion of an existing PLC network to a new PLC remote I/O panel located at the grit building. The Work includes, but is not limited to:

1. Vendor package of screen and washer.
2. Vendor package of conveyor.
3. Vendor package of cyclone degritters
4. PLC monitoring of the screening, washer, conveyor, and cyclone degritters.
5. Appropriate NFPA 820 ventilation monitoring systems.
6. Fiber optic cable routing from the new PLC remote I/O panel to the existing PLC-12 control panel in the South Sludge Thickeners Tunnel.
7. HMI updates, including new graphics, for both control and monitoring shall be required to incorporate the control strategies into the existing SCADA.

B. The system shall comprise unit processes organized into major process areas and a central monitoring and control point.

C. Unit processes shall be fully capable of accomplishing control, monitoring, storing and logging equipment operation at local point.

D. Unit Processes shall have the ability to transfer control to remote Area Control points or a remote Central Control point.

E. The system includes the following major equipment and all other appurtenances listed in the various Division 40 Sections:

F. Environmental Conditions:

1. The PMCS shall be designed and constructed for continuous operation under the following temperature and humidity conditions:

a. Control Rooms

1) Ambient Temperature
   a) Normal Range 60º F to 80º F
   b) Extremes 40º F to 105º F.
2) Relative Humidity
   a) Normal 80 percent
   b) Maximum 95 percent

b. Indoor locations
   1) Ambient Temperature 40º F to 120º F.
   2) Relative Humidity 98 percent maximum.

c. Outdoor locations
   1) Ambient Temperature -10º F to 120º F.
   2) Relative Humidity 100 percent maximum.

1.06 QUALITY ASSURANCE

A. Criteria

1. The PMCS facilities outlined in the Contract Documents and included herein have been designed to meet stringent quality standards. The criteria for selection of this system include, but are not limited to the following:
   a. The use of standard, "non-custom" equipment and application software.
   b. The ability of City's personnel to make modifications and adjustments in the field to react to actual field conditions.
   c. The ability of City to obtain training of City's personnel in a well-established equipment manufacturer training program.
   d. The availability of factory service and a well-stocked spare parts inventory, which could be drawn upon by the City in emergency situations.

B. PMCS Supplier

1. The PMCS shall be furnished by a single Supplier who shall assume responsibility for providing a complete and integrated system.
2. The system is to contain products of a single manufacturer, when possible, and to consist of equipment models, which are currently in production.
3. The Supplier shall identify those system components, which are not of his manufacture.
4. The Supplier shall supply his company's quality assurance plan, and for components which are not of his manufacture, the component

manufacturer's quality assurance plan. The plans shall include but not necessarily be limited to:

a. Method of testing, raw material criteria, methods of documentation, station control, "Burn-In", final tests and serialization coding and packaging.

b. Plans should be in accordance with M.I.L.-STD-1916.

C. Supplier's Qualifications

1. Shall be a financially sound firm having at least 10 years continuous experience in designing, implementing, supplying and supporting instrumentation and control systems, which are comparable to the PMCS in terms of hardware, software, cost and complexity.

2. Shall have manufactured and supported standard lines of digital processing and control equipment and application software continuously for the last 10 years.

3. Shall have in existence at the time of bid advertisement, an experienced Engineering and Technical staff capable of designing, implementing, supplying and supporting the PMCS and handling the PMCS submittal and training requirements.

4. Shall provide system hardware components and software packages of fully developed, field proven standardized designs and therefore shall furnish a system which is not a highly unique, custom one-of-a-kind system.

5. Shall have a minimum of 10 years' experience in operator interface software configuration and hardware application and programming of distributed microprocessor based controllers and data highway systems.

6. Shall provide standard course offerings in general process control applications and in operation, programming and maintenance of the control system and equipment at a facility specifically utilized for training purposes. The facility shall have been in operation continuously for the last 10 years.

7. Shall have a thorough working knowledge of Plant operation and control philosophy in accordance with standard practices of the industry.

8. Shall have a system of traceability of the manufactured units and purchased components through production, assembly, and testing.

9. Shall have a system of "Burn-In" for all components and available supportive documentation.

10. Shall have a demonstrated record of prompt response to field failures.

11. Shall have a documented program of failure analysis.

12. Shall have a UL approved panel shop.

13. Shall have a record of prompt shipments in accordance with Contract obligations required for previous projects.

D. Technical Proposal Requirements

1. The Contractor shall submit a copy of a Technical Proposal from the Supplier which he has selected to provide the PMCS.

2. The Technical Proposal shall be complete and at a minimum contain all information as specified below:

a. Financial Statement

1) Shall include the value of PLC/microprocessor based control systems delivered during the last 5 fiscal years.

2) Shall include the value of other process instrumentation and controls shipped during the period.

b. Experience

1) Shall provide evidence of compliance with the specific experience requirements under the Supplier Qualification listed in this Section in the form of an experience certification signed by an officer of the company.

2) Shall furnish list of last 10 projects completed.

3) Shall describe at least 3 completed municipal projects utilizing instrumentation and control equipment identical to or similar to (indicate which) that specified in this Section.

4) Shall indicate project name, value, completion date, names and phone numbers of representatives familiar with each project.

5) Letters of recommendation submitted does not relieve the Contractor from complying the requirements in this Section.

c. Personnel

1) Shall provide a listing of those personnel committed to be assigned to the Contract.

2) List shall include Project Manager, Project Engineer, Field Representative, Local Service Representative, and Sales Representative.

3) Shall identify addresses of personnel not based at supplier's main office.

4) Shall provide documentation including resumes of personnel demonstrating experience in Plant operations.

d. Exceptions

1) Shall list all exceptions and deviations from the requirements of the Contract.

2) Shall reference the Drawing Number, Section number, article, and paragraph of proposed variance and provide an explanation of why the proposed exception or deviation meets (or exceeds) the functional or equipment requirements specified.

e. Shipment Records

1) Shall provide evidence of timely delivery of equipment on past projects.

f. PMCS Hardware and Software:

1) Shall provide a general system configuration drawing and include designations for model numbers and types of the proposed distributed control system components and all other proposed system components.

2) Shall provide descriptive literature and manufacturer's catalog information covering all aspects of the hardware design and software functions and capabilities of the specific PLC control system and data highway system proposed for the PMCS.

3) Shall provide descriptive literature and catalog information covering the features and capabilities of all proposed hardware components.

4) Shall describe standard software packages proposed, including any customized software required to meet the functional intent of the system Specifications.

5) Descriptions shall address the following:

a) Overview of system software including the functions, organization and interrelationship of the major software modules provided.

b) Estimated memory requirements to accomplish the specified graphic display, logging, reporting and alarming functional requirements.

c) Examples of graphic displays, methods of display access and procedures for display definition and generation, including use of the standard symbols library and capabilities for generating and storing user defined symbols in the symbol library.

d) Real-time data logging and reporting software features and capabilities including examples of logs and reports, procedures for automatic reporting and logging file setups, limitations on sampling and computing frequency for data acquisition and

logging, and utilities for log file and report modifications and file maintenance.

e) Alarm handling software features and capabilities including an alarm display example, methods of defining alarms and alarm files, automatic printing of alarms, acknowledgements and return to normal conditions, chronological sorting and time-tagging of alarms, and alarm file maintenance utilities.

f) Distributed system programming and documentation software features and capabilities, including screen display and printout examples for a fully annotated and cross-referenced ladder diagram and the ladder diagram elements.

g) Use of system level diagnostics for monitoring the performance of and detecting and reporting faults associated with the distributed communications data highway.

g. Instrumentation and Panel Mounted Devices

1) The Contractor shall provide descriptive literature and catalog cuts for each type of sensor, transmitter, indicator, and other such devices required by the Contract.

h. Training

1) The Contractor shall provide information and literature as to the organization proposed and the factory facilities to be utilized for the training specified.

2) Indicate the qualifications of the factory training staff.

i. Availability Demonstration

1) The Contractor shall indicate how the Availability Demonstration will be accomplished.

j. Maintenance

1) The Contractor shall provide the following information:

a) Location of service facility along with minimum and maximum response time.

b) Location of parts facility with delivery time and method.

E. Supplier's Responsibility:

1. The Contractor shall retain the PMCS supplier to assume the responsibilities specified below. However, execution of these specified duties by the

System Supplier shall not relieve the Contractor of the ultimate responsibility for the PMCS.

a. Design, fabrication, implementation and applications programming of the PMCS and all subsystems in accordance with the Contract Documents and all referenced standards and codes.

b. Preparation, assembly and correction of all PMCS submittals in accordance with the Contract Documents.

c. Proper interfacing of the PMCS hardware, software, field devices and panels, including required interfacing with packaged control systems furnished by other equipment suppliers, and with the Facility's PMCS.

d. Supervision of the installation of PMCS, instruments, panels, consoles, cabinets, wiring and other components required.

e. Calibration, testing and start-up of the PMCS.

f. Training of The City personnel in operation and maintenance of the PMCS.

g. Handling of all warranty obligations for the control system components.

h. Maintenance of 2 reproducible copies of the complete PMCS system and running software at the supplier's facility for the duration of the warranty period.

1) Software copies shall be maintained on the bulk storage medium used by the supplier for system program development and shall be directly loadable on the supplied system.

F. Coordination and Progress Meetings:

1. The Contractor shall be responsible for the scheduling and coordinating the system installation with regard to all other work on the site and in accordance with the provisions of the General Conditions. Said coordination shall be documented on the project schedule.

2. Routine progress and coordination meetings will be scheduled by Engineer. The Contractor and a representative of the System Supplier shall be required to attend a minimum of one meeting per month for the length of Contract.

3. The purpose of the meetings shall be to review the progress of the work involving the PMCS and provide coordination for installation of the equipment to ensure construction schedules are met.

4. Representatives at the meetings shall have the competence and authority to make any and all necessary decisions. Decisions and statements made at the

meetings shall commit the Contractor and the System Supplier to agreed procedures and schedules.

G. System Supplier Project Personnel

1. The Contractor shall require the System Supplier to provide the following project personnel:

a. Project Manager

1) The System Supplier shall appoint a Project Manager who shall coordinate and schedule all work and assure that the Contract schedule is met.

2) The Project Manager shall have a minimum of 10 years' experience in coordination, scheduling and delivery of instrumentation and control contracts under similar Plant Facilities as this Contract thorough working knowledge of contract administration as both a prime and sub-prime Vendor/Contractor.

3) The Project Manager shall act as the liaison with the Contractor for the installation of the PMCS and shall assist in all matters required for proper coordination and interfacing of the equipment and processes.

b. Field Engineer

1) The System Supplier shall appoint a Field Engineer with responsibilities as follows:

a) Provide advice and technical consultation relative to installation techniques and procedures for equipment furnished.

b) Installed system checkout, calibration, adjustment and start-up including tuning of every control loop.

c) Maintenance services during availability demonstration.

d) Involvement in the on-site system training of pumping station personnel.

e) Resolving of control problems encountered during initial start-up and testing of all PMCS monitoring equipment.

2) The Field Engineer shall have a minimum of 10 years' experience in systems engineering and start-up and shall have a thorough working knowledge of both the hardware and software supplied for the PMCS.

c. Training Personnel:

1) Comply with requirements of Section 40 61 26 - PMCS Training.

1.07 SUBMITTALS

A. Shop Drawings General

1. The Contractor shall submit Shop Drawing and material specifications for the approval of the Engineer.

2. Shop Drawing preparation shall not commence until after the pre-submittal conference specified below.

3. Manufacture of the PMCS shall not commence until related and interfacing equipment submittals have been approved by the Engineer.

4. Shop Drawings shall be submitted in complete packages grouped to permit review of related items as generally outlined in this Section under Submittal Requirements.

5. Review of Shop Drawings will be for conformance with Contract Documents and with regard to functions specified to be provided.

B. Pre-Submittal Conference

1. The Contractor shall arrange and conduct a pre-submittal conference on the PMCS within 45 days of notification of preliminary acceptance of the proposed PMCS and Supplier by the City and the Engineer.

2. The Pre-submittal conference shall be attended by representatives of Contractor, the PMCS Supplier, and the Engineer. The Contractor shall allocate 1 full working day for the conference and that time shall be included in the price of this Contract. The meeting shall be held at the Plant or location approved by the Engineer.

3. The purpose of the pre-submittal conference shall be to review informally and approve the manner in which the control system supplier intends to respond to the Contract requirements before any submittals are prepared.

4. Contractor shall prepare the items listed below for presentation at the pre-submittal conference. The information shall be submitted to Engineer 4 working weeks prior to the date of the conference.

a. List of equipment and materials required for the PMCS and the brand and model which Contractor proposes to use for each item or component of the proposed system.

b. List of proposed exceptions to the plans and specifications along with a brief explanation of each.

1) Approval of exceptions and substitution shall be subject to a formal submittal according to the Contract procedure.

c. Sample of each type of submittal specified herein. These may be submittals prepared for other projects.

d. A flow chart showing the steps to be taken in preparing and coordinating each control system submittal to the Engineer, and a list of proposed submittals.

e. Schedule for all PMCS related activities from the pre-submittal conference through start-up and training.

1) Particular emphasis shall be given to dates relative to submittal, design, fabrication, programming, factory testing, delivery, installation and field testing.

2) The schedule shall be subdivided to show activities relative to each major item or group of items when everything in a given group is on the same schedule.

3) Schedule shall conform to requirements for Contract schedules.

f. General outline of the type of tests to be performed to verify that the PMCS and all its components including sensors/transducers, instruments and digital processing equipment are functioning properly.

C. Sensors/Transducers and Panel Instruments.

1. Submit product information for all sensors/transducers and panel instruments. Include the following:

a. Manufacturer's product name and model number.

b. Instrument tag number from Contract Documents.

c. Manufacturers' standard catalog product data.

d. Description of construction features.

e. Performance and operation data.

f. Installation and mounting details, instructions and recommendations.

g. Service requirements.

h. Dimensions.

D. PMCS Information:

1. System Description

a. Detailed block diagram showing system hardware configuration and identifying model numbers of system components.

b. Software language and organization:

1) Format, protocol and procedures for data highway communications and local communications with input/output modules and peripheral devices.

2. HMI details:
   a. Control and failure modes;
   b. On line and off line capabilities for programming, system utilities and diagnostics;
   c. Input/output point listing with I/O module cross reference identification for each distributed controller;
   d. Data base listing including all input/output points;
   e. Suggested detailed format and configuration of all log reports, alarm summaries, printer outputs, displays and graphics;
   f. List of spare parts and test equipment.
3. Equipment Hardware
   a. Layout drawings showing front, rear, end and plan views to scale of all processing equipment, I/O components, power supplies and peripheral devices.
   b. Construction details, features and procedures.
   c. Interconnection diagrams including termination details, cable identification list and cable length.
   d. Plans showing equipment layout in control panels.
   e. Installation requirements, instructions and/or recommendations.
4. Software Description
   a. Standard technical documentation covering all aspects of the PMCS software functions and capabilities, including instruction set description and programming procedures related to control, monitoring, display, logging, reporting and alarming functions.
   b. Standard technical and instructional documentation covering software for utility, system support, system documentation, display, communications, data logging and storage and diagnostic functions.
   c. Detailed functional descriptions of application programs explaining control, display, logging and alarming features to be provided and functions to be performed.
   d. Documentation describing memory type, size and structure and listing size of system memory, I/O and data table memory and size of memory available for control programs. Also define estimated

control program memory requirements and processor execution times and program scan times.

e. Documentation describing central monitoring station main and secondary memory type size and requirements to perform the display, logging, reporting and alarming functions required.

5. Panels, Consoles and Cabinets Information:

a. Layout Drawings shall include the following:

1) Front, rear, side, end, and plan views to scale.
2) Dimensional information.
3) Tag number and functional name of components mounted in and on panel, console or cabinet.
4) Product information on all panel components.
5) Nameplate location and legend including text, letter-size and colors to be used.
6) Location of anchoring connections and holes.
7) Location of external wiring and/or piping connections.
8) Mounting and installation details.
9) Proposed layouts and sizes of graphic display panels.
10) Calculations for heating and cooling.

b. Wiring and/or piping diagrams shall include the following:

1) Name of panel, console or cabinet.
2) Wiring sizes and types.
3) Piping sizes and types.
4) Terminal strip numbers.
5) Color coding.
6) Functional name and manufacturer's designation for components to which wiring and piping are connected.

c. Electrical control schematics in accordance with NFPA 79.

d. Plan showing equipment layout in each area.

6. Field piping diagrams shall include the following:

a. Piping sizes and types.

b. Location, functional name and manufacturer's designation of items to which piping is connected.

7. Instrument loop diagrams for all analog display, control and I/O loops prepared using ISA standard symbols in accordance with ISA 5.4 shall include the following:

a. Instrument tag numbers from Contract Documents.

b. Functional name of each item

c. Manufacturer's model, product, or catalog number for each item.

d. Location of each item

8. ISA Data Sheets:

a. ISA Data Sheets shall comply with ISA–TR20.00.01–2001 requirements and shall be computer generated.

b. All field and panel instruments ISA Data Sheets shall contain the following information, as a minimum.

1) Tag number in accordance with Contract Drawings;

2) Product (item) name used herein and on the Contract Drawings;

3) Name of manufacturer or supplier;

4) Manufacturer's complete model number;

5) Location of the device;

6) Input-output characteristics;

7) Range, size, and graduations;

8) Physical size with dimensions, NEMA enclosure classification and mounting details;

9) Materials of construction of all components;

10) Instrument or control device sizing calculations, where applicable;

11) Certified calibration data on all flow metering devices, where applicable;

12) Environmental requirements during storage and operation.

9. PMCS I/O Loop Wiring Diagrams

a. Contractor shall prepare drawings on a module-by-module basis and include the following information:

1) Rack numbers, slot number, module type and module terminal point numbers. Also, include location and identification of all intermediate panel terminal block and strip numbers to which I/O wiring and power supply wiring is connected. Identify all power supply circuit numbers and ratings.

2) Wiring sizes, types, wire numbers and color-coding.

3) Location, functional name, tag numbers and manufacturer model numbers of panel and field devices and instruments to which I/O wiring is connected. For discrete I/O devices, use JIC electrical symbols tagged with designation shown on P&IDs.

E. PMCS Operation and Maintenance (O&M) Manuals

1. The Contractor shall furnish O&M manuals for the PMCS in accordance with the Section 01 78 25 – Operation and Maintenance Manuals, this Section and the following minimum requirements:

   a. Name, address and telephone number of the PMCS Supplier's local service representative.

   b. Complete list of supplied system hardware parts with full model numbers referred to system part designations, including spare parts and test equipment provided.

   c. Copy of all approved submittal information and system shop drawings as specified herein with corrections made to reflect actual system as tested and delivered to the site for installation.

   d. Half-size black line reproductions shall be provided for all shop drawings larger than 11 by 17 inches.

   e. All drawings shall be 11 by 17 inches minimum size.

      1) Drawings 8-1/2 by 11 inches are not acceptable.

   f. Manufacturer's Original Copies of Hardware, Software and Installation, Assembly and Operations Manuals for the PMCS central monitoring station and peripheral devices, and all other control system components.

   g. Manuals shall include the following information:

      1) General descriptive information covering the basic features of the equipment.

      2) Physical description covering layout and installation requirements and all environmental constraints.

      3) Functional and operational descriptions covering the procedures for programming, operation, start-up, shutdown, and calibration of the distributed control system equipment and explaining how the various control functions are performed.

      4) Principles of operation explaining the logic of operation; provide information covering operation to a component level.

      5) Maintenance procedures covering checkout, troubleshooting, and servicing.

         a) Checkout procedures shall provide the means to verify the satisfactory operation of equipment,

         b) Troubleshooting procedures shall serve as a guide in determining faulty components and

c) Servicing procedure shall cover requirements and recommended time schedule for calibration, cleaning, lubrication and other housekeeping and preventive maintenance procedures.

6) Wiring, schematic and logic diagrams.

7) Safety considerations relating to operation and maintenance procedures.

F. Record Drawings and Documentation

1. The Contractor shall require the System supplier to revise all system shop drawings, submittals and software documentation to reflect as-built conditions in accordance with the requirements of the Contract Documents and the supplemental requirements.

2. All revised shop drawings and documentation shall be submitted to the Engineer per Section 01 78 40 – Final Record Documents to replace outdated drawings and documentation contained in the system O&M Manuals.

3. Half-size black line sets shall be provided for all drawings larger than 11 x 17. Specific instructions for outdated drawing removal and replacement shall be provided with the record drawing submittal.

4. Half-size black line prints of wiring diagrams applicable to each control panel shall be provided inside a clear plastic envelope and stored in a suitable print pocket or container inside each control panel.

G. Reports:

1. The following report shall be submitted shall be submitted to the Engineer:

a. Factory Test Reports as specified in Section 40 80 81 - PMCS Factory Testing.

b. Installation Inspection, Field Calibration, and Field Testing Reports, as specified in Section 40 80 82 - PMCS Startup and Field Testing.

c. Training as specified in Section 40 61 26 – PMCS Training.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The PMCS equipment shall be delivered, stored and handled in accordance with the Sections listed under Related Specification of this Section, the Specifications, the manufacturer’s recommendations and the following:

1. PMCS equipment shall be packaged at the factory prior to shipment to site, to protect each item from damage during shipment and storage.

2. Containers shall be protected against impact, abrasion, corrosion, discoloration and/or other damages.

3. Clearly label contents of each container and provide information on the required storage conditions necessary for the equipment.
4. PMCS equipment shall be inspected for shipping damage or loose parts when received.
5. Evidence of water which may have entered equipment during transit shall be checked.
6. PMCS equipment shall be lifted, rolled or jacked into locations shown on the Contract Drawings.
7. PMCS equipment shall be stored in a clean, dry location in which a uniform temperature is maintained.
8. PMCS equipment shall be protected in storage with suitable covering and air circulation maintained to ensure the equipment is kept dry and free from condensation.
9. Where dampness or condensation may be encountered, heaters shall be provided for equipment to prevent moisture damage.

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 the PMCS in accordance with the Sections listed under Related Specifications of this Section.

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.

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS/s shall be as manufactured by:

1. Optimum Controls Corp, Reading, PA;
2. Siemens Industry Inc., Washington, DC;
3. A.K. De Rama Industrial Control System Inc., Mountainside, NJ;
4. Avantech, Inc., Columbia, SC;
5. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Design Criteria

1. Power Supplies:

a. All electrically powered equipment and devices shall be suitable for operation on 115-volt +/- 10 percent, 60 Hz. If a different voltage or closer regulation is required, a suitable regulator or transformer shall be provided.

b. Appropriate power supplies shall be furnished by the Contractor for all 2 wire transmitters, loops for monitoring discrete inputs and all necessary outputs.

c. Power supplies shall be mounted in enclosures and installed in the appropriate indoor or field panel.

d. Power supplies shall be sized adequately for signal converter and repeater loads.

e. Design all power supplies for a minimum of 130 percent of the maximum simultaneous current draw.

f. A power on-off switch or an air circuit breaker shall be furnished for each item requiring electrical power.

g. Provide isolation transformers, line voltage regulators and power distribution panels for the distributed digital portions of the PMCS to eliminate electrical noise and/or transients entering on the primary power line.

2. Signal Requirements

a. The control system shall be designed to use 4 to 20 mA DC analog signals, unless otherwise specified.

b. Signal converters and repeaters shall be provided where required and in addition analog inputs to the distributed control system shall be through appropriate repeaters to provide signal isolation where series looped with other devices and to allow the loop to maintain integrity even if the distributed control system is out of service.

c. Signals shall be isolated from ground.

d. Signals shall not have a transient dc voltage exceeding 300 volts over one millisecond nor a dc component over 300 volts.

e. Equipment ranges, scales and set-point values specified in Division 40 and as shown on the P&IDs are for initial setting and configuration. Contractor shall coordinate these values with actual equipment furnished to implement proper and stable process action as systems are placed in operation.

f. For any items where ranges, scales and set-points may not have been specified, Contractor shall submit a recommendation to the Engineer for review and approval.

g. Design all logic and control loops for fail-safe operation.

h. Surge protection shall be provided for all PMCS and all other control system components which could be damaged by electrical surges.

i. The system and associated input/output wiring will be used in a Plant environment where there can be high energy ac fields, dc control pulses, and varying ground potentials between the sensors/transducers or input contact locations and the system components. The system design shall be adequate to provide proper protection against interference from all such possible situations.

B. Miscellaneous:

1. All PMCS components shall be heavy-duty types, designed for continuous service in a Plant environment.

2. All equipment provided are to be of Modular construction and to be capable of field expansion through the installation of plug-in circuit cards and additional cabinets as necessary.

3. All instrumentation and PMCS components shall be designed to return automatically to accurate measurement within 15 seconds upon restoration of power after a power failure or when transferred to standby power supply.

4. All field-mounted instruments and system components shall be designed for installation in humid and corrosive service conditions.

5. All field mounted cabinets, instrument enclosures, junction boxes and appurtenances shall conform to NEMA 4X requirements and be made of 12 gage 316 stainless steel, unless otherwise specified.

6. All relays with interconnections to field devices shall be wired through terminal blocks. Terminals as part of the relay base are not an acceptable alternate.

7. All panel mounted instruments, switches, and other devices shall be selected and arranged to present a pleasing coordinated appearance. All panel door mounted devices shall be of the same manufacturer and model line.

8. All components furnished, including field and rear of panel instruments, shall be tagged with the item number and nomenclature indicated on the Contract Documents and/or approved Shop Drawings.

9. Field-mounted devices shall be treated with an anti-fungus spray.

10. Field-mounted devices shall be protected from exposure to freezing temperatures.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Control Strategies

1. Functional descriptions of all monitoring and control sequences for the PMCS shall be as specified in Section 40 61 96 - PMCS Control Strategies.

2. The general guidance on how the control strategies shall be implemented in the PMCS shall be as specified in Section 40 61 95 – PMCS Monitoring and Control Criteria.

B. PLCs

1. Programmable Logic Controllers for the PMCS shall be as specified in Section 40 63 43 - PMCS Programmable Logic Controllers.

C. Panels and Enclosures

1. Panels and Enclosure for the PMCS shall be as specified in Section 40 67 16 - PMCS Panels and Enclosures.

D. Panel Mounted and Field Instruments

1. Instruments and Devices installed on panels and in the field for the PMCS shall be as specified in Section 40 78 90 - PMCS Panel Mounted Instruments and Devices.

E. Lists and Index

1. PMCS I/O shall be as specified in Section 40 61 93 – PMCS Input Output List.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Factory Tests

1. Factory testing for the PMCS shall be as specified in Section 40 80 81 – PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. Field Testing for the PMCS shall be as specified in Section 40 80 82 – PMCS Startup and Field Testing.

B. Training

1. Training on the operation and Maintenance of the PMCS shall be as specified in Section 40 61 26 – PMCS Training.

3.04 STARTUP / DEMONSTRATION

A. Operational Availability

1. The system test and Operational availability of the PMCS shall be as specified in Section 40 80 82 – PMCS Startup and Field Testing.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 61 26 – PMCS TRAINING
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and coordinate all required training at times acceptable to the City and the Engineer.

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

Article	Title	Section Page
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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 for 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 61 13 - PMCS General Requirements

1.04 REFERENCES

A. Definitions

1. Section 40 61 13 – PMCS General Requirements defines the terms abbreviations used in this Section and the PMCS

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to the PMCS.

1.05 DESCRIPTION

A. General

1. The Contractor shall retain the services of the PMCS Supplier to provide and perform standardized, structured training courses on site and off site, as specified in this Section, and the Specifications covering both operation and maintenance of the PMCS equipment.

2. On-Site Training

a. On-site training shall be within the Plant where the PMCS will be installed.

b. On-site training shall make extensive use of the installed PMCS to ensure Plant personnel develop an enhanced understanding and level of comfort with the PMCS.

c. On-site training submittals which in the opinion of the Engineer does not meet the objectives stated in this Section and the Specifications shall be rejected.

3. Off-site Training

a. Off-site training shall be conducted at an approved facility within a 10-mile radius of the Contract site.

b. The training facility shall be staffed with regular full-time training instructors.

c. If a the PMCS Supplier does not have a training facility with a ten-mile radius of the Contract Site a suitable facility shall be rented.

d. Off-site training submittals which in the opinion of the Engineer does not meet the objectives stated in this Section and the Specifications shall be rejected.

4. All training, except Follow-up Training specified in this Section, shall be scheduled so that it is completed prior to Acceptance of the PMCS by the City.

5. The City will send the following personnel to attend training courses:

a. Operations Training – 12 persons

b. Maintenance Training - 12 persons

c. Supervisor Training - 4 persons

d. Engineer Training - 2 persons

6. All training shall be conducted during the hours of 8:00 AM to 12:00 PM until the conclusion of the training course.

7. All training sessions shall be provided twice and shall be scheduled by the City to accommodate their shift schedule.

1.06 QUALITY ASSURANCE

A. General:

1. For equipment items not manufactured by the PMCS Supplier, the PMCS Supplier shall provide for training by an authorized representative of the equipment manufacturer as part of PMCS Supplier services.

2. The manufacturer's representative shall be fully knowledgeable in the operation and maintenance of the equipment.

B. PMCS Supplier's Training Qualifications

1. Section 40 61 13 – PMCS General Requirements specifies the PMCS Supplier's training qualifications.

C. PMCS Supplier's Training Responsibility:

1. Section 40 61 13 – PMCS General Requirements specifies the PMCS Supplier's training responsibility.

D. PMCS Supplier Training Personnel

1. The Contractor shall require the System Supplier to provide the following training personnel:

a. Lead Trainer

1) The System Supplier shall appoint a Lead Trainer who shall coordinate, schedule and conduct all work and assure that the Training schedule is met.

2) The Lead Trainer shall have a minimum of ten (10) years' experience in coordination, scheduling and delivery of instrumentation and control training at/under similar Plant Facilities as this Contract including a thorough working knowledge of training administration as both a prime and sub-prime Vendor/Contractor.

3) The Lead Trainer shall be the PMCS Supplier's liaison with the Contractor for all PMCS training requirements and shall assist in all matters required for proper coordination and interfacing of the training with the City.

1.07 SUBMITTALS

A. Shop Drawings General

1. Within 90 days of the effective Notice to Proceed, the Contractor shall submit for approval of the Engineer, Shop Drawings detailing the proposed plan for training, including but not limited to all course outlines and schedules.
2. Shop Drawing preparation shall not commence until after the pre-submittal specified in Section 40 61 13 – PMCS General Requirements.
3. Shop Drawings shall be submitted in complete packages grouped to permit review of related items as generally outlined in this Section.

B. Reports:

1. Training reports shall be submitted to the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The PMCS training equipment and materials shall be delivered, stored and handled in accordance with this Section, the Specifications, the PMCS Supplier's recommendations and the following:

1. PMCS training equipment and material shall be packaged to protect each item from damage during shipment and storage.
2. Containers shall be protected against impact, abrasion, corrosion, discoloration and/or other damages.
3. Clearly label contents of each container and provide information on the required storage conditions necessary for the equipment and materials.
4. PMCS training equipment and materials shall be inspected for shipping damage or loose parts when received.
5. Evidence of water which may have entered equipment during transit shall be checked.
6. PMCS training equipment and materials shall be stored in a clean dry location in which a uniform temperature is maintained.
7. PMCS training equipment and materials shall be protected in storage with suitable covering and air circulation maintained to ensure the equipment and materials are kept dry and free from condensation.

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. PMCS Training shall be as delivered by the approved PMCS Supplier.

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. Training of Plant Personnel

1. Operator Training

a. Provide a 2 days, 4 hours per day course covering the structure and the functions of the PMCS, its components and devices.

b. The course shall familiarize the Operator with the procedures for applying the PMCS to process control situations or scenarios and develop operator issue resolution capability.

c. As a minimum, the course shall cover the following topics:

1) Overview of PMCS functional capabilities.

2) Equipment overview including PMCS component functions, operating principles and proper use.

3) Loading and start-up of the digital system hardware components.

4) Use of PMCS commands.

5) Use of programs and control schemes.

6) Use of system displays.

2. Maintenance Training Course:

a. Provide 2 days, 4 hours per day course covering preventive and troubleshooting maintenance for the PMCS components.

b. The course shall familiarize the maintenance personnel with diagnostic capabilities of the system, both software and hardware, and also the routine maintenance procedures on the system and the common peripheral devices.

c. As a minimum the course shall cover the following topics:

1) PMCS overview description including the power subsystems and logic components of the processor bus.

2) Description of the maintenance and troubleshooting aids of the system including software diagnostic programs.

3) Description of all bus operations.

4) Description of peripheral and process interface devices.

5) The use of hardware diagnostic routines, test equipment and test procedures as required to enable the City's personnel to detect and isolate system faults to the circuit board or module level and to implement repairs by replacing failed circuit boards or modules.

3. Supervisor/Engineer Training

a. Provide a 5 days, 4 hours per day manufacturer's standard training in the use and configuration of the PMCS HMI software.

b. An instructor certified by the software manufacturer to furnish such training shall perform this training.

c. The course shall be structured as follows:

1) Fundamentals

a) One two-day course (minimum) shall be provided which shall serve as a PMCS familiarization course for project management personnel, engineers, and key operating/maintenance personnel.

b) This course shall be a prerequisite for the advanced course.

2) Advanced

a) One three-day (minimum) PMCS configuration and operating course shall be provided.

b) The level of training shall be sufficient to familiarize the City personnel with the configuration and application of all PMCS programs.

c) All essential system operating procedures shall be described as required to enable the City personnel to operate and configure the PMCS via all interfaces such as Work Stations, Large Display Screens and local control panels.

d. Upon completion of the training the City personnel shall be able to make modification to Control Strategies and have them run in the PMCS.

e. Training shall be provided in the following subjects:

1) PMCS Core Concepts:

a) System overview and capabilities

b) Database configuration

c) Graphic display configuration, including linking of data to displays

d) Historical data configuration (collection, manipulation, and display)

e) Real-time and historical trending

f) Report configuration, generation, printing, and customization

g) System security

h) I/O driver and configuration

i) System back-up and recovery

j) Troubleshooting

k) System optimization

l) System start-up and shutdown procedures

m) LAN and WAN communications, as appropriate

B. Follow-up Training

1. The PMCS Supplier shall provide operation and maintenance training covering all PMCS equipment provided.

2. The Follow-up Training shall take place 3 months after Acceptance of the PMCS by the City.

3. The Follow-up Training shall repeat the On-Site Training specified in this Section.

4. The Follow-up Training shall in addition, target those areas of PMCS equipment where Plant personnel have highlighted either operational or maintenance issues.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 40 61 93 – INPUT/OUTPUT LIST
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the I/O point list and requirements for configuring the PMCS databases.

B. The I/O List information is given in Table 1 at the end of this Section and is available from the Engineer on electronic media. Allow 30 days from request to delivery of the media.

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 for 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 61 13 – PMCS General Requirements.

B. Section 40 80 81 – PMCS Factory Tests.

C. Section 40 80 82 – PMCS Startup and Field Testing.

1.04 REFERENCES

A. Definitions

1. I/O – Input/Output
2. SFT – Start-up and Field Testing.
3. OAD – Operational Availability Demonstration.
4. URT – Upset and Recovery Testing.
5. WFAT - Witnessed Factory Acceptance Tests.
6. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. General

1. The I/O point list shall be used to configure the I/O interface hardware of all controllers of the PMCS.
2. The listing includes information on signal functions, signal ranges and range conversions.
3. As a minimum, the Contractor shall provide all hardware [and software] to provide the I/O points listed in the accompanying I/O List as indicated in the Contract documents and as required.
4. The Contractor shall furnish and install as spares, twenty-five (25) percent of each type of I/O of the listed I/O point hardware.
5. The Contractor shall furnish and install spare hardware and fully configure all spare points into the PMCS databases, displays, trends, alarms and controllers.
6. All I/O points designated as spares shall be completely prewired to equipment and panel terminal blocks such that only field connections need to be complete when the I/O is activated.

B. I/O List Column Headings

1. NO or Ref NO or Item NO – is a sequential number starting with a discrete number used to order the entries in the I/O List and permitting the list to sorted and resorted to its original order.
2. TAG NUMBER – is an alpha numeric character string used to identify the I/O point and laid out as follows ISA_######_Y where

a. ISA – is the functional identifier of the I/O and follows ISA 5.1.

1) ISA identifiers will be provided with the I/O Lists.

b. ####### - is a 7-digit number identifying the loop or field device.

c. Y – is a digit or letter identifying duplicate instruments or devices on the same loop.

3. I/O Type is a two letter describing the I/O as follows:

a. AI designates an analog input (4 to 20 mA DC)

b. AO designates an analog output (4 to 20 mA DC)

c. DI designates a discrete input

d. DO designates a momentary, maintained or latched discrete output.

4. INSTRUMENT TYPE – is an alphanumeric string up 30 positions describing the signal attribute of the point such as:

a. Flow Indicating Transmitter

b. Limit Switch Open

c. Solenoid Valve

5. SERVICE – is an alphanumeric string up 30 positions describing the equipment where the signal is located.

6. P&ID NUMBER – is the listing of the P&ID Drawing where the I/O point can be found.

7. LOCATION – is the listing of the physical location of the instrument or device generating the I/O Point

8. RANGE – is the range of the of the I/O in engineering units.

9. REMARKS – can be used for supplementary information or to cross-reference information.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The Contractor shall not commence production of database until the configuration of all I/O points has been approved by the Engineer.

C. For each I/O attribute listed in the I/O list which cannot be used exactly as listed, submit an explanation of the reason for the deviation and propose a method to modify the I/O list information.

D. I/O information specific to all controllers shall in addition be submitted with the submittal covering that controller.

E. I/O Lists shall be kept current, updated regularly and shall be available for inspection by the City at the project site.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit all I/O lists and schedules for the approval of the Engineer.

C. The Contractor is solely responsible for the timing of I/O listing submittal to enable approval by the Engineer and subsequent use by the PMCS Supplier.

D. The Contractor shall create, maintain and submit for review, an updated I/O Listing of all device, instruments and I/O points.

E. Submittal shall be made at least 60 days in advance of any proposed use by the PMCS Supplier.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

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. PMCS I/O Lists shall be implemented by the PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS Factory Test shall conform to the requirements of Section 40 80 81 – PMCS Factory Tests.

B. Section 40 80 81 details how the configuration of I/O specified under this Section shall be verified against approved submittals.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. I/O Configuration

1. Implement the control system database fields in a consistent manner by using the following procedures:

a. Use abbreviations and acronyms already established in the Contract Documents.

b. In particular use the information in the I/O List.

c. Use only abbreviation or acronym for a word or group of words respectively.

d. Use the same subject and word order within data fields.

e. Use the same term (either phrase, word or acronym) to denote the same meaning.

f. Do not use multiple terms for a single meaning.

g. Use the point names, descriptions, logic state descriptions, ranges and units of measurement exactly wherever the point is referenced.

h. Show point names and descriptions for all point references on documentation.

i. Spell correctly.

j. Maintain lists of acronyms and abbreviations used.

B. I/O Hardware Configuration

1. Partition the I/O among cards within an I/O enclosure to provide control loop integrity.

a. Put all inputs of the same I/O type associated with a device (e.g. pump, blower, clarifier or other piece of equipment) on the same card.

b. Put all inputs of the same I/O type for devices arranged in process trains (e.g. a pump, its inlet valve and its outlet valve, or a pump and its associated macerator) on the same card or cards if more than one card is needed to accommodate the points.

c. Put all outputs of the same I/O type associated with a device or group of devices in a process train on the same card.

d. Where the preceding requirements specified in this subparagraph would cause more than 20 percent spare points on a card, points for

a device or process train may be split between two consecutive cards.

e. Make unused terminals resulting from partitioning the I/O into pre-wired spares.

f. Provide pre-wired spare points with all cabling and termination internal to controllers as done for other I/O points.

C. Spares Utilization

1. If I/O is added by change order, incorporate pre-wired spare points into the active point data base at no increase in Contract price.

a. Include changing point names, descriptions, ranges, or statuses from spare to the new point.

b. Include adding points to group displays and summary displays.

c. Include related documentation changes.

2. Spares utilization will be subject to the following limitations:

a. The incorporation will not alter the control software configuration except to make the point accessible to displays, reports and future control software configuration.

b. The incorporation will not alter the local area panels or field wiring to the device.

c. Additions will not increase the size of reports or number of displays beyond that specified.

d. The change will not be made subsequent to the controller shop drawing approval for a given process area.

3. Treat changing of active points to spare points in the same manner as incorporation of spares.

D. Point Data Fields

1. I/O point data fields will be subject to review and modification by the Engineer during the shop drawing review phase.

2. Incorporate changes directed by the Engineer completely into the entire system at no increase in Contract price subject to the following limitations:

3. Limit the total number of modifications to 20 percent of the total number of I/O points.

4. Each unique change will count as one modification. For example, modifying the description, range, and engineering unit on an analog input count as 3 modifications.

5. Analog input alarm limit definition will not be counted as a modification.

3.03 FIELD TESTING / QUALITY CONTROL

A. PMCS Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. Section 40 80 82 details how the configuration of I/O specified under this Section shall be verified during Field Testing.

C. Not Used

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

B. The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the configuration of all PMCS I/O.

C. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

TABLE 1 - PMCS INPUT/OUTPUT LIST
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REF NO	TAG NUMBER ISA	#######	Y	I/O TYPE	INSTRUMENT TYPE	SERVICE	P&ID NO	LOCATION	RANGE	REMARKS
1	YA	20.069.02	B	DI	18" CLASSIFIER EMERGENCY STOP	PLC-12A	I-101	ELEC. BUILDING	N/A	
2	YL	20.069.02	A	DI	18" CLASSIFIER RUNNING	PLC-12A	I-101	ELEC. BUILDING	N/A	
3	TAH	20.069.02		DI	18" CLASSIFIER MOTOR HIGH TEMP	PLC-12A	I-101	ELEC. BUILDING	N/A	
4	SAL	20.069.02		DI	18" CLASSIFIER ZERO SPEED	PLC-12A	I-101	ELEC. BUILDING	N/A	
5	WAH	20.069.02		DI	18" CLASSIFIER HIGH TORQUE	PLC-12A	I-101	ELEC. BUILDING	N/A	
6	YA	20.069.01	B	DI	24" CLASSIFIER EMERGENCY STOP	PLC-12A	I-101	ELEC. BUILDING	N/A	
7	YL	20.069.01	A	DI	24" CLASSIFIER RUNNING	PLC-12A	I-101	ELEC. BUILDING	N/A	
8	TAH	20.069.01		DI	24" CLASSIFIER MOTOR HIGH TEMP	PLC-12A	I-101	ELEC. BUILDING	N/A	
9	SAL	20.069.01		DI	24" CLASSIFIER ZERO SPEED	PLC-12A	I-101	ELEC. BUILDING	N/A	
10	WAH	20.069.01		DI	24" CLASSIFIER HIGH TORQUE	PLC-12A	I-101	ELEC. BUILDING	N/A	
11	YL	07.025.01	D	DI	MECHANICAL SCREEN IN BYPASS	PLC-12A	I-102	ELEC. BUILDING	N/A	
12	YL	07.025.01	A	DI	MECHANICAL SCREEN RUN LOW SPD	PLC-12A	I-102	ELEC. BUILDING	N/A	
13	YL	07.025.01	B	DI	MECHANICAL SCREEN RUN HIGH SPD	PLC-12A	I-102	ELEC. BUILDING	N/A	
14	YL	07.025.01	C	DI	MECHANICAL SCREEN RUN REVERSE	PLC-12A	I-102	ELEC. BUILDING	N/A	
15	YL	07.025.01	F	DI	MECHANICAL SCREEN EMERGENCY STOP	PLC-12A	I-102	ELEC. BUILDING	N/A	
16	YL	07.025.01	E	DI	MECHANICAL SCREEN IN AUTO	PLC-12A	I-102	ELEC. BUILDING	N/A	
17	YA	07.025.01	A	DI	MECHANICAL SCREEN OVERLOAD	PLC-12A	I-102	ELEC. BUILDING	N/A	
18	LDAH	07.025.01		DI	MECHANICAL SCREEN HIGH DIFF. LEVEL	PLC-12A	I-102	ELEC. BUILDING	N/A	
19	YA	07.025.01	B	DI	MECHANICAL SCREEN COMMON ALARM	PLC-12A	I-102	ELEC. BUILDING	N/A	
20	YA	07.025.01	C	DI	MECHANICAL SCREEN JAM	PLC-12A	I-102	ELEC. BUILDING	N/A	
21	YL	07.176.03	B	DI	CONVEYOR IN AUTO	PLC-12A	I-102	ELEC. BUILDING	N/A	
22	YL	07.176.03	A	DI	CONVEYOR RUNNING	PLC-12A	I-102	ELEC. BUILDING	N/A	
23	YA	07.176.03	A	DI	CONVEYOR ALARM	PLC-12A	I-102	ELEC. BUILDING	N/A	
24	TAH	07.176.03		DI	CONVEYOR MOTOR HIGH TEMP	PLC-12A	I-102	ELEC. BUILDING	N/A	
25	SAL	07.176.03		DI	CONVEYOR ZERO SPEED	PLC-12A	I-102	ELEC. BUILDING	N/A	
26	YA	07.176.03	B	DI	CONVEYOR EMERGENCY STOP	PLC-12A	I-102	ELEC. BUILDING	N/A	
27	HS	07.176.03	E	DO	CONVEYOR START/STOP	PLC-12A	I-102	ELEC. BUILDING	N/A	
28	ZIC	07.004.05		DI	BYPASS CHANNEL SLIDE GATE 1 CLOSED	PLC-12A	I-102	ELEC. BUILDING	N/A	
29	ZIO	07.004.05		DI	BYPASS CHANNEL SLIDE GATE 2 OPENED	PLC-12A	I-102	ELEC. BUILDING	N/A	
30	ZIC	07.004.06		DI	BYPASS CHANNEL SLIDE GATE 1 CLOSED	PLC-12A	I-102	ELEC. BUILDING	N/A	
31	ZIO	07.004.06		DI	BYPASS CHANNEL SLIDE GATE 2 OPENED	PLC-12A	I-102	ELEC. BUILDING	N/A	
32	YL			DI	UPS LOW BATTERY	PLC-12A		ELEC. BUILDING	N/A	Internal to Panel
33	YL			DI	DC POWER FAIL	PLC-12A		ELEC. BUILDING	N/A	Internal to Panel
34	YL	50.111.04		DI	EXHAUST FAN 1 RUNNING	PLC-12A	I-103	ELEC. BUILDING	N/A	
35	YA	50.111.04		DI	EXHAUST FAN 1 OVERLOAD	PLC-12A	I-103	ELEC. BUILDING	N/A	
36	PDAH	50.111.04		DI	EXHAUST FAN 1 LOSS OF FLOW	PLC-12A	I-103	ELEC. BUILDING	N/A	

TABLE 1 - PMCS INPUT/OUTPUT LIST
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REF NO	TAG NUMBER ISA	#######	Y	I/O TYPE	INSTRUMENT TYPE	SERVICE	P&ID NO	LOCATION	RANGE	REMARKS
37	YL	50.111.01		DI	SUPPLY FAN 1 RUNNING	PLC-12A	I-103	ELEC. BUILDING	N/A	
38	YA	50.111.01		DI	SUPPLY FAN 1 OVERLOAD	PLC-12A	I-103	ELEC. BUILDING	N/A	
39	PDAH	50.111.01		DI	SUPPLY FAN 1 LOSS OF FLOW	PLC-12A	I-103	ELEC. BUILDING	N/A	
40	YL	50.111.02		DI	SUPPLY FAN 2 RUNNING	PLC-12A	I-103	ELEC. BUILDING	N/A	
41	YA	50.111.02		DI	SUPPLY FAN 2 OVERLOAD	PLC-12A	I-103	ELEC. BUILDING	N/A	
42	PDAH	50.111.02		DI	SUPPLY FAN 2 LOSS OF FLOW	PLC-12A	I-103	ELEC. BUILDING	N/A	
43	YL	50.111.03		DI	SUPPLY FAN 3 RUNNING	PLC-12A	I-103	ELEC. BUILDING	N/A	
44	YA	50.111.03		DI	SUPPLY FAN 3 OVERLOAD	PLC-12A	I-103	ELEC. BUILDING	N/A	
45	PDAH	50.111.03		DI	SUPPLY FAN 3 LOSS OF FLOW	PLC-12A	I-103	ELEC. BUILDING	N/A	
46	AI	62.254.01		AI	COMBUSTIBLE GAS %LEL	PLC-12A	I-103	ELEC. BUILDING	0 - 100	Existing Inst.
47	AI	62.254.02		AI	COMBUSTIBLE GAS %LEL	PLC-12A	I-103	ELEC. BUILDING	0 - 100	Existing Inst.
48	YI	50.111.07		DO	GO/NO-GO INDICATION	PLC-12A	I-103	ELEC. BUILDING	N/A	Multiple Devices
49	YI	50.111.05		DO	HORN/STROBE ANNUNCIATION	PLC-12A	I-103	ELEC. BUILDING	N/A	Multiple Devices
50	HS	50.111.05		DI	SILENCE/TEST PUSHBUTTON	PLC-12A	I-103	ELEC. BUILDING	N/A	1st Floor
51	HS	50.111.06		DI	SILENCE/TEST PUSHBUTTON	PLC-12A	I-103	ELEC. BUILDING	N/A	2nd Floor

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide the services of the PMCS Supplier , to develop, load, configure, test, document and place in satisfactory operation all [software] associated with the PMCS and all its ancillary devices, as described herein, as required by other Sections, as indicated on the Contract Drawings and as necessary for the Contractor to provide a properly operating and integrated system.

B. The Contractor shall provide a uniform appearance, seamless integration between all PMCS equipment and simplification of operation and maintenance, for the software being used and developed for all operator interfaces throughout the 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 40 61 13 – PMCS General Requirements.

B. Section 40 80 81 – PMCS Factory Testing

C. Section 40 80 82 – PMCS Startup and Field Testing

1.04 REFERENCES

A. Definitions

1. HMI – Human Machine Interface

2. I/O – Input/Output

3. SFT – Start-up and Field Testing.

4. OAD – Operational Availability Demonstration.

5. OIT – Operator Interface Terminal.

6. URT – Upset and Recovery Testing.

7. WFAT - Witnessed Factory Acceptance Tests.

8. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. PMCS Software Required

1. The software packages the Contractor will be required to furnish, install, customize, configure, and develop shall include, but shall not be limited to:

a. PLC Ladder Logic Development and Documentation Software.

b. HMI Configuration Software.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The PMCS Supplier shall utilize System and Software engineers who have been factory trained and certified on the respective software packages, to perform all programming functions, develop control strategies, create graphic displays, customize applications, document all work and coordinate the software interface.

C. System and Software engineers shall be intimately familiar with the details of this [Plant], instrumentation and control in general and the Contract goals and requirements.

D. System and Software engineers shall have a minimum of 10 years' experience in the PMCS development work required under this Contract.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The PMCS Supplier shall submit, through the Contractor, the following information for approval prior to beginning of the actual work of developing software for this Contract:

1. Qualifications and certifications of system software engineers.
2. A listing of all proposed software packages indicating quantities and where they will be installed.
3. Preliminary ladder logic for all PLC(s) and general methods of implementing the various control strategies.
4. Preliminary database and I/O listing showing system tag names and references.
5. Preliminary screen display count with general system structure.
6. Preliminary screen display development, general display organization and common components.

C. The PMCS Supplier shall submit all completed items to the Engineer for review and approval. As a minimum, the items to be submitted shall include, but shall not be limited to:

1. PLC ladder logic with full documentation and annotation
2. Full Color copies of all unique Graphic display screens
3. Screen animation and control
4. Databases
5. Alarm and event log lists, formats and messages

D. Submittals shall be made at least 60 days in advance of any proposed use by the PMCS Supplier.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

B. 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. PMCS Monitoring and Control Criteria shall be implemented by the PMCS Supplier.

B. Existing HMI visualization software is manufactured by:

1. Wonderware, Lake Forest, CA;

2. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS Factory Testing shall confirm to the requirements of Section 40 80 81 – PMCS Factory Testing.

B. PMCS Monitoring and Control Criteria specified under this Section shall be functionally verified during PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 APPLICATION

A. PMCS Software

1 . A single software package that has been approved by the City shall be used for all workstations, HMIs and OITs in this Contract.

2. The Contractor shall furnish to the City, the appropriate number and type of software packages as required by the scope of this Contract.

3. Once installed and operating and the Contract completed and accepted, all licenses, media, documentation and packaging shall be turned over to the City.

4. It shall be the responsibility of the Contractor to maintain all items entrusted to him in excellent condition.

5. Any damaged items or items not returned, shall be replaced at the Contractor's expense.

6. For City furnished PMCS Software required by this Section, it shall be the responsibility of the PMCS Supplier to provide factory training for his personnel, to allow them to become intimately familiar with all aspects of the supplied software package. This cost shall be included in the bid price and shall be done at no additional cost to the City.

7. It shall also be the responsibility of the Contractor, through the services of the PMCS supplier to install, setup, configure and place in optimum working order all PMCS Software as well as all other software referenced in this Section and as required.

8. All software shall be installed and configured, with strict adherence to manufacturer's recommendations and the requirements of this Section, on all workstations supplied under this Contract.

B. General Control Philosophy

1. In order for the Contractor to provide the most reliable and fault tolerant PMCS, the following approach to programming shall be implemented:

   a. All control logic, loop control, critical alarming and I/O shall be done in the controller at the local level.

   b. Local workstations and OITs shall contain the database for their attached controllers.

   c. Remote controllers shall access needed data from the respective local controller via the PMCS network shown in the Contract Drawings.

   d. Where the PMCS network is an Ethernet LAN the Contractor shall obtain designated non-routable IP addresses for this contract from DEP OIT.

   e. Workstations and OITs shall send only valid data to the PLC where it shall be "latched in" until such time as new valid data is made available.

   f. A failure of the workstation shall not prevent the PLC from continuing to function normally using the last valid data it received.

   g. All workstations, OITs, controllers and network components, shall be monitored for failures by the redundancy of components and through the use of "watchdog timers" programmed into the software.

   h. Failure of any component shall be alarmed and annunciated at the next level of control and the information shall be immediately made available on the network.

i. Workstations and OITs shall monitor and display all digital and analog data available on their local PLCs and all pertinent data available on the network.

j. Where possible, the software shall be configured to verify the validity of that data.

k. Data that is in disagreement or out of valid range shall be indicated as such through the extensive use of displays and alarms.

C. PLC Programming Conventions

1. General

a. All logic, sequencing, interlocking, safety and critical alarm and control, shall be implemented at the PLC local level in the respective PLC using ladder type logic.

1) Individual "rungs" shall be provided for each logic function.

2) Subroutines shall be used where repetitive logic is required.

3) Alarm logic shall not be performed in subroutines as they may not be active at all times.

b. Commands such as start, stop, open, close, operating mode, sequence selection, etc., that are sent from the remote workstation by operator initiative or response, shall be "pulsed" and "latched" into the PLC logic.

c. All analog loop control such as temperature, flow or level shall be performed at the local PLC level not in the workstation.

d. All calculations and logic necessary to keep an individual loop in operation, in the event of failure of, or loss of communication with the workstation, shall also be done in the local PLC.

e. Where possible, all data points both analog and digital associated with the PLC based loop controllers, shall be available to the operator at the workstation and fully displayed and adjustable.

f. The ladder program shall be so written that the operator, via a local or remote workstation/OIT, can select the mode in which each individual loop is to operate, i.e., manual/auto or local/remote setpoint.

g. The operator also be able to view and manually adjust all parameters such as setpoint, output, gain, integral, derivative, etc., from the workstation.

h. Once entered, the valid data shall remain stored in the PLC until such time as new valid data is received.

2. Program Structure

a. All programming shall be implemented using ladder logic style programming only.

b. Other styles of programming, where necessary, shall only be used with the prior written permission of the Engineer and only when the task cannot be performed using ladder type logic.

c. The program shall be written using a well-organized and well documented structured approach.

d. All common elements shall be grouped together as much as possible.

e. For example, all logic for a single piece of equipment such as start/stop, indication, fault and alarm logic shall be grouped together to allow a phased or sequential startup and trouble-shooting.

3. Safeties and Interlocks

a. Upon initial startup or a subsequent restart of the PLC programs shall be written as follows:

1) First initialize all logic and data

2) Second bring all equipment and controls to a safe and ready status as allowed by safety and interlock status.

3) Only when equipment is in the safe and ready status shall equipment be permitted to be started as indicated in the individual control strategies.

4) When all start permissives are satisfied, a "ready" status for each piece of affected equipment, shall be issued for display by the HMI.

b. Upon startup or restart of equipment and/or systems after a power failure, the program shall retain the status of all equipment prior to the interruption.

c. Upon restoration of stable power, with a suitable and adjustable time delay on each piece of equipment, the program shall check the status of all controlled equipment and systems for faults and/or safety trips and only then allow equipment to be started as indicated in the individual control strategies.

d. Items indicating a faulted or unsafe condition shall be immediately locked out and the appropriate alarms generated for display by the HMI.

e. Where at all possible, all preset values (for timers, counters, etc.) and variables shall be stored in register memory and shall be made available to the operator at the HMI for both display and adjustment.

D. PMCS Programming Conventions

1. General

a. The operator interface to the PMCS Software shall be through an organized system of graphic displays and tabular data displayed on the workstations, HMIs and OITs and interface units installed throughout the PMCS.

b. Graphic displays shall be based on schematic representations of the process, as shown on the Contract P&IDs and general equipment arrangement.

c. While only one of each type of similar equipment may be detailed on the P&IDs, all equipment, instrumentation and devices shall be represented on graphic displays in the level of detail depicted for the one typical equipment, device or instrument shown.

d. Displays of process equipment and piping shall be neatly laid out so as to be uncluttered and easily interpreted.

e. PMCS shall be displayed on multiple screens to allow all equipment and data to be shown clearly.

f. Displays of process piping and vessels shall be color coded to match the colors listed in the process piping schedules and shall match painting color schemes.

g. Color coding shall allow the operators to easily identify, by color, what process is being viewed.

h. If no color has been assigned to a certain process, the Contractor shall notify the Engineer who shall assign one.

i. Extensive use of animation; color and appearance change and sound shall be employed within displays.

j. Log-on and Password protection shall be required for all functions other than viewing general displays.

k. The Engineer shall decide the operator access level for each function provided by the Contractor.

2. Display System Structure

a. Displays shall be generally organized into areas based on the process with which they are associated.

b. An area index screen shall be provided showing “links” which when picked, will access all other screens in that system.

c. A general plant-wide index screen, accessible from the area index screen, having links to access all other area index screens shall be provided.

d. If previously created, the plant-wide index screen and all associated software shall be updated under this Contract to reflect the additions and/or changes made as part of this Contract.

e. All changes and updates shall be made on a plant wide basis, updating all workstations in the plant with the latest screens and information.

f. All displays throughout the PMCS shall have certain common elements. These elements shall include but shall not be limited to the following:

1) There shall be a group of quick access “buttons” located at the top of each screen.

a) Each of these buttons shall be assigned to screen within an area and shall provide a link, which when picked, will display the assigned screens.

b) When there are no alarms present on a given screen, the button shall be blank and disabled.

c) When there is any unacknowledged alarm present on a screen, its assigned button shall flash the system name in amber.

d) These screen names shall be assigned by the Engineer.

e) When the alarm(s) has (have) been acknowledged but is(are) still present, the system name shall show steady amber on the button.

f) The relative position of these buttons shall not change from screen to screen within an area.

2) There shall be additional buttons provided at the bottom of each screen allowing access to frequently needed items as follows:

a) The first items shall be an alarm SILENCE button and an ACKNOWLEDGE button.

(1) The SILENCE button shall silence alarms generated on any screen from any screen.

(2) This button shall silence both workstation audio alarms and any audible devices in the field and control room.

(3) The ACKNOWLEDGE button shall only acknowledge alarms generated on that screen.

(4) All alarms and alarms not associated with a given screen, shall be acknowledged from the alarm history screen.

b) The second item shall be an ALARM HISTORY button.

(1) This button shall immediately bring up the alarm history tabular display screen with the most recent alarms on the top of the list.

c) The third common item shall be an INDEX button. This button shall immediately bring up on the display, the area index screen previously described.

d) The remaining bottom buttons shall be used to provide direct links to other screens associated with the current screen.

(1) Some of these associated screens will be defined later.

(2) When possible, buttons for links to a particular screen shall occupy the same relative position from screen to screen.

3. Equipment Control Location Status

a. Each process and piece of process equipment (pumps, grinders, blowers, fans, etc.) shall have selector switches to transfer control of the equipment from one control location to another control location.

b. The graphic representation for each unit shall have an adjacent text field indicating where the current control location is.

c. The text background shall read “CONSOLE” on a blue background when control is at the workstation and read “FIELD” as appropriate on a gray background when control is elsewhere.

4. Equipment Start/Stop Control

a. All equipment started and stopped by the PLC shall have an operator graphic display on one or more of the graphic display screens.

b. As indicated on the P&IDs, each piece of equipment shall have a specific method of starting and stopping inclusive of emergency stop or one or a combination of the following

1) Manual ON/OFF control

2) Manual START/STOP

3) Combination of HAND/OFF/AUTOMATIC.

c. Starting, stopping or changing operating mode of any equipment or system shall require double action followed by a confirming dialog box.

1) The operator shall "double click" on a predefined pick box within the desired equipment symbol causing a dialog box to appear.

2) The dialog box shall contain buttons for the different mode selections available to the operator for that piece of equipment or system.

3) An "OK" button shall also appear in the box which shall confirm the selection.

4) Once completed, a second dialog box shall appear to reconfirm the selection with dialog such as "DO YOU WISH TO PLACE PUMP 3 IN RUN MODE".

5) The operator shall select a "YES" or "NO" button to confirm the selection.

6) All dialog boxes shall have a "CANCEL" button which shall leave the system unchanged.

5. Alarms

a. Provide eight (8) levels of alarming for each analog variable. There shall be high-high-high, high-high, high, deviation low, deviation high, low, low-low, low-low-low.

b. Annunciate alarm with horn provided in the HMI/s and display appropriate alarm.

c. Assign alarm to printer(s) for logging.

d. The software shall display alarm status via color change or blink in line, text, or fill attributes.

e. The software shall have both alarm summary and alarm history displays with configurable message text including: DATE, TIME, TAG NAME, ALARM EVENT, ALARM TYPE, VALUE, SETPOINT, SEVERITY.

f. The alarm summary and alarm history displays shall be configurable for color of alarm window, new alarms, ACK alarms, and RTN alarms.

g. Momentary alarms shall be reported by the software if the signal made a transition from the normal state to the alarm state and back to the normal state between the polling sequences of a remote unit.

h. Momentary normal states shall be reported by the software if the signal made a transition from the alarm state to the normal state and back to alarm state between the polling sequences of a remote unit.

i. Multiple alarm and multiple normal states shall be reported by the software if multiple transitions were made between polling sequences.

j. Alarms shall be able to be routed to screen, printer, and/or disk file.

6. Trending

a. Software shall allow the configuration of real time trend displays which update continuously as new values are acquired.

b. Real time trend display shall be in Variable versus Time format.

c. Real time trend display shall support scaling of both variable and time axes.

d. Real time trend display shall support a minimum 4 variables per graph.

e. Software shall allow any number of real time trend graphs per screen.

f. Software shall allow configuration of Real time trends and Historical trends on same screen.

g. Software shall allow configuration of trend graphs and other animation (bar charts, push buttons, etc.) on the same screen.

h. Real time trend shall support trending result of arithmetic and/or logical expressions involving Tag names by typing in the expression in the desired pen field.

i. The PMCS supplier shall develop and assign real time trends for all monitored system analog variables, and shall submit proposed trend plot groupings as part of the system software documentation submittal.

7. Historical Data Management

a. The PMCS shall contain a Historical Data Base Utility which provides for long term storage of data collected from remote processors or manually entered from the keyboard.

b. The Historical data shall be collected from the real time database and from these samples.

c. The Historical system shall be configurable to calculate the average, maximum, minimum, standard deviation and total values over sampled data time intervals configurable on a per point basis.

d. The software shall allow for historical data to be manually entered from the keyboard to facilitate entry of lab data or other information to be used in generating historical plant performance calculations.

e. Signal values from the Historical Data Base shall be available for graphic displays, reports and trending.

f. The size of the Historical Data Base shall be limited only by available disk space which at minimum shall be capable of holding 6 months of data.

g. The Historical Data Management software shall provide utility routines to archive data to long term storage devices on demand, or automatically based on a user configurable time schedule.

h. The Historical Data Base shall be organized as a series of Time Classes, each of which stores sampled or calculated values over a specified time interval.

8. Reports

a. Software shall support printing of any screen created by the PMCS Supplier, whether or not it is the current active screen used by the operator.

b. Software shall allow screen prints based on demand (i.e. push button), event, time, or combination thereof.

c. PMCS Supplier shall submit actual copies of suggested report layouts for review and approval in accordance with the requirements of this Section.

d. The process report generation software shall provide the means to process, store, and print data for historical records.

e. Configuration shall be flexible so that contents of the reports can be easily modified.

f. As a minimum, the following data collection functions shall be provided for all analog variables:

1) Instantaneous value; value at the end of the data collection interval.

2) Average value over the time interval.

3) Totalization over the time interval.

4) Highest value over the time interval.

5) Lowest value over the time interval.

g. Equipment Run Times shall be monitored, calculated and reported for all major process equipment items in the system.

h. Report data developed shall include year-to-date and month-to-date run times and starts for each item.

i. As a maximum, report data shall be collected and stored at ten minute intervals.

j. Each log report page shall have the capability to contain information for ten log points as a minimum.

k. Periodic log reports shall be printed automatically at the end of the time period.

l. A calculation extension capability shall be provided to perform calculations on data that has been accumulated for report generation.

1) Calculations shall consist of addition, subtraction, multiplication, and division functions for calculations of such items as engineering unit changes, totalization values where measurement values are different, and performance indexes.

2) Provisions shall be made for a minimum of 200 calculation extensions.

m. All reports shall be free form, thereby printing all general information, headings and data in an established format at the time of generation.

1) Pre- printed sheets shall not be acceptable.

2) Each page of a report shall have printed the plant name, type of report, date and time the report was printed, and page numbers.

n. Software shall be provided for generation of special event, hourly, daily, monthly and annual reports.

1) Reports shall be generated using process input/output, event information, analog, digital, manual and/or computed point information from records in database.

9. Process Variable Indicators and Controllers

a. Where indicated on the P&IDs, required by the specifications or wherever available, all instruments providing analog data whether real or calculated shall be graphically displayed on the screen in its relative position in the process or in tabular form as required.

b. Process indicators such as “PI”, “FI”, “TI”, “FIC”, “TIC”, etc., shall be provided with all of the following features.

1) Each “instrument” shall appear as a standard instrument “bubble” or “lollipop” containing the ISA instrument type designation.

2) The instrument tag number shall appear using the same format as the Contract Drawings.

3) When instruments of the same equipment number appear on the same screen, the loop number alone shall be sufficient provided there are no duplicate loop numbers and it is clear what equipment the instrument is associated with.

4) Adjacent to the instrument symbol, the current "real time" value of the variable, in engineering units, shall be displayed.

5) Next to this shall appear the appropriate units.

c. All analog values, whether real or calculated, shall have alarm points configured in the software.

1) Those of a critical nature or where used to control equipment shall have this performed in the local PLC while being set and monitored from a workstation.

2) While within the normal range, variables shall appear in black.

3) When the variable moves outside the normal range, the text shall flash in red and the bubble shall flash amber.

4) Once acknowledged, both will cease flashing and remain steady colors until the condition is corrected.

5) A signal out of range or containing invalid data shall cause the text to display question marks on a flashing red background.

d. The operator shall be able to "double click" the instrument symbol and cause a dialog box to appear.

1) This box shall contain the full tag number of the instrument, measured variable name (i.e. Return Sludge Pump 1 Flow), calibrated range and current alarm points.

2) One button shall be provided in the box to edit the alarm setpoints.

3) A second button shall allow the operator to display a trend graph, on a partial screen, of the variable against a time base of minutes, or hours (selectable).

10. Accumulators

a. Provide HMI configuration for accumulations.

1) Include run time for each piece of equipment.

2) Include number of starts for each motor.

3) Include totalized values for all flows.

11. Security

a. System Protection from unauthorized access to the PMCS interfaces shall be provided by means of software and hardware interlocks.

b. Provide 8 levels of security.

c. Software interlocks shall provide a minimum of two levels of security, Operator and Process/System Engineer.

d. Operators shall only be permitted access to PMCS HMI software allowing only operating and configuration of equipment for operational actions only, such as start, stop, modes changes such as local and remote, placing multiple items of similar equipment in and out of service, generating trends, dealing with alarms and all actions required by Operators to maintain processes 24 hours a day, 365/366 days a year.

e. Only Process/System Engineers shall be allowed to exit the HMI software and access the operating system and other resident software applications for hardware and software operating system, controller/PLC programming and editing.

f. Program editing access shall require entry of a minimum eight character entry code assigned within the controller program.

g. All PMCS users shall be required to log on to the LAN network and PMCS Software interface with a predefined username and password before access to operate or modify the system can be obtained.

h. All defined usernames shall be associated with a set security level.

i. Each display shall be assigned a security level required to access it.

j. All signals and control functions shall have separately assignable security levels required for viewing functions signal value change functions to restrict control access where required or desired.

3.03 FIELD TESTING / QUALITY CONTROL

A. PMCS Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. PMCS Monitoring and Control Criteria specified under this Section shall be verified during PMCS Startup and Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

B. The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the correct implementation of the PMCS Monitoring and Control Criteria specified under this Section.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 61 96 – PMCS CONTROL STRATEGIES
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall furnish Control Strategy diagrams, configuration sheets and Control Strategy descriptions as shop drawings for approval.

B. The Contractor shall perform all programming, configuration and tuning required to implement each Control Strategy listed in this Section.

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. Section 40 05 59.05 – Stainless Steel Slide Gates

B. Section 40 61 13 – PMCS General Requirements.

C. Section 40 80 81 – PMCS Factory Testing.

D. Section 40 80 82 – PMCS Startup and Field Testing.

E. Section 41 12 20 – Screenings Conveyor

F. Section 46 21 12 – Mechanically Cleaned Bar Screens

G. Section 46 23 63 – Grit Classifying and Washing Equipment

1.04 REFERENCES

A. Definitions

1. CS - Control Strategy

2. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. The Control Strategies in this Section are written descriptions of the basic configuration and/or programming required to implement regulatory and sequential control of the unit processes as shown on the P&IDs.

B. The Control Strategies do not in all cases describe the process characteristics fully, many of which may only become apparent during shop drawing assembly or during start-up.

C. Control Strategies shall fully reside in the memory of the designated PLC.

D. The process inputs/outputs referred to in the Control Strategies are all shown on the P&IDs.

E. Any additional I/O (Maximum 20%) required shall be added during Shop Drawing Review and shall be provided at no additional cost to the City.

F. Process Control Functions

1. Process control function shall be structured to permit the realization of all Control Strategy requirements.

2. Each control function shall be designed so that bumpless, balance free transfers are obtained during operating mode changeover and/or initialization.

3. Where applicable, user-changeable parameters shall be automatically defaulted to a preset value if a specific value is not given during system generation.

4. Provision shall be made to include certain control functions that apply to all analog inputs, virtual variables, analog controllers and discrete control whether or not shown on the P&IDs, even though one or more of the functions may be disabled by the user for a given data base point:

a. Analog Data Scaling

1) This control function shall scale all analog inputs to a common span and shall normalize the digital representation of each analog input to a percent of the operating span.

2) The processed value shall be expressed as a binary number that specifies the analog input's position on a straight line lying between zero and full scale as defined for a given input by the zero span values in the data base.

b. Amplitude Limit Check

1) This control function shall perform dual level, high/low amplitude limit checking and shall identify a limit violation every time a measured or virtual variable goes out-of-limits and returns back into limits.

2) The control function shall determine the time at which each limit excursion occurred.

3) A deadband shall be provided on each limit and shall be expressed as a percentage of span or in engineering units.

4) Low and high limiting default values will be set-up for each measured or calculated variables used in the process control loops.

c. Engineering Unit Conversion

1) This control function shall convert scaled analog data to engineering units by means of the following equation:

a) $Y = ((H - L) (D/DH) + L)$ where

Y is the value in engineering units.

H is the high value of span, expressed in engineering units

L is the low value of span, expressed in engineering units.

D is the digitized scaled input value in counts.

DH is the full scale digitized value in counts

d. Manual Control

1) It shall be possible for plant engineer to interrupt any sequence, loop or automatic operation and operate the same manually through operator workstation.

e. Verification of Digital Outputs

1) This control function shall verify that the equipment has responded to the digital commands before proceeding to next step during automatic operation.

2) If any discrepancy is detected, an alarm will be annunciated.

G. Hardware

1. The Contractor shall provide all the hardware, whether or not shown or specified that may be necessary to implement the Control Strategies as described in this Section or the Specifications.

H. Configuration

1. All set points, tuning parameters and engineering scales, etc., shall be documented for each control point and each control strategy on configuration sheets or similar documents.

2. These documents shall be updated during factory testing and finally during start-up.

I. Control Strategy Displays

1. Control Strategy displays shall be submitted for review.

2. Displays shall clearly show initial conditions, start, and progression of the control strategies.

3. Each Control Strategy shall be displayed in a minimum number of displays for ease of monitoring by the operator.

J. Power Failure

1. Plant equipment controlled by the PLC shall be programmed to automatically reset upon failure.

K. Restart

1. All equipment and motors shall be automatically restarted after power failure by the control system in an orderly fashion approved by the Engineer.

2. Final approval of the restart sequence shall be given by the Engineer during factory testing and start-up.

L. Position indication of Gates and Valve in transition.

1. Open pilot lights and indicators in/at all Control Stations and HMIs shall blink when a gate or valve is in the open transition and shall stay steady on when fully open.

2. Closed pilot lights and indicators in/at all Control Stations and HMIs shall blink when a gate or valve is in the closed transition and shall stay steady on when fully closed.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements.

1.07 SUBMITTALS

A. Control Strategies detailed in this Section shall be submitted for approval by the Engineer.

B. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Control Strategies shall be as implemented by the PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Control Strategy CS-01

1. TITLE: Screens
2. DRAWING: I-102
3. DESCRIPTION: Monitoring and Control of Screens and related equipment
   a. Screen is a complete vendor supplied system, specified in Section 46 21 12 – Mechanically Cleaned Bar Screens.
   b. Conveyor specified in Section 41 12 20 – Screenings Conveyor, controls within MCC with vendor control station.
   c. Bypass slide gates specified in Section 40 05 59.05 – Stainless Steel Slide Gates operate manually from the electric actuator.
4. FUNCTIONAL DESCRIPTIONS

a. System Operation from Controls

1) Screen, when in Auto, operates continuously in low speed. Upon high differential level, Screen operates at a high speed.

2) The conveyor runs while in auto, when the screen is running. Prior to operation, the conveyor annunciates a horn and strobe for 5 seconds and then starts.

5. SCADA MONITORING AND CONTROL

a. Indications to be added on the HMI shall include:

1) Screen In Bypass

2) Screen Running Low Speed

3) Screen Running High Speed

4) Screen Running Reverse

5) Screen In Auto

6) Conveyor In Auto

7) Conveyor Running

8) Bypass Gates position status

b. Alarms to be added on the HMI shall include:

1) Screen Emergency Stop

2) Screen Motor Overload

3) Screen High Differential Level

4) Screen Common Alarm

5) Screen Jam

6) Conveyor Alarm

7) Conveyor Motor High Temp

8) Conveyor Zero Speed

9) Conveyor Emergency Stop

B. Control Strategy CS-02

1. TITLE: Cyclone Degritter

2. DRAWING: I-101

3. DESCRIPTION: Monitoring and Control of Hydrogritter Classifiers

a. Hydrogritter Classifiers are a vendor supplied system, specified in Section 46 23 63 – Grit Classifying and Washing Equipment.

b. An 18” and 24” system will be installed.

4. FUNCTIONAL DESCRIPTIONS

a. System Operation

1) In the On position, the classifier runs. In the Off position, the classifier is inoperable.

2) Spray water solenoids open when classifier is running.

5. SCADA MONITORING AND CONTROL

a. Indications to be added on the HMI shall include:

1) Classifier Running (Typ. Of 2)

b. Alarms to be added on the HMI shall include:

1) Classifier Emergency Stop (Typ. Of 2)

2) Classifier Motor High Temp. (Typ. Of 2)

3) Classifier Zero Speed (Typ. Of 2)

4) Classifier High Torque (Typ. Of 2)

C. Control Strategy CS-03

1. TITLE: HVAC Ventilation Monitoring

2. DRAWING: I-103

3. DESCRIPTION: Monitoring of Ventilation System for NFPA 820 Compliance

a. Supply and Exhaust Fans will be replaced and provided with flow monitoring.

b. Go/No-Go control stations with push-to-test lights, and horn/strobe annunciator panels on each floor with silence and test pushbuttons.

c. Combustible Gas monitors are existing.

d. Typical HVAC controls are described on the H drawings.

4. FUNCTIONAL DESCRIPTIONS

a. System Operation

1) Exhaust Fans and Supply Fans possess flow monitoring and simple status monitoring of the motor starters.

2) If a fan is running, and no flow is detected, or if the fan overload is tripped, this constitutes a failure condition.

3) If any of the fans in the room have failed, the Go/No-Go stations positioned at entryways will illuminate the No-Go warning.

4) High methane levels (at least 10%LEL), detected by the existing combustible gas detectors, will also illuminate the No-Go warning.

5) In either state, ventilation fail or combustible gas detected, the Horn and Strobe on each floor will activate. The strobe will stay active until the warning condition has been remedied. The horn will annunciate until the Silence pushbutton is pressed.

6) Holding the Silence/Test pushbutton during normal conditions for over 5 seconds will annunciate the horn and strobe for testing operation.

7) Pressing silence at one control station silences all horns in the building.

8) Under normal conditions the Go light will be illuminated at Go/No-Go stations.

5. SCADA MONITORING AND CONTROL

a. Indications to be added on the HMI shall include:

1) Fan Running (typ. of Supply and Exhaust Fans)

2) Combustible Gas Level (typ. of all detectors)

b. Alarms to be added on the HMI shall include:

1) Fan Overload (typ. of Supply and Exhaust Fans)

2) Fan Loss of Flow (typ. of Supply and Exhaust Fans)

3) Combustible Gas Level High (typ. of all detectors)

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Shop Tests

1. Shop Testing shall conform to the requirements of Section 40 80 81 – PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. 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 40 63 43 – PMCS PROGRAMMABLE LOGIC CONTROLLERS
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish, install, calibrate, test, startup, and place into satisfactory operation PMCS PLCs.

B. The PMCS Supplier shall provide on behalf of the Contractor all configuration and documentation of all PMCS PLCs.

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 40 61 13 – PMCS General Requirements.

B. Section 40 61 95 – PMCS Monitoring and Control Criteria.

C. Section 40 61 96 – PMCS Control Strategies.

D. Section 40 80 81 – PMCS Factory Testing.

E. Section 40 80 82 – PMCS Startup and Field Testing.

1.04 REFERENCES

A. Definitions

1.	Peer-to-Peer	-	Communication between devices connected to a common channel where each device can control the communication exchange.
2.	PID	–	Proportional, Integral and Derivative, a description of controller action which modifies the response to an input signal and a set point such that the output rapidly and optimally achieves the set point.
3.	PPU	–	Portable Programming Unit
4.	Section 40 61 13	–	PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

B. Reference Standards

1.	Section 40 61 13	–	PMCS General Requirements lists the standards applicable to this Section and the PMCS.
2.	IEEE 37.90.1	–	IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus.
3.	NEMA ICS 61131-1	–	Programmable Controllers Part 1: General Information.
4.	NEMA ICS 61131-4	–	Programmable Controllers Part 4: User Guidelines.
5.	IEC 61131	–	Programmable Controllers

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. All materials and equipment furnished shall be new, free from defects, and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of PLCs.

C. Manufacturers shall have produced PLCs for a minimum of 20 years.

D. Where there is more than one item of similar equipment required under the Contract, all such similar equipment shall be the product of one manufacturer.

E. All material furnished under this Contract shall be determined safe by either Underwriters Laboratories, Inc., or Factory Mutual Engineering Corporation and all material shall be labeled, certified, or listed by the testing agency.

F. Custom made equipment or related installation which are constructed specially for this Project will not be acceptable.

G. Equipment furnished within this Contract shall be standard products furnished by a supplier regularly engaged in the manufacture of such products.

H. The PMCS Supplier shall utilize System and Software engineers who have been factory trained and certified on the respective software packages, to perform all programming functions, develop control strategies, create graphic displays, customize applications, document all work and coordinate the software interface.

I. System and Software engineers shall be intimately familiar with the details of this Plant, instrumentation and control in general and the Contract goals and requirements.

J. System and Software engineers shall have a minimum of 10 years' experience in the PMCS development work required under this Contract.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The PMCS Supplier shall submit, through the Contractor, the following information for approval prior to beginning of the actual work of developing software for this Contract:

1. Qualifications and certifications of system software engineers.

2. A listing of all proposed software packages indicating quantities and where they will be installed.

3. Preliminary ladder logic for all PLC(s) and general methods of implementing the various control strategies.

4. Preliminary database and I/O listing showing system tag names and references.

5. Preliminary screen display count with general system structure.

6. Preliminary screen display development, general display organization and common components.

C. The PMCS Supplier shall submit all completed items to the Engineer for review and approval. As a minimum, the items to be submitted shall include, but shall not be limited to:

1. PLC ladder logic with full documentation and annotation
2. Full Color copies of all unique Graphic display screens
3. Screen animation and control
4. Databases
5. Alarm and event log lists, formats and messages

D. Submittals shall be made at least 60 days in advance of any proposed use by the PMCS Supplier.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall comply with spare parts, special tools and supplies listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Spare parts and tools shall be as recommended by the manufacturer and shall as a minimum include the following:

1. One (1) I/O module for each type furnished.
2. One (1) communication module (Ethernet, Remote I/O, PLC LAN) for each type furnished.
3. One (1) CPU of each size and type furnished.
4. One (1) power supplies of each size furnished.
5. All spare parts recommended by manufacturer and listed as recommended spare parts in the manufacturer's submitted O&M Manual.
6. Tools
    a. Furnish all tools necessary to service, disassemble, repair, and adjust the equipment.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS Programmable Logic Controllers shall be as manufactured by:

a. Schneider Electric, Andover, MA;

b. Allen Bradley, Milwaukee, WI.

c. Or approved equal.

B. PPUs shall be as manufactured by:

1. Dell, Round Rock, TX;

2. Panasonic, Newark, NJ;

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. General

1. The PMCS PLCs shall implement and provide the Control Strategies specified in Section 40 61 96 – PMCS Control Strategies.

2. Where shown on the Contract Drawings redundant PLCs configured in hot standby arrangements shall be provided.

3. The PLC shall be configured by the Contractor to perform functions shown and specified. The Contractor shall coordinate and obtain from all equipment suppliers PLC systems of the same manufacturer and series.

4. Functions to be performed by the PLC include but are not necessarily limited to the following:

a. Alarm and status indication.

b. PID control and arithmetic functions.

c. Interlock and sequential logic control of processes and equipment operations.

d. Collection and transmission of data and control parameters to and from other PLCs.

e. Provide a dry contact rated 2 amperes at 120-volt a-c for remote indication of processor failure.

5. The PLC shall be microprocessor type furnished with all necessary relays, timers, counters, and latches as data manipulative functions and arranged into the format required to accomplish the functions shown and specified.

6. The PLC shall be designed and constructed for the demanding requirements of real-time process management and control on a continuous basis for use in a [Plant].

7. The manipulative functions shall have the capability of being rearranged into any desired format while the controller is performing other control tasks.

8. Expansion of the controller by the input/output points, internal data manipulative functions, and relays, timers and counters shall be accomplished by reprogramming.

9. The control programs and applications memory of the PLC shall be capable of being remotely (off-line) and locally (on-line) monitored, programmed, modified and displayed by use of a personal computer and documentation software which shall be provided as part of this Contract.

10. In addition, the PLC shall be capable of being programmed by an external PC compatible host device via an Ethernet communication port. The host communication interface shall allow controlled access for authorized users via password protection to all registers, I/O system fault status and I/O override.

11. The logic shall be entered and displayed in ladder diagram format.

12. The ladder diagram format shall contain a complete cross reference with each coil referred to in logic and identified as normally open or normally closed.

13. Mnemonic information shall be added to each coil and to both real and internal I/O points. Alphanumeric titles and descriptions shall appear on the screen.

14. Any restructuring of the control logic shall be done at the PLC installation and shall not necessitate any removal components of the PLC to another location.

15. The PLC construction shall be that of a modular type design.

16. All inputs, outputs, and logic control interface units shall be easily removed for ease in replacement or restructuring the hardware arrangement.

17. Shut down of the processor control logic (halting of program scan) shall not occur if I/O or Remote I/O modules are removed.

18. In the event of a power failure or malfunction of the logic hardware, the controller shall provide dry, Form C contact closures for remote and local indication and alarming.

19. A self-diagnostics package to determine proper processor operation shall be included. Diagnostic LED shall be provided in clear view on the front of the PLC enclosure.

20. Changing an on-line control logic process operation shall not necessitate the halting of the processor.

21. Burn-in for all printed circuit boards and modules shall be performed at the factory.

22. Programmable Logic Controllers shall conform to NEMA ICS 61131 – 1 and NEMA ICS 61131 – 4

23. The primary interface to the process equipment and field devices shall be provided by the input/output system consisting of I/O modules installed in the PLC backplane, chassis or remote mounting racks.

24. The input/output system hardware shall be designed with the following features:

    a. Noise immunity and filtering.

    b. IEEE surge-withstand rating to IEEE 37.90.1

    c. Optical isolation for all inputs and outputs to provide controller logic protection.

    d. No on board pots requiring adjustment or maintenance.

    e. Any card, any slot, plug-in packaging, with locking bars and/or screws to hold I/O modules in place.

    f. 600 volt, screw type, field wiring terminal strips sized to accommodate a minimum of two # 14 AWG wires per terminal within control panels and MCCs.

    g. Terminal strip design shall allow I/O module removal and replacement without disturbing wiring connections.

    h. Front-of-module LED status indicators for each individual I/O point to indicate when power is applied at I/O terminals.

    i. Individually fused output circuits for all output modules.

    j. Output fuses shall be capable of being inspected without removal of and replaced without disassembly of the output module.

    k. Individually isolated output modules shall be provided with front-of-module blown fuse LED status indicators for each output point.

    l. Non-isolated (common output power source) output modules shall be provided with common blown fuse LED status indicators for a maximum of every four points.

    m. All outputs for contactors and relays shall be rated for a minimum of 2.0 amps continuous at 120 VAC.

    n. Where higher rated outputs are required interposing relays located inside control panels shall be provided in order to assure that ratings of the PLC output contacts are not exceeded.

    o. For outputs to motor contactors and other equipment type load relays, provide transient and inrush surge suppressor connected across the output contact terminal and the neutral common terminal inside the control panel to suppress the switching surge transient to lower than the continuous rating of the output contacts.

    p. The maximum number of points per I/O module shall be as follows:

1) Discrete: 16.

2) Analog: 8.

q. The following types of I/O modules shall be provided for use with the supplied PLC System:

1) Analog Inputs (12 bits minimum):

a) 4-20 mA DC (250 ohms maximum impedance).

2) Analog Outputs (12 bits minimum):

a) 4-20 mA DC (load of 750 ohms minimum).

3) Discrete Inputs:

a) 120 VAC/DC in both isolated and common circuit types.

4) Discrete Outputs:

a) 120 VAC in both isolated and common circuit types.

b) Form C Relay Contacts.

5) Remote I/O

a) Remote I/O shall be provided where shown on the Contract Drawings or the PMCS Block Diagrams or where recommended by the manufacturer to reduce the level and quantity physical wiring at the PLC location.

b) Remote I/O shall be either PLC rack type I/O or intelligent field modules, as manufactured by the PLC manufacturer.

c) Remote I/O processor or communication modules shall be modular and individually replaceable.

d) Remote I/O shall communicate with PLC CPU using the PLC manufacturer's communication bus for remote I/O.

e) All required cabling shall be furnished under this Contract for use in/with the conduit system as indicated on the Contract Drawings.

(1) Provide adequate lengths.

(2) Cabling will be installed under the Electrical Contract.

25. Signal and control circuitry to individual I/O boards shall be arranged such that a board failure shall not disable more than one half of the control loops

within any group of controlled equipment (e.g., one pump out of a group of three pumps, two pumps out of four, etc.).

26. Where possible, individual control loops and equipment shall be assigned to individual boards such that failure of the board will disable only one loop or piece of equipment.

B. Required PLC Features:

1. Construction

   a. Modular printed circuit boards.

2. Type

   a. Electronic components with central processing unit and software reprogramming capabilities.

3. Memory

   a. System Memory

      1) Electrically Erasable Non-volatile type (EEPROM) or Lithium battery-backed RAM with minimum retention time of 2 years under worst case conditions.

   b. Application Memory:

      1) Type, Lithium Battery-backed RAM with minimum retention time of 2 years under worst case conditions, or RAM with EEPROM or NOVRAM backup modules.

      2) Size, as required for present and dedicated future I/O capacity and for performance of the specified functional requirements plus 25 percent spare capacity as a minimum.

4. Language Format

   a. Ladder type diagrams and functional blocks.

5. Provide type and quantity of I/O as required to perform the operational and functional requirements plus 20 percent spare (minimum of one module) for each type of I/O module used.

6. Spare I/O points shall be mounted and wired ready for use and shall require only field wiring connections and software configuration to place the point in service.

7. Internal Functions

   a. Relays, timers, counters, latches, internal storage registers, and other functions as required to perform specified functional requirements plus 25 percent spare capacity.

8. Security Features

a. Key switch interlock on PLC and/or security password protection through system programmer terminal to prevent tampering of logic sequences and unauthorized programming.

9. Processor Scan Time

a. At least 5000 instructions per millisecond.

b. No more than one word shall be required for each contact or coil including address, no more than one word for a branch, no words for spaces or connects, and no words shall be required to begin a new rung.

c. Scan time refers to nominal memory scan time of words of relay ladder logic, with an "immediate I/O" command to operate on instantaneous alarm information.

d. Unprogrammed memory shall not be scanned.

10. Operating Temperature

a. 32 ^{0}F to 140 ^{0}F.

11. Storage Temperature

a. Minus 40 ^{0}F to 160 ^{0}F.

12. Power Supply

a. 120 VAC, with circuit breaker protection.

b. Supplies shall be sized for a minimum of 130 percent of maximum simultaneous current draw.

c. Comply with requirements specified in with Section 40 61 13 – PMCS General Requirements.

13. Data Communications

a. The PLCs provided shall be capable of peer-to-peer communications with other PLCs of the same and different types by means of manufacturer standard data highway system.

b. All PLCs shall be provided with Ethernet networking capability using TCP/IP protocol. All modules required shall be supplied.

14. Clock

a. Battery-backed clock with typical variation of ±20 sec. per month.

15. Programming/Documentation Software

a. Provide PLC programming/documentation software package which shall be fully menu-driven and self-prompting.

b. Package shall provide fully integrated ladder diagram programming and documentation.

c. The package shall allow 3 lines of mnemonics per ladder element with 6 characters per line minimum. The package shall also provide for the inclusion of the following documentation information for ladder diagram contacts and coils:

1) Panel I/O wiring list.

2) Rack number.

3) Module position slot number.

4) I/O module type.

5) Terminal number and wire number.

6) Electrical and Mechanical Drawing Reference Number.

7) Description of up to 240 characters in length for each element.

d. The programming/ documentation software displays shall allow the user to flip between documentation and the uncommented rung as it resides in the controller.

e. Software shall also allow selection of single rung and continuous ladder diagram printouts.

16. PLC Configuration

a. PLC types shall be as designated on the PMCS Block Diagram and this Section.

b. Memory and processor shall be adequate for all control functions specified.

17. PLC Minimum Performance Requirements

a. Internal RAM: 4096kB

b. Supports 1024 I/O Discrete, 256 I/O Analog points

c. Supports two additional Ethernet communications modules

d. Two microsecond instruction execution time

e. Supports 10 slots per backplane

C. Portable Programming Units

1. The Contractor shall provide industrially hardened portable programming units (PPU) for all PLCs furnished for loading the control program into the processor memory and monitoring the data table.

2. The PPU shall be able to interface with the PLC during operation.

3. The PPU shall be furnished with the latest Windows Operating System at the time of bid, communication interfaces and a dust, drip and rain proof fully sealed case.

4. The PPU shall have comply with the following requirements:
   a. Section 40 61 95 – PMCS Monitoring and Control Criteria.
5. The PPU shall be capable of programming the PMCS PLCs through the use of a ladder logic instruction set.
6. It shall also be possible to observe the I/O status and the register values.
7. Overriding of inputs and outputs shall also be possible.
8. The PPU shall be capable of basic programming functions which shall include normally-open, normally-closed contacts, latch relays, one shots, timers, and up-down counters.
9. The PPU shall contain an available field of nine (9) contacts and one (1) coil across by seven (7) contacts down, for each rung of the program.
10. The PPU shall be capable of modifying the program element by element or rung by rung.
11. The PPU shall also be capable of complete program documentation.
12. The PPU shall have the following three modes of operation, on-line, off-line, and monitor.
13. The PPU shall be capable of displaying the status of contacts, coils, timers, counters, and registers while in the monitor mode.
14. The PPU shall be capable of normal programming in the off-line mode.
15. The PPU shall be capable of editing, and modifying the running program while in the on-line mode.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS PLCs shall confirm to the requirements of Section 40 80 81 – PMCS Factory Testing.

B. PMCS PLC monitoring and control criteria specified under this Section shall be functionally verified during PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. Install each item in accordance with manufacturers recommendations and in accordance with the Contract Documents.

B. Configure PLC to prevent erroneous and nuisance alarms by using techniques including time delays and logic such as

1. Inhibit initiation of a seal water failure alarm when pump is not running

2. Provide a time delay on high discharge pressure alarm.

C. Arrange PLC data table. Repeat all status and alarm bits and analog values (including timer and counter presets) into a separate, contiguous block of memory, grouped by type. Provide 25% space in each group to allow for future expansion.

D. Configure operator interface unit using function keys and instructional prompts so that the operators can modify set-points and presets without any special training or knowledge of the PLC program.

E. A modular and structured approach to PLC program development shall be implemented.

F. The programs shall be broken up in logical segments to allow easy debugging in the field.

G. All real world outputs/inputs shall be grouped such that their addresses can be mapped in contiguous registers to allow use of matrix functions for troubleshooting, debugging, and alarming.

H. An alarm segment shall be developed for all real world outputs.

I. The alarm segment shall be separate from the rung logic for real world outputs.

J. For open/close valves, the associated limit switch positions shall be compared with the PLC output.

1. If the output calls for an open valve, the open limit switch should be made and the closed switch should not and vice versa.

2. Any combination other than these two shall cause an alarm.

K. The PLC shall monitor limit switch positions for valves in transition.

1. Valves in transition (between open and close position) shall be displayed on the operator interface with message "In Transition".

2. The Contractor shall submit limit switch development for all valves.

L. For motors, the run output shall be compared to the run status with the appropriate time delays.

1. Any mismatch between RUN output and RUN status shall cause an alarm.

M. Unless waived in writing by the engineer, application programs written for PLCs shall be written using ladder logic, showing discrete references in individual ladder rungs.

N. Each output shall have its own complete set of logic to aid in startup and trouble shooting.

O. Where duplicate or repetitive logic is required subroutines shall be used to reduce program memory requirements and scan time.

P. The program shall be written in a logical sequence with associated rungs grouped together in a manner to make the system logic clearly evident.

Q. Where multiple rungs use the same constants for associated presets or reference, the constant shall be in the form of a register location and shall be loaded in the beginning of the program each time it is run.

R. All preset register values shall be part of the program and load each time the program is run.

S. Where possible, constants that must be calculated shall have this done in the program.

T. Where values must be input, whether in the program or during operation, software "traps" shall be used to prevent input of values out of range or that will cause improper operation of the system.

3.03 FIELD TESTING / QUALITY CONTROL

A. PMCS PLCs filed testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. PMCS PLCs monitoring and control criteria specified under this Section shall be verified during PMCS Startup and Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

B. The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the correct implementation of the PMCS PLCs specified under this Section.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, supervision, materials, equipment and incidentals as shown, as specified and required to furnish, install, calibrate, test, start-up and place into satisfactory operation all control panels and/or equipment enclosures, termination cabinets and all associated equipment, as indicated on the Contract Drawings and as specified in this Section.

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

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C. The Contractor shall furnish and install all panels and enclosures as required.

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 05 05 23.02 – Miscellaneous Metal Fastenings.

C. Section 40 61 13 – PMCS General Requirements.

D. Section 40 80 81 – PMCS Factory Testing.

E. Section 40 80 82 – PMCS Startup and Field Testing.

1.04 REFERENCES

A. Definitions

1. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. Not Used

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall provide spare parts for the equipment provided under this Section.

B. The spare parts shall be listed in an index and packed in containers suitable for long term storage, provided with labels clearly designating the manufacturer's part number with complete information for use and reordering.

C. The Contractor shall provide minimum the following:

1. Ten (10) percent (minimum of 1), spare space heaters of each type and rating.

2. Ten (10) percent (minimum of 1), spare heater thermostats of each type

3. One (1) spare lighting fixture and switch of each type provided.

4. Ten (10) percent (minimum of 2), spare power supply, regulator, power conditioner, etc., of each type and rating provided.

5. Ten (10) percent (minimum of 1), spare thermal control device (fan, air conditioner, heat exchanger, etc.) for each type and rating provided.
6. Ten (10) percent (minimum of 10), spare fuses, circuit breakers, equipment mounting (DIN) rails.
7. Twenty-five (25) percent (minimum of 100) spare terminals of each type provided for the entire project.
8. Spare parts as recommended by the individual equipment manufacturers.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. NEMA 4, 4X and 12 panels and enclosures shall be as manufactured by:
   1. Hoffman, Anoka, MN;
   2. B-Line, Highland, IL;
   3. Or approved equal.

B. NEMA 7 panels and enclosures shall be as manufactured by:
   1. Adalet, Cardington, OH;
   2. Crouse-Hinds, Syracuse, NY;
   3. Or approved equal.

C. Fiberglass or polycarbonate panels and enclosures shall be as manufactured by:
   1. Adalet, Cardington, OH;
   2. Crouse-Hinds, Syracuse, NY;
   3. Or approved equal.

D. Wire troughs and wire management shall be as manufactured by
   1. Panduit, Lockport, IL;
   2. Hoffman, Anoka, MN
   3. Or approved equal.

E. Circuit breakers shall be as manufactured by:
   1. Siemens Industry, Inc., Washington, DC;
   2. Allen Bradley, Milwaukee, WI;
   3. Or approved equal.

F. Terminal blocks shall be as manufactured by:

1. Entrelec, Montgomery AL;
2. Phoenix Contact, Harrisburg, PA;
3. Or approved equal.

G. Fused Terminal blocks shall be as manufactured by:
1. Allen-Bradley, Milwaukee, WI;
2. Phoenix Contact, Harrisburg, PA;
3. Or approved equal.

H. Panel or enclosure heaters shall be as manufactured by:
1. Hoffman (DAH8001B), Anoka, MN;
2. Hammond Manufacturing, Cheektowaga, NY;
3. Or approved equal.

I. Panel or enclosure corrosion inhibitors shall be as manufactured by:
1. Hoffman (HCI series), Anoka, MN;
2. Or approved equal.

J. Panel or enclosure heat exchangers shall be as manufactured by:
1. Hoffman (Spectracool), Anoka, MN;
2. Hammond Manufacturing, Cheektowaga, NY;
3. Or approved equal.

K. Fiber Optic Patch Panels (Panel Mount)
1. Corning Cable Systems, Corning, NY;
2. Tripp Lite, Chicago, IL;
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. General Requirements:
1. Furnish and install panels, boxes and enclosures with a NEMA rating based on the table listed in Appendix A in this Section.
2. Panels and enclosures shall meet or exceed the NEMA and NYCEC requirements for the area in which they are installed.
3. Unless otherwise specified or indicated, panels and enclosures shall have a NEMA 4X rating and shall be fabricated of 316 stainless steel.

4. Panels provided as part of a packaged system, from an equipment vendor, (sump pumps, seal water pumps, VFDs, etc.) shall comply with all requirements specified in this Section.
5. The NEMA rating of panels, enclosure and devices shall be as required in their individual Sections if so specified.
6. The sizes of panels and enclosures shown on the Contract Drawings are estimates.
7. The Contractor shall furnish enclosures of the size required to house all equipment, instruments, front panel mounted devices, power supplies, power distribution panels, wiring, tubing, and other components installed in the enclosures while maintaining adequate free space within the enclosure.
8. Panel, box and enclosure doors shall be continuously hinged and shall be of pan construction. Clamp type closures shall be provided.
9. Adequately support and restrain all devices and components mounted on or within the panel to prevent any movement.
    a. Provide sub-panels for installation of all internally mounted components.
    b. Provide mounting strips for installation of all relays and other components where mounting strips are practical.
    c. Sub-panels shall be pan construction to prevent warping.
10. Devices shall be arranged to allow adequate wiring room for ease of connections and servicing.
11. All panel and enclosure components shall be identified both inside and out with engraved, laminated plastic name plates.
12. Panels shall be provided with an engraved laminated plastic sign inscribed "WARNING – This Device Is Connected to Multiple Sources of Power ". Letters shall be 1/2" high, white on a red background
13. Provide all electrical and/or pneumatic connections, components and devices, support hardware, fasteners, interconnecting wiring and/or piping required to make the control panels complete and operational units.
14. Provide bulkhead fittings for all gas, liquid piping and tubing leaving panels and enclosures.
15. Provide all panel-mounted pilot devices as shown and specified.
16. Locate and install all devices, wiring, and components so that connections can be easily made and there is ample room for servicing each item.
17. Components for installation on panel exterior shall be located as shown on the Contract Drawings or as directed by the engineer.

a. Layouts shall be submitted for approval.

b. All exterior panel mounted instruments shall have a NEMA rating equal to or greater than the enclosure.

c. For panel mounted devices which cannot be obtained with the correct NEMA rating equal to the enclosure, the device shall be mounted behind a transparent viewing window or door, manufactured for the purpose that provides the proper rating.

d. The viewing window or door shall maintain the NEMA rating of the enclosure and be easily opened for access to the instruments.

18. Where permitted by location and layout as shown on the Contract Drawings, all panels and enclosures shall have full height rear access doors, unless otherwise shown.

19. Where rear doors are not possible, panels shall have full height front access doors.

20. All wiring to panel connections from field instruments, devices, and other panels shall be terminated at master numbered terminal strips, unless otherwise specified.

21. Free standing control panel, enclosure or any panel with a dimension of 36 inches or more shall comply with the following:

a. Provide at least one 120 VAC, 15 Amp duplex, grounding type receptacle.

b. At least one 120 VAC LED light fixture complete with a protective plastic shield and capable of generating 25 foot candles on all the components within the enclosure.

c. One 120 VAC, 15 Amp, snap switch in an outlet box with a cover to turn on the light. The switch shall be located so that it is easily accessible from the door.

d. The service light with switch and duplex receptacle shall have their own circuit breaker.

e. The bottom 12 inches and top 6 inches of free-standing panels shall be free of all devices, including terminal strips, to provide ease of installation, wiring and testing.

f. In general, panel indication and control devices shall be mounted within a range of 40 to 72 inches above the operating floor but not less than 36 inches nor greater than 78 inches unless otherwise shown on the Contract Drawings.

g. Annunciators or alarm message display devices shall be mounted up to 84 inches above the operating floor.

h. All instrument read-outs and displays shall be in ENGINEERING UNITS of the desired process variable. Percent of scale or digital counts are not acceptable unless approved in writing by the Engineer.

i. Panels shall be constructed with an integral fully enclosed solid bottom section at least 6 inches in height from the bottom of the enclosure to the bottom edge of the enclosure door opening.

j. Free standing enclosures shall be mounted on concrete base pad.

k. Free standing panels installed in areas with raised computer type floors shall be provided with an adjustable, welded steel support frame to support the panel from the building structure.

1) The frame load rating shall have a 50 percent safety factor.

2) The frame shall be coordinated with the flooring being installed and shall be flush with the height of the raised floor.

B. Panel and Enclosure Fabrication:

1. Panels and enclosures shall be fabricated as indicated on the Contract Drawings and as specified in this Section.

a. Control panels and enclosures shall be assembled, wired, and tested in the PMCS Supplier's own or other City/Engineer approved facility.

b. All components and all necessary accessories such as power supplies, power conditioning equipment, mounting hardware, input and output terminal blocks, plug strips, relays, lighting, circuit breakers, fuses, and other components which may be required to complete the system shall be provided.

c. The Contractor is directed to review the area classifications with regards to hazardous atmospheres, as they are defined by the NYCEC and NFPA 820.

1) Many areas of the facility within the scope of this Contract are classified as NYCEC Class I, Division I or II hazardous and all construction shall meet those requirements.

2) All equipment, controls, instruments, panels, enclosures, etc., for use in these areas, shall be constructed to meet the area requirements.

d. All control panels and enclosures shall be of formed or welded construction of steel or stainless steel, as required, unless otherwise noted.

e. Panels and enclosures shall be fabricated in accordance with the NEMA ratings as specified, shown, or required.

f. Panels and enclosures shall meet or exceed the requirements of the area in which they are located.

g. As a minimum, a NEMA 12 rating shall be required in all non-corrosive areas and NEMA 4X S/S in outdoor, process, and corrosive areas

h. Where enclosure size or weight requires, provide lifting eye bolts to facilitate handling of the enclosures.

   1) All panels or enclosures with any dimension 72 inches or greater or with a weight in excess of 150 pounds, shall be equipped with lifting eyes.

   2) Bolt lifting eyes directly through the enclosure structural members.

i. Continuously weld all exterior seams and grind smooth.

j. Reinforce sheet steel with steel angles where necessary to adequately support equipment, ensure rigidity, and preclude distortion and resonant vibrations.

k. Panels and enclosure surfaces shall be flat within 1/16 inch over a 24 inch by 24-inch area, or flat within 1/8 inch for a larger surfaces.

   1) Flatness shall be checked by using a 72-inch-long straight edge.

   2) Out-of-flatness shall be gradual, in one direction only, and shall not consist of obvious depressions or a series of wavy sections.

l. Use pan-type construction for doors.

   1) Door widths shall not exceed 36 inches.

   2) Mount doors with full-length heavy-duty continuous piano hinge with stainless steel hinge pins.

   3) Provide handle-operated, oil-tight, key-lockable three-point stainless steel latching system with rollers on latch-rods for easy door closing.

   4) Provide oil resistant continuous gasket completely around each door or opening.

m. Provide interior mounting panels and shelves constructed of minimum 12-gauge steel with a white enamel finish.

n. Provide steel print pocket with white enamel finish.

o. Use 304 stainless steel fasteners throughout.

p. Provide Type 316 stainless steel sun shielding for all outdoor panels.

q. Panels and enclosures shall have adequate wiring space provided on the top and bottom.

1) A minimum of six (6) inches of clear space shall be provided between enclosed equipment and the top and the bottom of the enclosure.

2) Additional space shall be provided when a large number of conduits or wires enter the enclosure.

r. Provide enclosure mounting supports or bases as required for floor, frame, or wall mounted enclosures, and for free standing enclosures.

1) For floor mounted enclosures, provide minimum 12-gauge stainless steel floor stand kits bolted to the bottom of the enclosure, sealed and gasketed to maintain the NEMA rating.

2) Floor stand heights shall be coordinated with enclosure sizes and base pads to comply with the general indication and control device mounting height requirements as specified in this Section or as shown on the Contract Drawings.

3) Floor stands shall be mounted on base pads using anchor bolts or expansion anchors.

s. All panels shall have solid bottoms.

1) Removable panels may be provided to ease punching of conduit entries.

2) Panels and enclosures mounted on raised floors may have open bottoms but shall comply with all codes.

t. Provide all necessary holes and cutouts for installation of equipment.

1) Openings shall be punched or saw cut without distorting the face of the panel.

2) Flame cutting is prohibited.

3) All openings shall be ground straight, square, level and smooth.

u. Provide space and clear area for entry of conduit and wire.

v. Cable and piping shall enter the enclosure through the bottom whenever possible.

w. All conduit and piping openings and all conduits shall be sealed watertight and maintain the NEMA rating of the panel.

x. Panels located inside air-conditioned control room areas shall be NEMA 12 rated stainless steel unless otherwise noted.

y. Fabricate enclosures using minimum 14-gauge stainless steel for wall or frame-mounted enclosures and minimum 12-gauge stainless steel for floor mounted and free standing enclosures. Steel shall be free of pitting and surface blemishes.

z. Standard prefabricated enclosures are preferred.

aa. When required by area classification or Contract Documents, NEMA 7 panels and devices shall be provided.

1) Panels and enclosures, to be installed in areas classified as hazardous (Class I, Div. I or II), per Contract Documents or Codes, shall be constructed to NEMA 7 and Class I, Division I, Group D requirements.

2) In damp or corrosive areas, these panels shall have an "O" ring seal on the door, to prevent entry of corrosive atmospheres.

3) These panels shall be manufactured with all necessary tapped openings to accept devices and conduit entry.

4) Ten (10) percent (minimum of one (1) spare, plugged, tapped, openings shall be provided for each size furnished.

5) Field tapping is not permitted.

C. Environmental Controls

1. Outdoor Panels:

a. Provide thermostatically controlled heaters to maintain temperature inside each enclosure 10°F above the ambient temperature, above 40°F., or that required for component operation (whichever is greater), and to prevent interior condensation over an outside ambient temperature range of -20°F through 120°F.

b. Provide automatically controlled closed-loop heat exchangers or closed loop air conditioners with filtered air louvers when required to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the enclosure.

c. Provide internal corrosion inhibitor devices for corrosion control inside of each enclosure.

d. Outdoor panels shall be designed to withstand wind driven rain and snow without any moisture entry. The panel shall not be damaged by the buildup of ice or snow.

D. Indoor Panels:

1. Provide automatically controlled heaters as required to maintain temperature approximately 10°F above ambient for condensation prevention inside panels.

1) Panel heaters shall be thermostatically controlled, fan-driven heaters, with all components mounted in an anodized aluminum housing for sub-panel mounting.

2) The heaters shall be powered from 115 VAC from a dedicated circuit breaker and separate panel power feed.

2. Provide automatically controlled closed loop heat exchangers or closed loop air conditioners with filtered air louvers if required to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the enclosure.

1) Heat exchangers and air conditioners shall be of a dual loop design to isolate panel interior air from exterior air.

2) The units shall be thermostatically controlled and shall be powered at 115 VAC from a dedicated circuit breaker and separate panel power feed.

E. Electrical

1. General:

a. Control panel power supply source type, voltage, number of circuits and circuit ratings shall be as shown on the Contract Drawings and as required by the equipment.

b. Unless otherwise noted, power supply to all panels shall be 120VAC 60 Hz.

c. Surge protection shall be provided to protect the electronic instrumentation systems from surges propagating along the signal and power supply lines. The protection systems shall be such that the protection level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level, be maintenance free, and self restoring. Signals originating from instruments mounted outside the building where the control panel is located shall include surge protection at the panel and at the transmitter, for two-wire and four-wire instruments.

1) Provide lightning and surge protection devices at all antennas, as well as signal lines, communication networks, and power feeds for all lines that originate or are routed

outside a building on any part of the existing or proposed circuits.

2) Lightning and surge protection devices shall provide full protection from line to line and from line to ground. Units shall be DIN-rail mounted, rated for a minimum of 10kA maximum surge current and voltage suitable for the type of circuit being protected. Reaction time shall be on the order of nanoseconds.

3) AC power lines shall comply with all requirements of UL1449 with listed devices having a minimum 18kA surge protection and RFI filtering.

4) Surge protectors shall be removable without changing the impedance of the circuit.

d. Provide Type 1 surge protective devices, per NEC Article 242, at the power feed to the panel. Surge Protective Devices (SPD) shall be designed to provide transient voltage protection for a service entrance panelboard. SPD units shall comply with UL 1449, and shall be listed for such use. SPD units shall be rated for the voltage and phase service of the panel at 120 kA per phase. SPD units shall have a built-in diagnostic package with flashing trouble indicator, a display for the status of each phase, and a counter and display to indicate the number of surges that have caused the device to operate.

e. Uninterruptible Power Supply (UPS) units shall be provided to power panels as indicated on the Contract Drawings.

1) As a minimum, a UPS shall be provided for all panels and enclosures containing network, PLC, gas detection, etc. equipment. UPS units shall be furnished and installed as specified.

f. The panels and enclosures shall be provided with internal 120 VAC, 20-amp DIN rail mounted circuit breakers sized as required to distribute power to the panel components and field instruments.

g. Provide quantity of circuits shall include 25 percent spares.

h. Provide a durable legend mounted near the circuit breakers in each panel, which lists the circuit breaker numbers and circuit descriptions.

i. Provide circuit breakers to protect each circuit, with no more than six instruments on a single circuit.

j. Provide DC power supplies of quantities and sizes as required for powering DC signal and control loops.

k. Where wires pass through adjacent panel walls, provide suitable grommets or bushings to prevent cutting or damage of insulation.

l. When DC power and/or low voltage AC power is required, provide and install the necessary power supplies, transformers, regulators and fuses in the panel.

m. All spare field and panel wires, within each panel or enclosure, shall be tagged as spare and labeled and marked as per specifications with “As-Builts” showing their source and destination.

n. Provide complete approved schematic and wiring diagram including spare wiring, showing "As-Built" circuitry.

o. In addition to required submittals, the final approved "As-Built" diagram shall be enclosed in transparent plastic and placed in an easily accessible drawing pocket built in the panel or enclosure door.

2. Electrical Wiring and Accessories:

a. Unless otherwise specified, internal wiring shall be Type MTW stranded copper wire with thermoplastic insulation rated for 600 Volts at 85°C for single conductors.

b. Wiring shall be color coded and labeled with wire identification.

c. For DC signal wiring, use No. 16 minimum AWG twisted tinned copper pairs with overall braided copper shield and drain wire.

d. For AC power wiring, use No. 12 minimum AWG. For AC and DC control use No.14 AWG wiring. For wiring carrying 10 Amps or more, use sizes required by NYCEC.

e. Install wiring runs in ventilated wire troughs along horizontal or vertical routes to present a neat appearance.

1) Wire trough shall be filled to no more than 40 percent capacity. Angled runs are not acceptable.

2) Separate and shield DC signal wiring from power and control wiring by a minimum of 4 inches, using separate wire troughs.

3) Separate troughs shall be provided for field wiring.

4) Where practical, in the panels and enclosures, route the low voltage DC signal wiring along the left side of the enclosure sub-panel(s) and route the AC power and control wiring to the right side of the sub-panel(s), with the incoming power and distribution circuit breakers located to the upper right.

f. Group or bundle parallel runs of wire using covered troughs. Maximum bundle size to be 1 inch. Troughs shall have 60 percent spare capacity. Adequately support and restrain all wiring runs to prevent sagging or other movement.

g. In panels controlling and monitoring equipment operating or fed at voltages above 600, wiring used for AC or DC, control, control power, metering, indication, etc. shall be No.14 AWG type SIS (switchboard) wire.

h. Wiring for current transformer (C.T.) circuits shall be minimum #10 AWG type SIS and shall be color coded yellow. Connections shall be by ring type solderless compression terminals.

i. Where wiring runs across a door or panel hinge, the bundle shall be run along the hinge as far as possible and anchored at both ends to distribute the torque along the greatest wire length.

j. Wire bundles running within a panel or onto the door, shall have at least 20 percent spare wires included.

k. Provide intrinsically safe barriers for circuits entering classified spaces. Intrinsic circuits shall be separated from other power and control wiring, in separate wireway.

3. Terminal Blocks:

a. Terminate all field wiring and internal panel wiring at 600 Volt barrier type terminal blocks.

b. Panel wiring shall be kept to one side of the strip leaving the other side for field wire termination.

c. Jumpers needed to provide common connections between terminals shall be provided on the panel side of the strip.

d. Terminal blocks shall be tubular screw type with pressure plate capable of accepting #22 through #8 wires and shall be mounted on rigid steel rail.

e. All wiring terminations, both field and panel shall be made with forked tongue solderless crimp type connectors. Field wiring terminals shall have a minimum of a # 8 screw or stud.

f. Heavy duty end anchors shall be provided on both ends of all terminal strips to firmly anchor the terminal blocks to the mounting rail and insulating end barriers shall be provided on one end of the terminal strip as necessary.

g. Terminal blocks shall have a unique identifier for each block and for each terminal on that block (i.e. TB7-25) where the terminal number shall be the unique wire number shown on the approved drawings.

h. No more than two wires shall be terminated at any single screw.

i. Provide jumpers as required to join adjacent terminal blocks for additional wiring connection points. Jumpers shall only be installed on the panel side of the terminal block.

j. All terminal blocks shall be labeled with permanently affixed numeric identifiers on each block.

k. Identifiers shall be self-stick plastic strips with permanent, machine printed numbers.

l. Provide a separate terminal block for landing analog signal cable shield, and separate terminal strips for DC signal and AC power wiring. A separate terminal shall be provided for landing shield wiring.

m. Provide separate terminal blocks for C.T wiring. Terminal blocks for C.T. wiring shall be equipped with shorting bars and screws to selectively short an individual C.T. circuit for maintenance purposes.

n. Provide spare terminal blocks equal in number to 20 percent of the terminals used for each type of wiring (i.e., DC signal and AC power).

o. Terminal blocks shall be copper-nickel alloy terminal strips and screws.

p. Terminal blocks shall have minimum clearance of 5 inch on each side of each strip.

4. Fused Terminal Blocks:

a. Provide fused terminal blocks for all wiring powered from within panels or enclosures to devices located outside the panel or enclosure, as required.

b. Fused terminal blocks shall be UL approved, 600 Volts, capable of accepting #22 through #10 wires, and shall be mounted on rigid steel rail. Fuses shall be dead front and shall have safety pull out feature.

c. Heavy-duty end anchors shall be provided on both ends of all terminal strips to firmly anchor the terminal blocks to the mounting rail and insulating end barriers shall be provided on one end of the terminal strip as necessary.

d. Provide fuses (sized as required) and fuse pullers for all fused terminal blocks.

e. Provide 20 percent spare fused terminal blocks rail mounted within each panel or enclosure.

f. Terminal blocks shall be copper-nickel alloy terminal strips and screws.

5. Wire Markers:

a. All panel wires and field wires shall have an alphanumeric identification tag at each point of termination.

b. Wire numbers shall be unique.

c. Wire numbers shall be grouped and spaces allowed for additions to each group.

d. Where wire numbers change, the appropriate drawings shall include both wire numbers, clearly indicated, at the point of transition.

e. Each wire number shall be solid, machine printed, and not pieced from other single and/or double digit tags. Wire markers shall be heat, oil, water, tear and solvent resistant, vinyl, tube type markers.

f. All wire labels shall be clearly visible and not hidden by wire duct or other components in the enclosures. All wiring shall be installed such that if wires are removed from any one device, power will not be disrupted to any other device.

6. Grounding / Bonding:

a. All equipment and components mounted in or on control panels and enclosures, shall be bonded to the equipment grounding system.

b. Provide 1-inch-wide by 1/4 inch thick copper grounding bar in each panel or enclosure containing equipment, instruments or controls.

c. The bar shall be as long as needed for the required number of connections, plus 25% future connections (6 inch minimum).

d. Ground bars shall be installed on insulated "standoffs" (1-inch clearance from grounded surfaces), and shall have a braided #6 AWG bonding jumper.

e. Separate buses shall be provided for grounding of AC equipment and for shield grounds.

f. The AC ground bus shall be bonded to the panel frame and system ground.

g. Shield grounds shall be completely isolated from the enclosure and instrument power/equipment grounds.

h. Insulated ground wires shall be run with all control power circuits within the panel to all equipment.

i. Equipment mounting sub-panels (plates) shall be bonded to the frame of the enclosure with a No. 10 AWG braided bonding jumper.

F. Finishes

1. Steel Panels

a. Panels located in control rooms, electrical equipment (switchgear, MCCs) rooms, and office areas, may be carbon steel with a finish as follows:

1) Completely clean all interior and exterior surfaces so they are free of corrosive or oily residue, oil, grease, and dirt.

2) All interior and exterior surfaces shall be phosphatized for corrosion protection for non-stainless steel enclosures.

3) One coat of primer shall be applied to all interior and exterior surfaces immediately, except for stainless steel enclosures.

4) Surfaces shall be electrostatically coated with a polyester urethane powder or epoxy powder coating.

5) Exterior surfaces shall be ANSI- 61 gray, interior surfaces shall be ANSI-61 gray or gloss white.

6) Equipment mounting sub-panels shall be given a gloss white melamine enamel coating. A Grade 1 finish shall be produced on the finish coat.

2. Stainless Steel Panels

a. Panels and enclosures located outdoors, in damp or corrosive areas, tunnels or galleries or in any process areas shall be fabricated of type 316 or 304 Stainless Steel per the manufacturers published recommendations for chemical resistance and service.

b. Stainless steel panel finish shall be brushed or satin and shall be free from blemishes and machine marks.

c. All mounting, anchoring and accessory hardware shall be stainless steel.

3. PVC Coated Panels

a. In hazardous areas, subject to frequent moisture and corrosive elements, panels shall be PVC coated.

b. In areas where the conduit and raceway system, is required to be PVC coated, all panels, control stations and enclosures shall be PVC coated. Colors shall match the conduit system.

c. PVC coating shall be a minimum of 40 Mil. and shall cover all exposed surfaces.

d. All mounting and accessory hardware shall be type 316 stainless.

4. Panel in Highly Corrosive Areas

a. Unless otherwise noted, in areas designated as highly corrosive or where sodium hypochlorite is handled, pumped, metered or stored, panels and enclosures shall be fabricated of molded fiberglass, fiberglass reinforced polyester, or polycarbonate and recommended for the service.

b. Panels shall be finished smooth or finished with gel coat and epoxy.

c. Glass fiber strands shall be neither exposed nor visible.

d. Panels shall be chemical, sunlight and UV resistant.

G. Fiber Optic Patch Panels (Panel Mount)

1. Fiber optic patch panels shall consist of a system of components for routing, supporting, and terminating the fiber optic cables. Terminations shall be ST type. Fiber optic cable connections shall be provided with ceramic ferrules, polycarbonate not acceptable.

2. Provide the following wall/panel mounted patch panels as shown on the drawings:

a. Wall-mounted type fiber optic patch panels constructed of aluminum or steel with removable hinged doors.

b. A machine printed port labeling system.

c. Cable routers and storage decks to retain cables' minimum bending radius.

d. Sufficient quantity of ports to terminate the number of fiber strands specified and blank covers for unused port spaces.

e. One port for each fiber in accordance with the specified cable type.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Shop Tests

1. Shop and Testing shall conform to the requirements of Section 40 80 81 – PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used.

3.02 INSTALLATION

A. The Contractor shall install panels in conformance with NYCEC and the Contract Drawings.

B. All panels and enclosures shall be mounted straight, level and parallel to building surfaces.

C. Wall mounted panels and enclosures shall be securely mounted to walls or columns as required. They shall be spaced a minimum of 3/4" from the structure using strut or plates.

D. Stand mounted panels or stations shall be supported using 6-inch epoxy powder coated steel channel securely mounted to the floor with a minimum of three 1/2" stainless steel bolts and leveling nuts.

1. Stand bases shall be grouted for added rigidity.

2. Stands shall be secure and level, shall easily support the mounted equipment and shall hold the equipment rigidly. Multiple stands or fabricated frames shall be used for larger or heavy panels.

E. All freestanding control panels shall be installed on a 6-inch-wide and 4 inch high reinforced concrete curb or 4 inch pad.

1. Pad shall have 1-inch chamfer on all corners.

2. Pad shall extend one (1) inch minimum (plus chamfer) past panel exterior.

F. When panels or enclosures are installed on raised computer type floors, additional supports and bracing shall be provided under the floor as required to prevent the floor from being overloaded.

1. Large and/or heavy panels having any dimension larger than 36 inches or weighing 150 lbs. or more or where the weight of the completed panel exceeds 80% of the specified live load bearing capacity of the flooring, shall be supported from the structural sub floor independently of the raised floor.

2. Provide a welded steel, adjustable support framework the size of the unit footprint capable of rigidly supporting the weight of the entire panel with a 50% safety factor. The frame shall be installed flush and level with the floor.

3. Load and bracing calculations shall be submitted for review.

4. It shall be the responsibility of this Contractor to coordinate raised and finished floor installation requirements with the flooring supplier and installer.

5. In areas where floor modifications are required, and the floor has already been installed, the contractor shall retain the services of an approved flooring contractor to make the appropriate modifications at no additional cost to the City.

G. Panels, and the equipment enclosed, shall be protected from damage during and after installation. If in the opinion of the Contractor or the Engineer, the area is not suitable for electronic equipment or panels, the equipment shall be removed or protected until the area has been secured.

H. Unless otherwise noted, the Contractor shall install indoor panels on 4-inch concrete pad.

I. Extend concrete pad 4 inches beyond outside dimensions of the base, on all sides.

J. Lay grout after panel sills have been securely fastened down.

K. Unless otherwise noted, install outdoor NEMA 4X panels on a reinforced concrete pedestal:

1. Minimum thickness shall be 8 inches with No. 4 steel reinforcing bars at 12 inches on centers, each way.

2. Minimum size shall be 12 inches larger than outer dimensions of base, on all sides.

3. Lay grout after panel sills have been securely fastened down.

L. The Contractor shall provide concrete work in conformance with Section 03 30 00 – Cast-in-Place Concrete.

M. The Contractor shall install anchor bolts and anchor in accordance with Section 05 05 23.02 – Miscellaneous Metal Fastenings.

N. The Contractor shall install and interconnect all equipment, devices, electrical hardware, instrumentation and controls and process controller components into and out of and among the enclosures as indicated on the Contract Drawings.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

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 shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish, install calibrate, test, startup, and place into satisfactory operation PMCS Panel Mounted Instruments and Devices as described herein and as indicated on the Contract Drawings.

B. The provisions of this Section apply to instruments and devices provided as a part of packaged systems specified elsewhere in this Contract, including but not limited to, function, quality, spare parts, tools, testing, training, documentation and installation.

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 40 61 13 – PMCS General Requirements

B. Section 40 80 81 – PMCS Factory Testing.

C. Section 40 80 82 – PMCS Startup and Field Testing

1.04 REFERENCES

A. Definitions

1. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

2. PMID - Panel Mounted Instruments and Devices.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. PMIDs and controls shall be provided with all associated services and appurtenant equipment.

B. The Contract Drawings and Specifications illustrate and specify general functional, environmental and construction requirements of PMIDs, and do not necessarily show or specify all components, wiring, piping and accessories required by specific manufacturers, to provide a completely integrated system.

C. The Contractor shall provide all additional components, piping, wiring, accessories, services, labor, etc. required to furnish and install PMIDs and accessories to provide a complete and properly functioning integrated system.

D. The PMCS Supplier acting through the Contractor shall:

1. Provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install, calibrate, test, adjust and place into satisfactory operation, all PMIDs specified or required under this Section.

2. Retain the services of each equipment manufacturer to properly select, apply, size and locate each PMID they are to provide.

3. Also, the manufacturer’s services shall be provided to setup, commission and fine tune all instruments provided.

4. Provide application and design engineering services to properly select, apply, and install; provide detailed design, location, and mounting drawings and to test, calibrate and commission, PMIDs provided herein.

5. Coordinate the installation of all items specified herein and required to ensure the complete and proper operation and interfacing of all the components and systems.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. All materials and equipment furnished shall be new, free from defects, and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of PMIDs.

C. Manufacturers shall have produced PMIDs for a minimum of 20 years

D. Where there is more than one item of similar equipment required under the Contract, all such similar equipment shall be the product of one manufacturer.

E. All material furnished under this Contract shall be determined safe by UL and all material shall be labeled, certified, or listed by the testing agency.

F. Custom made equipment or related installations which are constructed specially for this Contract will not be acceptable.

G. Equipment furnished within this Contract shall be standard products furnished by a supplier regularly engaged in the manufacture of such products.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit PMIDs and schedules for the approval of the Engineer.

C. The Contractor is solely responsible for the timing of PMID submittals to enable approval by the Engineer and subsequent use by the PMCS Supplier.

D. The Contractor shall create, maintain and submit for review, an updated index of PMIDs.

E. Submittals shall be made at least 60 days in advance of any proposed use by the PMCS Supplier.

F. The manufacturer’s calculations, assumptions and application details, and recommendations shall be submitted to the Engineer for review and approval.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall comply with spare parts, special tools and supplies listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Spare parts and tools shall be as recommended by the manufacturer and shall as a minimum include the following:

1. One PMID for every five (5) PMID of a given model furnished, minimum of one.
2. One (1) communication card for every five (5) of each type furnished, minimum of one.
3. One (1) power supply for every (5) of each size furnished, minimum of one.
4. All spare parts recommended by the manufacturer and listed as recommended spare parts in the approved manufacturer's O&M Manual.

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Signal Loop Isolators shall be as manufactured by:
   1. Moore Industries, North Hill, CA;
   2. Acromag Inc., Wixom, MI;
   3. Or approved equal.

B. Loop Power Supplies shall be as manufactured by:
   1. Acopian, Easton, PA;
   2. Acromag Inc., Wixom, MI;
   3. Or approved equal.

C. Signal Splitters shall be as manufactured by:
   1. Moore Industries, North Hill, CA;
   2. Acromag Inc., Wixom, MI;
   3. Or approved equal.

D. Control Relay shall be as manufactured by:
   1. Idec, East Dundee, IL;
   2. Square D, Andover, MA;
   3. Allen-Bradley, Milwaukee, WI;
   4. Siemens, Washington, DC;
   5. Or approved equal.

E. Control panel Pilot Devices shall be as manufactured by:
   1. Allen-Bradley, Milwaukee, WI;

2. Square D, Andover, MA;
3. Siemens, Washington, DC;
4. Or approved equal.

F. Managed Ethernet Switches shall be as manufactured by:
1. Hirschmann/Belden, St. Louis, MO;
2. Cisco, San Jose, CA
3. Or approved equal.

G. Hazardous Area Horn, NEMA 4X shall be as manufactured by:
1. Federal Signal, Oak Brook, IL
2. Edwards Signaling, Mebane, NC
3. Or approved equal

H. Hazardous Area Strobe, NEMA 4X shall be as manufactured by:
1. Federal Signal, Oak Brook, IL
2. Edwards Signaling, Mebane, NC
3. Or approved equal

I. Operator Interface Terminals shall be as manufactured by:
1. Advantech, Irvine, CA;
2. Proface America, Ann Arbor, MI
3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. Signal Loop Isolator
1. Design:
a. Provide the necessary quantity to perform all monitoring and control functions as specified and shown on the Contract Drawing.
b. Type: Isolator type signal converter/transmitter/transducer that accepts any standard or many non-standard input signals and produces a 4-20 mA output or another standard process current or voltage signal with three-way isolation (power, signal input, and signal output all isolated from each other).
2. Construction and Required Features:
a. Span Adjustment: 22-turn front panel potentiometer.
b. Zero Adjustment: 22-turn front panel potentiometer.
c. Housing: General purpose enclosure designed for internal panel mounting.

d. Power Supply Input: 117 VAC, 50/60 Hz.

e. Interference Protection: Built-in RFI/EMI protection.

3. Performance Requirements:

a. Calibration Capability: 0.2 percent of span.

b. Ambient Temperature:

1) Range: + 32 F to +158 F.

2) Effect: ± 0.02 percent per Deg F over the entire range.

c. Frequency Response: 5 Hz.

d. Input Current: 4-20 mA into 50 Ohms nominal.

e. Input Voltage: 1-5 Volts.

f. Output Current: 4-20 mA into 0-1200 Ohm load.

g. Output Voltage: 1-5 VDC at 0.25 mA DC max.

h. Span Adjustment: 100 percent ± 25 percent of span, with full scale input.

i. Zero Adjustment: 0 percent ± 10 percent of span, with minimum input.

j. Load Effect: ± 0.02 percent of the span from 0 to maximum load resistance.

B. Control Relay (General Purpose)

1. Design:

a. Type: General purpose, plug-in type rated for continuous duty.

2. Construction Features:

a. Coil Voltage: 24 VDC or 120 VAC as required.

b. Contact Configuration: Number and arrangement as required to perform the intended functions, plus a minimum of one spare SPDT contact per relay function.

c. Contact Material and Rating:

1) General Use: Silver or silver cadmium oxide contacts rated for 10 Amps minimum at 120 VAC.

2) Low Power Switching: Fine silver, gold flashed contacts specifically designed for low power switching, rated for 2 Amps minimum at 30 VDC.

d. Mounting: Pin or blade mount in sockets for sub-panel mounting on DIN rail. Sockets shall have screw terminals for wiring

connections, which shall accept a minimum of two #14 AWG wires.

e. Cover: Clear plastic dust cover.

f. Indication: Indicator light.

g. Accessories: Hold-down spring, push-button test.

h. Approvals: UL recognized.

3. Loop Power Supply (Single Loop)

4. Design:

a. Provide DC power for 4-20 mA current loops and as shown on the Contract Drawing.

b. Type: A single output, regulated, plug-in type 24 VDC power supply.

5. Construction Features:

a. Housing: All components shall be enclosed.

b. Mounting: Power supply to plug into the octagonal socket with numbered, screw-type terminals. Provide mounting bracket to secure power supply module in the octagonal base.

6. Performance:

a. Temperature: Operational from -10 to 65 C.

b. Output: 24 VDC, 200 mA.

c. Power Requirements: 120 VAC, 60 Hz, single phase.

d. Regulations: ±0.5 percent.

e. Ripple: 0.5 mV RMS.

f. Protection: Overvoltage protection.

g. Approval: U.L. recognized.

C. Control Panel Pilot Devices

1. Design:

a. Provide selector switches, pushbuttons and indicating lights as specified and shown. All components shall be of the full size, heavy-duty, oil-tight, round type, with modular contacts and NEMA rating equal to that of the enclosure on which devices are installed.

b. Provide individual legend plates for indication of switch, push-button, and light functions (e.g. Open, Closed, Hand-Off-Auto). Legend plates shall conform to the requirements of this Section.

c. Start pushbuttons shall have a flush button, while stop pushbuttons shall have raised pushbuttons.

d. Where noted on the Contract Drawing, pushbuttons and selector switches shall be illuminated type and use the color code as shown.

e. Units shall be Heavy Duty, 30.5 mm, oil tight, and shall maintain the NEMA rating of the panel or enclosure. Corrosion resistant devices shall be provided on NEMA 4 and 4X panels and enclosures.

f. Extra-large, engraved, laminated name plates and function indicator escutcheon.

2. Construction Features:

a. Selector Switch:

1) Two (2), three (3), four (4) and (X) position as shown and required.

2) Maintained or spring return position; maintained contacts; number and arrangement as required to perform intended functions specified but not less than one double pole, double throw, double break contact per switch. Contact rating shall be compatible with AC or DC throughput current of devices simultaneously operated by the switch contacts but not less than 10 Amperes resistive at 120 Volts AC or DC continuous.

3) Heavy Duty, gloved hand operator, extra-large, engraved position indicator.

b. Push-button:

1) Maintained or momentary as required and as shown on the Contract Drawing.

2) Contacts shall comply with requirements specified for selector switches above.

3) Provide extended head push-button for all stop functions, two inch-push/pull the mushroom head and maintained contacts for emergency stop functions, and flush head pushbuttons for all other functions. Emergency stop push buttons shall have padlock attachment.

c. Indicating Lights:

1) Integral transformer type.

2) Low voltage, long life L.E.D. lamps (6 Volts).

3) 0.6 Watts maximum.

4) Integral push-to-test required.

5) Lense colors shall be as follows:

a) Run or Open: Red

b) Off or Closed: Green

c) Fault: Yellow

D. Managed Ethernet Switches

1. Design: Full gigabit Ethernet with modular design for expanding a mix of up to 26 fiber and copper ports. Base system combines with expansion modules to add ports.

2. Provide Ethernet switches suitable for connections as shown on the Contract Drawings, plus 25% spare ports.

3. Features:

a. Base Modules – 8 Copper and 2 Fiber ports

b. Expansion Modules – 8 or 16 Copper ports, 8 Fiber ports, 6C/2F ports mixed

c. Copper ports are RJ45 10/100/1000

d. Fiber ports are SFP 100/1000

e. USB and SD storage onboard

f. 2 alarms in/1 alarm out

g. Console ports: RS-232 via RJ-45 and USB type B.

h. Dual power inputs for DC power 9.6 to 60 VDC

i. Operating environment: -40 to 70 degrees C

4. Performance:

a. Number of queues: 8

b. Unicast MAC addresses: 8K

c. IGMP multicast groups: 1K

d. No. of VLANs: 256

e. IPv4 indirect routes: 2000

f. IPv6 indirect routes: 512

g. Spanning Tree Protocol Instances: 128

h. Access Control Entries: 3K

i. DRAM: 2GB

E. Hazardous Area Horn

1. Horn produces sound by electro-mechanical vibration of a diaphragm.
2. Power requirements: 120VAC.
3. Produces up to 110 dBA at 1m – Reduce volume prior to installation to a level below 85 dBA to prevent hearing loss.
4. Fuse terminal block provided for field wiring.
5. Provide mounting hardware for wall mounting within vestibule areas.
6. Rated NEMA Type 4X, IP65.
7. UL Listed.
8. Suitable for installation in Class 1, Division 2 areas.

F. Hazardous Area Strobe

1. Strobe light provides approximately 80 high-intensity flashes per minute.
2. Power requirements: 120VAC.
3. Lens colors: Amber, Red.
4. Dome guard included.
5. Conformally coated PCB.
6. Provide mounting hardware for wall mounting within vestibule areas with ¾ NPT mount.
7. Rated NEMA Type 4X, IP66.
8. UL Listed.
9. Suitable for installation in Class 1, Division 2 areas.

G. Operator Interface Terminals

1. Design: Consists of an industrial CPU in an enclosure mounted to the rear of a capacitive touch display.
2. Provide in locations as shown on the Contract Drawings.
3. Industrial CPU Features:
    a. Supported OS: Windows 10 IoT 64 bit
    b. CPU: Intel Core i5, AMD Ryzen 5 or approved equal.
    c. Memory: 8GB
    d. Video: Shared onboard graphics
    e. Ports: Serial Port, Ethernet RJ-45x2, at least 3 USB ports
    f. Storage: M.2 SSD
    g. Power Requirements: 24 VDC or 120 VAC
4. Industrial Touchscreen:

a. Type: LED Color TFT LCD
b. Size: 15.6 inches wide
c. Resolution: 1366x768 pixels
d. Colors: 16 million
e. Backlight: 50000 hours rated
f. Touch Panel: Projected capacitive (multi-touch)
g. Rating: NEMA 4X and 12

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS PMIDs shall confirm to the requirements of Section 40 80 81 – PMCS Factory Testing.

B. PMCS OITs PLC monitoring and control criteria specified under this Section shall be functionally verified during PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Contractor shall install each PMID in accordance with manufacturer's recommendations, this Section and the Contract Documents.

B. Panels into which these PMIDs are to be mounted shall provide rigid structural support for the PMIDs and shall allow necessary access and working space to permit maintenance of the PMID while installed.

C. Additional strengthening and/or bracing required for a sound installation shall be provided as part of this contract.

D. Contractor shall provide all supports, bracing, wiring, and incidental hardware.

E. All software required for the PMIDs shall be loaded, configured and fully tested as part of this contract.

F. Contractor shall configure the OITs using function keys and instructional prompts so that operators can operate equipment, modify set points and presets and monitor the system without any special training or knowledge of the PMIDs with which the OIT interfaces.

3.03 FIELD TESTING / QUALITY CONTROL

A. PMIDs Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

B. Section 40 80 82 details how PMIDs specified under this Section shall be verified during Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Section 40 80 82 – PMCS Startup and Field Testing details the requirements for OAD and PMCS Upset and Recovery Testing.

The OAD and the PMCS Upset and Recovery Testing shall serve as the final verification of the correct functioning of all PMIDs.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to perform Witnessed Factory Acceptance Testing of all equipment and components of the PMCS, at the manufacturer's facility.

B. Witnessed Factory Acceptance Testing shall verify that the PMCS, its components and associated equipment functions properly both as units and as an integrated systems and that the functional and performance requirements of the Contract Documents are met.

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. Costs under this Section shall include travel, transport, board and lodging for two representatives of the City or the Engineer to attend all PMCS

WFAT at the PMCS manufacturer's facility or approved test facility, in accordance with Section 01 43 15 – Witness Shop Testing.

2. If PMCS equipment and associated components or part thereof require retesting and witnessing is required the Contractor shall be responsible for the associated cost in addition to the travel, transport, board, lodging, and time cost of the witnesses.

1.03 RELATED SECTIONS

A. Section 01 43 15 – Witness Shop Testing

B. Section 40 61 13 – PMCS General Requirements

C. Section 40 80 82 – PMCS Startup and Field Testing

1.04 REFERENCES

A. Definitions

1. WFAT - Witnessed Factory Acceptance Tests

2. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS.

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. General

1. The intent of the WFAT is to ensure that all equipment and components of the PMCS and peripherals to be supplied by the Contractor and intended for operation in the Contract Facility and as defined in the Contract documents demonstrate their performance over their design ranges as individual units and an as integrated system.

2. All the Control Strategy submittals which have been approved for integration into the PMCS and associated equipment shall be demonstrated over the full range of their designed operation.

3. Every attempt shall be made during the WFAT to resolve any issues arising.

4. No issue observed during the WFAT shall be left for resolution during Field Testing unless approved by the Engineer.

5. The Contractor shall provide all necessary supervision, personnel, materials, fluids, facilities, temporary test setups, test fixtures, test equipment, and simulation where approved to perform satisfactory and complete testing.

6. The City representative, Engineer and the Contractor's representative shall be present for all WFATs.

7. Presence of the City and the Engineer at the WFAT does not relieve the Contractor from conforming to the requirements of the Contract Documents.

8. Presence of the City and the Engineer at the WFAT shall in no way imply Acceptance of the PMCS equipment or its components.

B. HMIs

1. Prior to the staging and testing of the system, all display environments shall have been configured per the agreed upon display structure, loaded and data base parameters linked to the specified fields.

C. Notifications and Scheduling

1. The WFAT shall not be scheduled or begun, until all related PMCS Shop Drawings, Test Procedures, Test Documentation and Schedules have been submitted and approved.

2. Integrated PMCS WFAT shall only be scheduled after the PMCS supplier has conducted a non-witnessed factory test and certified that the complete PMCS and associated equipment are ready for a WFAT.

3. The Contractor shall notify the Engineer in writing 60 days before expected initiation of the WFAT.

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. All PMCS components and associated equipment shall be inspected.

1. Inspection shall include but not be limited to the following:

2. Nameplates and tags

3. Wire sizes and color coding

4. Annunciator and terminal block spares

5. Proper wiring practices and grounding

6. Enclosure flatness, finish and color.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit information on factory testing procedures and schedules to verify that testing shall fulfill the requirements specified in this Section and the Specifications.

C. Submittal shall be made at least 60 days months in advance of any scheduled testing and shall include dates of scheduled tests.

D. The procedures for WFATs detailed in this Section shall be submitted for approval by the Engineer.

E. The details of simulation software which will be used in conjunction with the PMCS equipment shall submitted for to the Engineer for approval

F. Reports

1. A report on the WFATs completed shall be submitted to the Engineer for approval.

2. Factory test reports shall include the following information:

a. List of tests performed.

b. Certified check lists or documentation verifying all I/O has been tested, as specified in this Section.

c. Document verifying all panel wiring has been checked and conforms to the approved submittals with any correction made during the testing.

d. List of all modifications or corrections identified during the WFAT and corrective action taken.

e. Equipment shall not be shipped from the factory until certified factory test reports indicating satisfactory performance have been submitted and approved by the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Factory Testing shall be as implemented by the PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. HMIs and Printers

1. The overall display structure shall be demonstrated, including environment configurations, passwords, security, etc.
2. The display contents of memos shall be reviewed to demonstrate how an operator navigates within the overall display structure.
3. The assignment of displays to annunciator keys shall also be demonstrated.
4. Each graphic display shall be reviewed for correctness in terms of the layout, symbols, color scheme, etc.
5. The operation of standard alarm management displays (Current Alarm Display. Alarm History, etc.) shall also be demonstrated.
6. A demonstration of each type of report specified shall be performed.
    a. Printing shall be an integral part of the report demonstration.

B. PMCS Hardware Operational Testing

1. All input/output devices and components shall be tested to verify operability and basic calibration.
2. All PMCS hardware components and associated equipment shall be tested to verify proper operation of the equipment as standalone units. Test shall include, but not be limited to, the following:
    a. AC/DC power checks
    b. Power fail/restart tests
    c. Diagnostics checks
    d. Test demonstrating that all specified equipment functional capabilities are working properly.
3. All system components shall be tested to verify that communication between units is working properly.
4. An integrated PMCS test with all system equipment connected (excluding field sensors and instruments) shall be performed to verify that· all equipment is performing properly as an integrated system.
5. All field sensors and instruments shall be simulated over their operating ranges inclusive of major set points.

C. PMCS Software Demonstration

1. Contractor shall demonstrate all system [software] utility and security programs incorporated into the PMCS to illustrate the various functions and capabilities specified.
2. Contractor shall demonstrate the operation and display of all software based on a simulation of 20 percent of total input/output count, both analog and discrete, as selected by the manufacturer.
3. The City/Engineer shall also randomly select, at the time of the test, additional inputs and outputs to be simulated in an amount approximately equal to 10 percent of total input/output count.
4. Demonstration shall show that the monitoring and control application software associated with the input/output points performs the functions intended.

D. System performance shall be tested using a fully integrated system, including all software and hardware if applicable.

1. To achieve this, the entire control system, including all the peripheral devices and all interconnecting cables, shall be assembled on the factory test floor and simulated inputs applied.
2. Every device shall have nameplate with description and device's P&ID tag number.
3. Nameplates shall be removable and interchangeable for multiple use during the test.
4. Simulated inputs/outputs shall at minimum include:
    a. Toggle switches to simulate field or other input contacts
    b. Indicating lights to simulate outputs from tested panels
    c. Control relays to simulate MCC coil inputs
    d. Time relays to simulate position switches
    e. Indications (mA) to indicate every 4-20 mA output from tested panel
    f. Potentiometers to simulate 4-20 mA inputs to tested panel
5. The Contractor shall carry out a full system test, during which the entire system shall operate continuously without failure in accordance with the requirements of the Specifications and Contract Drawings.

E. Demonstration of communication between PLC's or to remote I/O's shall be included in the Test Procedure where applicable.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Field Testing

1. Field Testing shall conform to the requirements of Section 40 80 82 – PMCS Startup and Field Testing.

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 40 80 82 – PMCS STARTUP AND FIELD TESTING
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all supervision, labor, materials, equipment and incidentals as shown, specified and required to furnish and install all equipment and coordinate all activities necessary to perform check out, start up and field testing of the PMCS and all associated 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 40 61 13 – PMCS General Requirements.

B. Section 40 78 90 - PMCS Panel Mounted Instruments and Devices

C. Section 40 80 81 – PMCS Factory Testing

1.04 REFERENCES

A. Definitions

1. SFT – Start-up and Field Testing.
2. OAD – Operational Availability Demonstration.
3. URT – Upset and Recovery Testing.
4. WFAT – Witnessed Factory Acceptance Tests.
5. Section 40 61 13 – PMCS General Requirements defines the terms and abbreviations used in this Section and the PMCS

B. Reference Standards

1. Section 40 61 13 – PMCS General Requirements lists the standards applicable to this Section and the PMCS.

1.05 DESCRIPTION

A. Start-up and Field Testing of the PMCS and associated equipment shall include but not be limited to the following:

1. Check Out, Start up and Initial Operation of Equipment.
    a. Instrument calibration and operation
    b. Cable and wire testing
    c. Instrument Loop testing
    d. Control panel installation test
    e. Local control of equipment
    f. PLC and I/O operation
    g. I/O loop testing
2. Final Field-testing of Equipment
    a. Control panel operational testing
    b. Instrument full operation testing
    c. Verification of local and remote control of individual equipment
    d. Execution of control strategies for individual equipment
3. Check Out, Start up and Initial Operation of System Equipment
    a. Process control panel local system operation
    b. Preliminary loop tuning
    c. Remote control of systems
    d. Individual and system loop operation
    e. Network and communication link testing

f. Network and communication performance testing

g. Execution of local system logic and control

4. Final Field-testing of Systems

a. Execution of control strategies for equipment systems

b. Network and communication optimization

B. Integrated System Field Test

C. Operational Availability Demonstration

D. PMCS Upset Testing

1.06 QUALITY ASSURANCE

A. The Contractor shall comply with the Quality Assurance requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. The Contractor shall retain the services of the PMCS Supplier to supervise, coordinate and perform check-out and start-up of all PMCS components and associated equipment.

C. All I/O points, loops, and functions including spares shall be fully operational and undergo Start up and Field Testing.

D. Start up and Field Testing shall be conducted on all PMCS and associated equipment including those for which Factory Testing has been completed.

E. As part of these services, the PMCS Supplier shall include for those equipment items not manufactured by him, the services of an authorized manufacturer's representative to check and certify the equipment installation and place the equipment in operation.

F. Each manufacturer's representative shall be thoroughly knowledgeable about the specific installation, and factory certified in the installation, operation, and maintenance of the equipment.

G. Start-up and Field Testing shall include but not be limited to, field and panel devices, hardware, software, communications, and programming.

H. Simulators and test equipment may be used for the following test phases:

1. Check-out, Start-up and Initial Operation of all equipment and systems

I. Actual field conditions, process variables and process fluids shall be used for the following test phases:

1. Final Tests

2. Integrated System Field Test

3. Operational Availability Demonstration

4. PMCS URT

J. The PMCS Supplier's personnel shall be present for and participate in all phases of the testing of the entire PMCS including all process equipment and systems monitored and controlled by PMCS.

K. Strat-up and Field Testing shall only be considered complete upon the successful performance of all specified functions.

L. Acceptance of PMCS and all associated equipment by the City is contingent upon the approval by the Engineer of all Test Reports.

1.07 SUBMITTALS

A. The Contractor shall comply with submittal requirements listed in Section 40 61 13 – PMCS General Requirements, this Section and the Specifications.

B. Contractor shall submit information on all SFT procedures and schedules for the approval of the Engineer, to verify that testing shall fulfill the requirements specified in this Section and the Specifications.

C. Submittal shall be made at least 60 days in advance of any scheduled testing and shall include dates of scheduled tests.

D. The details of simulation software which will be used in conjunction with the PMCS equipment shall submitted for to the Engineer for approval

E. Complete and detailed information, shall include but not be limited to:

1. Test Flow Charts outlining both the testing and responsibilities of all parties.

2. Proposed log sheets showing what, when and how all test parameters will be recorded and by whom.

3. Proposed reporting formats listing all the information to be recorded for each test

F. Test Reports

1. A report on the each SFT activity completed shall be submitted to the Engineer for approval.

2. Reports shall include the following information:

a. List of tests performed.

b. All raw field test data, test personnel notes, witness comments

c. Certified check lists or documentation verifying all I/O has been tested, as specified in this Section.

d. Test documentation demonstrating that all digital and analog points of the PMCS residing in all controllers and databases have been conformed to be accurately linked to their respective instrument tag names, database tags and assigned names real or virtual.

e. Document verifying all panel wiring has been checked and conforms to the approved submittals with any correction made during the testing.

f. Confirmation that all modifications or corrections identified during the WFAT have been incorporated into the build of the PMCS an associated equipment tested.

g. Confirmation that all modifications or corrections identified during the SFT have been incorporated into the SFT documentation marked up corrective actions taken.

G. Each major phase of test, such as OAD, shall not commence until certified test reports indicating satisfactory performance of prior major phases have been submitted and approved by the Engineer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall comply with delivery, storage and handling requirements listed in Section 40 61 13 – PMCS General Requirements.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 WARRANTY

A. Not Used

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PMCS Start-up and Field Testing shall be as implemented by the PMCS Supplier.

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. PMCS Factory Testing shall conform to the requirements of Section 40 80 81 – PMCS Factory Testing.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 INSTALLATION

A. Not Used

3.03 FIELD TESTING / QUALITY CONTROL

A. Equipment/System Check Out, Start-up and Initial Operation

1. The Contractor, under the supervision of the PMCS supplier, and other instrument suppliers as applicable, shall perform the following:

   a. Check and approve the installation of all PMCS components and all cable and wiring connections between the various system components prior to placing the various processes and equipment into operation.

   b. Conduct a complete system checkout and adjustment, including calibration of all instruments, tuning of control loops, checking operation functions, and testing of final control actions.

   c. Where future operational functions are included in this work, they shall be included in the check-out.

   d. All problems encountered shall be promptly corrected to prevent any delays in start-up of the various unit processes.

2. The Contractor shall provide all test equipment necessary to perform the testing during system checkout and start-up.

3. The Contractor and PMCS Supplier shall be responsible for initial operation of system and shall make any required changes, adjustments or replacements for operation, monitoring and control of the various processes and equipment necessary to perform the functions intended.

4. The Contractor shall furnish to the Engineer certified calibration reports for all field instruments and devices specified in Section 40 78 90 - PMCS Panel Mounted Instruments and Devices, as soon as calibrations are completed.

5. The Contractor shall furnish the Engineer an installation inspection report certifying that all equipment has been installed correctly and is operating properly.

6. The report shall be signed by authorized representatives of both the Contractor and the PMCS Supplier.

B. Integrated System Field Test

1. Following the PMCS and associated equipment checkout and initial operation, the Contractor, under the supervision of the PMCS Supplier, shall perform a complete system test to verify that all equipment and programmed software is operating properly as a fully integrated system, and that the intended monitoring and control functions are fully implemented and operational.
2. Any defects or problems found during the test shall be corrected by the Contractor and then re-tested to demonstrate proper operation.
3. The PMCS including field sensors/transducers and instruments shall be running and fully operational for a continuous 72 hour period.
4. The City and the Engineer shall agree that the Integrated System Field Test has successfully concluded with no issues to be resolved at the end of the 72 hour period.

3.04 STARTUP / DEMONSTRATION

A. Operational Availability Demonstration

1. The OAD shall commence upon approval by the Engineer after the Integrated System Field Test has been accepted by the City and the Engineer.
2. The OAD shall run continuously from initiation, for 60 days, during which time the PMCS and all associated equipment (hardware and software) shall achieve a minimum of a 99.9% or better availability with no system failures.
3. Any system failures which occur after the initiation of the OAD shall cause the current 60 day period to be terminated and a new 60 day period started after the correction of the failure.
4. During the OAD the PMCS and associated equipment shall be available to plant operating personnel for use in normal operation of the plant.
5. For the purpose of the OAD the system will be defined as consisting of the following systems and components:
    a. All Local Control Panels
    b. All PLCs residing in equipment controlled by the PMCS.
6. The conditions listed below shall constitute system failures which count towards the termination of the OAD:
    a. Failure to repair a hardware or software problem within 120 consecutive hours from the time of notification of a system failure.
    b. If the same hardware or software problem occurs three times or more times.
    c. Software problem causing a processor to halt execution.

7. The following conditions shall constitute a system failure in determining the system availability based on the equation specified in this Section:
   a. Failure of any non-redundant operator interface or PLC.
   b. Loss of communications between devices on the communications network.
   c. Failure of one or more input/output components.
   d. Failure of any type affecting ten or more input/output points simultaneously.
   e. Failure of any type affecting one or more regulatory control loops or sequential control strategies thereby causing a loss of the automatic control of the process variable or process sequence operation.
   f. Failure of power supply. Where redundant power supplies are provided, failure of one power supply shall not constitute a system failure provided the backup power supply operates properly and maintains supply power.
   g. Failure of the backup supply to operate properly and maintain supply power shall constitute a system failure.
   h. Failure of three or more primary sensors/transducers or field instruments simultaneously.

B. The system availability shall be calculated based on the following equation:
   1. A = ((TTO)/(TTO+TTR)) x 100% where
      a. A = system availability in percent
      b. TTO = total time in operation
      c. TTR = total time to repair
      d. Time to repair shall be the period between the time that Contractor is notified of a system failure and the time that the system has been restored to proper operation in terms of hours with an allowance for the following dead times which shall not be counted as part of the time to repair period.
         1) Actual travel time for service personnel to get to the plant site up to 6 hours per incident from the time the Contractor is notified of a system failure.
         2) Time for receipt of spare parts to the plant site once requested up to 24 hours per incident.
         3) No work shall be done on the system while waiting for delivery of spare parts.

4) Dead time shall not be counted as part of the system available period.

5) The dead time shall be logged and the duration of the OAD extended for an amount of time equal to the total dead time.

C. All parts and maintenance materials required to repair the system prior to completion of the OAD shall be supplied by the Contractor at no additional cost to the City.

D. If parts are obtained from the required plant spare parts inventory, they shall be replaced to provide a full complement of parts as specified.

E. A Plant Monitoring and Control System Malfunction/Repair Reporting Form shall be completed by the plant personnel and the Engineer to document system failures, notifications to the Contractor, arrival and repair times and the Contractor repair actions. Format of the form shall be developed and agreed upon prior to the start of the OAD.

F. PMCS Upset and Recovery Testing.

1. The Contractor shall conduct Upset and Recovery Testing of the entire PMCS provided under this contract and all equipment monitored or controlled by the System.

2. URT shall prove the fault tolerance and failure response across the entire PMCS.

3. URT shall be performed after the OAD and shall be imitated from a steady state condition of the PMCS

4. URT shall continue for three consecutive workdays (24 hours).

5. URT shall consist of intentional, non-destructive shutdown and failure of portions of the PMCS equipment, and systems.

6. The Engineer and the City shall randomly pick individual pieces of operating equipment such as valves, instruments, controls, etc. to be disabled or tripped and process variables and set points to be modified

7. The PMCS and associated equipment shall respond as specified to the upset.

8. PMCS and associated equipment responses shall be monitored and recorded.

9. Various failure modes and conditions shall be tried on all equipment.

10. Failure modes to be tested shall include but not be limited to:

a. closing valves

b. stopping flows

c. gas detection

d. set point changes

e. simulated scenarios

f. Full manual and semiautomatic back up modes shall also be tested

g. UPS run times shall be tested and several PMCS equipment "black starts" shall be attempted to test PMCS restart capability after a prolonged power outage.

h. Controllers and software shall be stopped; portions of and the entire network shall be disabled.

11. PMCS URT Responses

a. The PMCS must respond immediately by

b. generating the proper alarms

c. starting backup or sequential equipment

d. shutting down remaining affected equipment in accordance with the Control Strategies, programmed sequences, and safety and interlock logic.

e. All equipment and controls shall respond per design.

f. Each PLC must continue to control properly, monitor and alarm the equipment that it operates while disconnected from the PMCS.

g. Portions of the PMCS which have been stopped shall not cause usable portions of PMCS to stop running.

12. PMCS URT Recording

a. Status of the PMCS shall be recorded and monitored.

13. Unexpected or undesirable results, or failure of PMCS to correctly respond to an upset, shall result in stopping the test, making repairs or changes, retesting the changes and then restarting the test.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 41 12 20 – SCREENINGS CONVEYOR
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies wet screenings conveyor, conveyor belt, tracks and supports, take up and drive.

B. The Contractor shall provide all labor, materials, and equipment necessary to furnish, paint, shop test, deliver, install, adjust, field test, and place in satisfactory operation the screenings conveyor as specified herein.

C. The Contractor shall provide all labor, materials, and equipment necessary to connect conveyor discharge chute to the existing grit discharge chute.

D. The Contractor shall coordinate the Work of this Section with Section 46 21 12 – Mechanically Cleaned Bar Screens.

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

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F. The following schedule, attached after the end of section designation, is a part of this Section:

1. Schedule 41 12 20-1, Screenings Conveyor

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 43 05 – Contractor's Work Quality

C. Section 01 61 50 – General Product Requirements

D. Section 01 65 00 – Product Delivery Requirements

E. Section 01 66 00 – Protection of Materials and Equipment

F. Section 01 73 17 – Installation of Equipment

G. Section 01 75 10 – Preliminary and Final Field Tests

H. Section 01 78 10 – Project Closeout

I. Section 01 78 24 – Spare Parts and Maintenance Materials

J. Section 01 78 25 - Operation and Maintenance Manuals

K. Section 01 79 05 – Equipment Start-up and Training

L. Section 26 05 91 – Low-Voltage Electrical Motors

M. Section 40 05 97 – Identification for Process Equipment

N. Section 40 61 95 – PMCS Monitoring and Control Criteria

O. Section 40 61 96 – PMCS Control Strategies

P. Section 46 21 12 – Mechanically Cleaned Bar Screens

1.04 REFERENCES

A. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail

B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing,

references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

C. American Bearing Manufacturers Association

1.	ABMA 9	Load Ratings and Fatigue Life for Ball Bearings

D. American Gear Manufacturers Association

1.	AGMA 6010 E	Spur, Helical, Herringbone, and Bevel Enclosed Drives

E. American Iron and Steel Institute

1.	AISI	Pocketbook of AISI Standard Steels
2.	AISI C-1020	Carbon Steel

F. American Society for Testing and Materials

1.	ASTM A36	Carbon Structural Steel
2.	ASTM A53	Pipe, Steel, Black and Hot-dipped, Zinc-Coated,
3.	Welded and Seamless	
4.	ASTM A276	Stainless Steel Bars and Shapes
5.	ASTM A480/A480M	Flat-Rolled Stainless and Heat-Resisting Steel
6.	Plate, Sheet, and Strip	
7.	ASTM D4020	Ultra-high Molecular Weight (UHMW)
8.	Polyethylene Molding and Extrusion Materials	

G. American Welding Society

1.	AWS-D1. 1-90	Structural Welding Code – Steel

H. Conveyor Equipment Manufacturer Association

1.	CEMA Standard 402	Belt Conveyors

I. National Electrical Manufacturers Association

1.	NEMA 250	Enclosures for Electrical Equipment (1,000 Volts Maximum)
2.	NEMA ICS 2	Industrial Control Devices, Controllers and
3.	Systems: Controllers, Contactors and Overload	
4.	Relays Rated 600 Volts	

J. National Fire Protection Association

1.	NFPA-70	National Electrical Code (NEC)

K. Occupational Safety and Health Administration

L. Uniform Building Code

M. Underwriter's Laboratories, Inc.

1. Electrical Construction Materials Directory
2. UL-508 Industrial Control Equipment

1.05 DESCRIPTION

A. The belt conveyor shall be the heavy duty, idler type with motor drive unit mounted on the conveyor frame. The belt conveyor shall consist of the following components:

1. Belt with take-up adjustment
2. Idlers
3. Pulleys and shafts
4. Frames and support
5. Belt cleaner
6. Drip pan
7. Deck Plate
8. Drive guards
9. Skirts
10. Discharge chute
11. Drive unit with speed reducer
12. Associated switches, sensors and auxiliary devices required for operation detailed in this Section.

B. The Grit Building will contain 1 belt conveyor within the Screening Area. The conveyor will transport screenings from the Mechanically Cleaned Bar Screens (as specified in Section 46 21 12 – Mechanically Cleaned Bar Screens) to the dumpster located on lower level. Screening conveyor will discharge the screenings in to dumpster chute located on the second level. During periods when the conveyor is not available for service, screenings shall be discharged to dewatering containers via bypass chutes.

C. The conveyor system shall be designed to operate in an area that is classified as Class 1 Div.1

D. The conveyor will operate whenever the bar screens operate.

E. The conveyor will transport suspended solids (screenings) screened from primary and secondary sludge bearing rags, tramp metal, stringy material, grit, sand, a vast variety of other materials typically found in a primary and secondary sludge.

1.06 QUALITY ASSURANCE

A. In accordance with the procedures and requirements set forth in the General Conditions of the Contract and Division 1, General requirements, the following provisions shall pertain to Work under this Section:

1. Manufacturer's Qualifications:

a. The Contractor shall provide evidence to the Engineer that the manufacturer has a minimum of 10 years' experience, in the design, manufacture, and supervision of installation of equipment of the type required under this Section.

b. The conveyor structural support system, including the cantilevered discharge end of the conveyor, shall be designed by a New York State Registered Professional Engineer having a minimum of 10 years of substantially similar design experience.

2. Quality Assurance Inspection Requirements

a. Shop inspections may be made by City representatives. The Contractor shall give ample notice to the Engineer prior to the beginning of any Work so that inspection may be performed. Shop quality assurance inspections will be performed in accordance with the requirements of Division 1.

1.07 SUBMITTALS

A. All submittals shall be in accordance with Section 01 33 00 – Submittal Procedures or as specified herein.

B. The Contractor shall submit the following:

1. Working Drawings
2. Conveyor Structural Support Design
3. Operation and Maintenance Manuals
4. Shop Testing Plan, Field Testing Plans, Training Plans
5. Lists of Spare Parts, Special Tools, and Supplies
6. Reports of Certified Shop Tests
7. Reports of Field Tests
8. Reports of Manufacturer's Representative Site Visits
9. Envision Submittals

C. Working drawings data shall include, but not be limited to, the following:

1. A copy of this Section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate Section compliance or marked to

indicate requested deviations from Section requirements or those parts which are to be provided by the Contractor or others. Check marks shall denote full compliance with a paragraph as a whole. If deviations from the Sections are indicated, and, therefore, requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Engineer will be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the Sections. Failure to include a copy of the marked-up Section, along with justification(s) for any requested deviations to the Section requirements shall be cause for rejection of the entire submittal and no further submittal material will be reviewed.

2. A copy of the contract document control diagrams and process and instrumentation diagrams, with addenda updates, that apply to the equipment in this section marked to show specific changes necessary for the supplied equipment. If no changes are required, the working drawing shall be marked "No Changes Required."

3. Manufacturer’s equipment specifications and data sheets, with identification of all materials used and methods of fabrication.

4. Parts list with materials of construction.

5. Complete assembly, layout, installation, and shop drawings, with clearly marked dimensions, anchorage and baseplate details, blade diameter and details. Include detailed structural, mechanical, and electrical drawings showing equipment fabrications and interface/connections with other items or Work.

6. Manufacturer’s delivery, storage, and handling requirements.

7. Manufacturer’s installation instructions and recommendations, including installation requirements requiring coordination with the Contractor and/or other equipment suppliers.

8. Weights of equipment component parts, assembled weight of equipment, and total shipping weight. As applicable, include dynamic loads and weight when full and all loads transmitted to supporting structure.

9. Certification of manufacturing facility.

10. Painting and Coating details.

11. Equipment nameplate data.

12. Manufacturer experience and listing of successful operation in other facilities of equipment similar to that proposed for this Project, as specified herein and the General Conditions of the Contract and Division 1, General Requirements.

13. Control Panel outline details, electrical wiring diagrams and schematics.

14. Motor data as specified in Section 26 05 91 – Low-Voltage Electric Motors.

15. Equipment warranty information.

16. Comprehensive schematic diagrams showing wiring for each individual item of electrical equipment and all interconnecting wiring; the latter to be clearly indicated as to be furnished and installed by others, if such is applicable.

17. A list of the quantity and type of recommended lubricants, spare parts, special tools and appurtenances.

18. Structural, including anchorage, and/or process design calculations. Structural calculations shall be signed by a Professional Engineer registered in the State of New York.

D. Operation and Maintenance Manuals

1. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the Section 01 78 25 - Operation and Maintenance Manuals.

E. Sustainability Submittals

1. 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 their 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. The Contractor shall deliver, store, and handle the equipment and materials provided under this Section as specified in Section 01 65 00 – Product Delivery Requirements, and 01 66 00 – Protection of Materials and Equipment, except as modified herein.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Provide tools necessary to disassemble, repair and adjust the equipment furnished under this Section, as specified in Section 01 78 24 – Spare Parts and Maintenance Materials and Section 01 78 10 – Project Closeout.

B. Provide special tools necessary to disassemble, service, repair and adjust the equipment, and all spare parts recommended by the equipment manufacturer.

C. At minimum, the following spare parts shall be provided:

1. One (1) set of matched V-belts for reducer drive.
2. Two (2) head shaft bearings of each size and type.
3. Two (2) take-up bearings of each size and type.
4. Two (2) sets of blades/wipers for bladed/wiper cleaning devices.
5. Two (2) sets of stub idler assemblies.
6. Two (2) sets of flat idler assemblies.
7. One (1) mechanical belt/sidewall splicing device.
8. All other spare parts as recommended by the various equipment *manufacturers.*

D. Provide electric motor spare parts in accordance with Section 26 05 91 – Low-Voltage Electric Motors.

E. Instrumentation and control system spare parts in accordance with Section 40 61 95 – PMCS Monitoring and Control Criteria and Section 40 61 96 – PMCS Control Strategies.

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. All equipment provided under this Section shall be covered by a 2-year warranty period subsequent to the date of Substantial Completion (or use and occupancy in accordance with Article 16 of the Standard Construction Contract).

B. The Contractor shall provide manufacturer warranty for the screenings conveyor starting from the date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. All continuous belt screenings conveyor equipment specified shall be manufactured by the following with all standard and specified additional features and accessories:

1. Keystone Conveyor, Elk River, MN
2. KWS Manufacturing Company, Burleson, TX.
3. Jim Myer & Sons (JMS), Charlotte, NC.
4. Or approved equal

B. Gear Reducer

1. Gear reducer shall be Class II speed reducer manufactured by,
   a. Eurodrive
   b. Nord
   c. Or Approved equal

2.02 MATERIALS / EQUIPMENT

A. Screenings Conveyor shall be in accordance with Section 01 61 50 – General Product Requirements, except as modified herein.

B. The screenings conveyor shall be suitable for operation under the following conditions:

Condition	Value
Design Capacity (cf/hr)	70
Maximum belt Speed (fpm)	100
Motor horsepower (maximum)	3 hp
Enclosure Type	Explosion-proof
Minimum belt width (in)	24-in
Maximum belt height from operating floor (in)	72-in
End of conveyor extends 8 to 10 feet past the last support stand. Ensure manufacturer designs the support structure for the conveyor overhang. Design shall be sealed by NYS professional engineer.	

C. Materials of components shall be as follows:

Component	Material
Drip Pans	316 stainless steel
Skirt plates	316 stainless steel
Belt	Polyester carcass
Idler Frames	316 stainless steel
Pulleys	316 stainless steel
Frame and supports	ASTM A36 steel hot dip galvanized after fabrication.
Take-up screw assembly	316 stainless steel
Deck plate	316 stainless steel
Discharge chute	316 stainless steel

D. Materials specified are considered the minimum acceptable for the purposes of durability, strength, and resistance to erosion and corrosion. The Contractor may propose alternative materials for the purpose of providing greater strength or to meet required stress limitations. However, alternative materials must provide at least the same qualities as those specified for the purpose.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Belts

1. Belts shall be of 4-ply cross rigid construction with cord filling placed alternately above and below the main cord wrap. Belts shall have moderately oil resistant 1/8 inch neoprene rubber top cover and 1/16-inch neoprene rubber bottom cover. Belts shall have an allowable working tension of 220 pounds per inch of width.

2. All belt splices shall be field vulcanized with overlapping cuts, and all splices shall be as strong as uncut belt. Belt shall be spliced with stainless steel mechanical hinged fastener, drawn and recessed into the belt cover. All splices shall be free of pockets or discontinuities and shall have a smooth surface to permit the belt cleaners to operate most efficiently.

3. Belt stretch shall be limited to a maximum of 2.5% of total length.

4. The conveyor shall have sidewalls vulcanized to the belt to contain the materials and prevent spillage. Provide field vulcanizing as recommended by manufacturer. The sidewalls shall be a minimum of 3 inches height and recessed to provide sidewall stability and allow can idlers to transition the conveyor from horizontal to incline and incline to horizontal direction. Sidewall shall be spliced with cold vulcanizing kit and a single stainless steel fastener.

B. Idlers

1. Provide idler roll with stainless steel shafts, covered with corrosion and wear resistant 1/8-inch thick molded urethane. Support the idlers from the frame with 316 stainless steel brackets. Belt idlers shall be CEMA Class C, 5-inches minimum in diameter. All idlers shall be sealed for life and require no grease fittings.

2. Carrying idlers shall be of rigid shaft, single-roller type. Shaft seals shall be multi-passage labyrinth with a positive wiper and an outer shield construction meeting the requirements of CEMA.

3. Carrying idler spacing shall be no greater than 4’-0”. In loading areas, defined to extend one foot before and one foot after the actual loading chute dimension, idler spacing shall be 1’-0”. Return idler spacing shall be no greater than 10’-0”. Calculated belt sag shall be no greater than 2% of idler spacing.

C. Bearings

1. All bearings shall be grease lubricated antifriction type designed for continuous duty and moderate loads and shall have a minimum B-10 life of 60,000 hours.

2. Pulley bearings shall be self-aligning roller bearings while idler bearings shall be precision tapered roller bearings.

3. Tail shafts and head shafts bearings shall be provided with two-bolt roller bearing pillow blocks. Pulley bearings and idler bearings shall be sized to accept the specified full shaft diameters.

4. All bearings shall be sealed, prepacked and regreaseable.

D. Pulleys

1. Head and tail pulley shall be minimum 12-inch diameter and at least 4-inches wider than the conveyor belt width. The head pulley shall be of the welded steel crown faced drum type with grooved lagging. The lagging shall be minimum 3/8-inch thick with herringbone groves and shall be of 50-60 durometer hardness solid neoprene vulcanized rubber. Lagging shall be grooved in a herringbone pattern with quarter inch grooves. Both pulleys shall be self-aligning.

2. Pulley shafts shall be ANSI C1045 steel, with a minimum shaft size of 1-15/16-inches with tapered "QD" compression type hubs. Head pulley shall be keyed to the shaft. Shaft slope at hubs and bearings shall be no greater than 0.0015-inch per inch. The shaft shall be sized such that the maximum combined bending, belt tension, and torsional stresses do not exceed the material yield stress.

3. Pulley shafts shall be supported by roller-bearing pillow blocks. Bearings shall be self-aligning rollers, with a minimum B-10 life of 60,000 hours. For each shaft, one bearing shall be fixed, the other floating to allow for shaft expansion. The fixed bearing shall be located on the driver side of drive pulley. Bearing adjustment screws shall be provided on each end of bearing base to aid alignment.

4. Pulley shaft bearings at the drive end shall be greased from a single grease fitting located on the most accessible side of the conveyor. Pulley shaft bearings at the tail end shall also be greased from a single grease fitting located on the most accessible side of the conveyor. Stainless steel tubing, mounted on the frame, shall convey grease from the single grease fitting to the bearing on the opposite side of the conveyor.

E. Take-up Service

1. Take-ups for each conveyor shall provide for a minimum travel of 2% of total conveyor centers, plus sufficient length for splicing of belting.

2. A brass capstan nut shall be provided on the take-up screw assembly for ease of movement in either direction under load. The assembly shall be as strong in tension as compression.

3. Screw take-ups shall be self-aligning roller bearing units on protected screw frames with an adjustment of at least 12 inches.

F. Belt Cleaner

1. The conveyor shall be furnished with a spring tensioned wiper blade at its point of discharge. The cleaner shall be designed to exert an even pressure across the width of the belt and shall be provided with minimum 1/2 inch-thick medium-hard unreinforced blades made of 3/8-inch minimum neoprene and UHWW-PE blade bracket. A dual ratchet or single handle system shall be provided to allow adjustment for optimum belt cleaning.

The cleaner shall be tensioned by two adjustable Type 316 stainless steel springs.

2. Head pulley Operating Conveyor belt cleaners shall be arranged so that they are easily accessible for service from one side of the conveyor, and do not interfere with drive arrangements and other conveyor features.

G. Frames and Supports

1. Belt conveyor frames and supports shall have structural members with spreaders, sized as required to limit deflection to 1/250 at the longest support span.

2. Supports shall be capable of transmitting all vertical and lateral loads to the equipment anchors. Top of channel frames shall be covered with 3/16-inch nominal 316 stainless steel return belt cover to prevent product spillage onto the return run of the belt.

3. All metals, excluding stainless steel components and shafting, shall be hot-dip galvanized with a minimum thickness of 4-7 mils in accordance with requirements of ASTM A123, ASTM A153 and ASTM A386. Damage to hot-dipped galvanized coatings shall be repaired in accordance with requirements of ASTM A780.

4. The frame shall be supported by legs provided at ten feet maximum intervals. The support legs shall include bottom plates for anchorage of the conveyor to the supporting structural component. Support location, support design loadings, and anchorage requirements for each support shall be clearly detailed in the submittals.

5. Anchor bolts shall be minimum 5/8-inch diameter and designed by the conveyor manufacturer. Anchor bolts and fasteners shall be type 316 stainless steel adhesive anchors.

H. Deck Plate

1. The conveyors shall be equipped with a continuous flat deck plate fabricated of minimum 14 gauge.

I. Guards

1. Stainless steel safety guards, 18-gauge minimum thickness, shall be furnished for all exposed gears, chains, sprockets and flexible couplings. Guards shall be rigidly supported and designed to permit easy removal.

2. The chain drive shall be provided with a stainless steel OSHA guard.

J. Drip Pans

1. The conveyors shall be equipped with a continuous drip pan fabricated of minimum #16-gauge stainless steel extending not less than 2- inches on each side of the return belt and turned up at the edges not less than two-inches.

2. Drip pans shall be fabricated with nested sections and sloped to a drain connection. Drain connection(s) shall be a flanged opening for attachment of 3-inch drainage pipe. Supports for the drip pans shall be stainless steel.

K. Skirt Plates

1. Skirt plates shall be a minimum of 7-inches high exclusive of the edging. The skirt plates shall be fabricated of 10 gauge minimum and shall be mounted to the conveyor framework in the loading area only using 3/8-inch thick stainless-steel brackets. Each skirt plate shall have a full length, ½-inch thick x 4-inch high neoprene edging bolted to it, with provisions for vertical adjustment.

L. Drive System

1. Drive assembly shall consist of a close-coupled integral gearmotor. Gear housing shall be cast iron, furnishing complete protection under all conditions of service. Gears shall be manufactured and rated for continuous duty in accordance with AGMA Standards, of heat treated alloy steel. Provide splash type gear lubrication. Gear reducer shall be Class II speed reducer as manufactured by Eurodrive, Nord or approved equal.

2. The gear reducer and drive shall be designed to provide an applied torque adequate to start a full loaded belt.

M. Discharge Chute

1. Discharge chutes shall be provided where belt conveyor is discharged. The chute shall be fabricated from a minimum 10 gauge plate, adequately stiffened. The design of the chutes shall take into consideration material trajectory and minimization of material buildup. Chute shall be designed to direct material to the center of dumpster. Openings with tight covers will be provided in the chute as needed for servicing of belt cleaners and other equipment, adjustment of deflectors and observation of material trajectory.

N. Motor

1. Motor shall be 3 phase, 230/460V, maximum 1,800 RPM speed, high starting torque, continuous severe duty, class B insulated, 40-degree C ambient, 1.15 service factor, suitable for a Class I, Div. 1 hazardous location, and conform to all applicable requirements of Section 26 05 91 – Low-Voltage Electric Motors.

2. Motor H.P. shall be selected to assure that belt speed can be increased and decreased by 10% without requiring motor change.

3. Motor shall be capable of starting fully loaded, without exceeding motor nameplate H.P. rating.

O. Controls

1. Switches shall have contacts rated for 10-amperes at 120 VAC. Switch enclosures shall be of corrosion resistant NEMA 7 suitable for Class I Division 1 explosion hazard. The sensors shall be 120 VAC.
2. The equipment manufacturer shall coordinate, furnish, and install the following electrical components as shown on the Contract Drawings.
    a. Zero (0)-speed sensor on the conveyor to detect conveyor belt operation.
    b. Emergency pull stop cord and switch shall be installed along the conveyor side frames to pull the cord to stop the conveyor.
    c. Local Control station NEMA 7 enclosure with the features:
        1) Run light - RED
        2) Hand – Off – Auto switch
        3) Emergency Stop button.
    d. All required electrical junction boxes associated with the above components.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Certified tests shall be performed as specified herein.
1. Certified shop tests for motors shall be performed as specified in Section 26 05 91 – Low-Voltage Electric Motors.
2. Certified shop tests for instrumentation and controls shall be performed as specified in Section 40 61 95 – PMCS Monitoring and Control Criteria and Section 40 61 96 – PMCS Control Strategies.

B. A visual inspection of the unit to confirm Project requirements.
1. A no load test run to confirm that no oil leaks, excessive lubricant temperature, excessive noise, and excessive vibration occur. Any causes for leaks, excessive sound, vibration, or lubricant temperature shall be corrected before shipment.
2. Measurement of the no load amp draw of the motor shall be performed.
3. Measurement of the output rpm/speed of the equipment to verify speed reduction shall be performed.

C. The entire assembly shall be prepared for shipment in accordance with the manufacturer's recommendations.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. All Work shall be in accordance with Section 01 43 05 – Contractor’s Work Quality.

3.02 INSTALLATION

A. Installation shall be in accordance with the manufacturer's written installation procedures and the pertinent requirements of Section 01 73 17 – Installation of Equipment. All equipment furnished shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with detailed drawings, Sections, engineering data, instructions, and recommendations furnished by the equipment manufacturer. Final assembly of the entire conveyor unit may require the cutting and redrilling of some of the components, such as track sections, drip pans and covers in order to conform with any Site deviations. This Work shall be performed on Site by the Contractor at no additional expense to the City.

B. Installation shall be carried out by mechanics skilled in Work of this kind, under the general supervision of a factory-trained representative of the manufacturer. The equipment shall be checked, aligned, tested, and placed in operation by a factory-trained manufacturer's representative.

C. Equipment identification shall be in accordance with Section 40 05 97 – Identification for Process Equipment.

D. The Contractor shall provide the service of the manufacturer’s representative to: assist in the installation of equipment; check the installation before the equipment is placed into operation; assist in the start-up of the equipment; and train the Plant Operations and the Maintenance staff in the care, operation, and maintenance of the equipment. The services provided shall be in accordance with the requirements of Section 01 61 50 - General Product Requirements, Section 01 73 17 – Installation of Equipment, Section 01 75 10 – Preliminary and Final Field Tests, and Section 01 79 05 – Equipment Start-up and Training.

3.03 FIELD TESTING / QUALITY CONTROL

A. Preliminary and final field tests shall be performed in accordance with the requirements of the Section 01 75 10 - Preliminary and Final Field Tests, Section 26 05 91 – Low-Voltage Electric Motors, Section 40 61 95 – PMCS Monitoring and Control Criteria and Section 40 61 96 – PMCS Control Strategies.

B. System operational tests shall be as follows:

1. No-Load Test.

   a. The Contractor shall run a 12 hour no-load test. The test shall be considered complete when the installed conveyor system operates continuously for a 12 hour period without shutdown for realignment or repair.

2. Load Test

   a. The no-load test shall be followed by a load test at the load specified in 2.02.A until the dumpster reaches weight capacity. The test shall be simulated with sand or gravel.

C. The conveyors shall be started and stopped under available load conditions without spillage during the load test.

3.04 STARTUP / DEMONSTRATION

A. As a part of the commissioning services, provide on-the-job training as specified herein and conforming to the requirements of Section 01 79 05 - Equipment Start-up and Training and Section 01 75 10 – Preliminary and Final Field Tests. Training shall be scheduled in combination with the first start up trip. Training shall include the following:

1. Operational and Controls information for the specific equipment provided under this section
2. Troubleshooting
3. Operation and Maintenance Manual orientation and layout

B. Routine maintenance

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not used.

3.06 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall provide the service of the manufacturer's representative to assist in the installation of equipment; check the installation before the equipment is placed into operation; assist in the start-up of the equipment; and train the plant operations and the maintenance staff in the care, operation, and maintenance of the equipment. The services provided shall be in accordance with the requirements of Section 01 61 50 - General Product Requirements, Section 01 73 17 – Installation of Equipment, Section 01 75 10 – Preliminary and Final Testing, and Section 01 79 05 – Equipment Start-up and Training.

B. The Contractor shall provide the services of the manufacturer's representative at such times and for such durations as needed to perform the tasks required of the representative. At a minimum, the services of the manufacturer's representative shall be provided as indicated herein below. The number of visits and person-days per visit indicated below shall be understood as referring to the total required services for the lot of equipment provided under this Section.

1. Installation: two (2) visits of two (2) person-days per visit.
2. Field Testing: two (2) visits of two (2) person-days per visit.
3. Start-up: two (2) visits of two (2) person-days per visit.
4. Training: two (2) visits of one (1) person-days per visit.

C. Field Testing and Start-up can be a single trip. Installation and Training shall be separate trips.

D. The Engineer reserves the right to require that any unused person-days from any visit be applied to any other specified visit.

E. Person-days shall be understood only as days spent onsite (not in transit).

F. Unless otherwise authorized by the Engineer, the manufacturer's representative shall be a direct employee of the equipment manufacturer, with at least 3 years' experience in the installation, testing, training and start-up of equipment of the type provided under this Section. The manufacturer's sales and marketing personnel will not be accepted as manufacturer's representatives.

G. The manufacturer's representative shall sign in and out at the office of the Engineer each day they are at the Site.

H. Reports: The Contractor shall submit a report from the manufacturer for each visit to the Site of the manufacturer's representative. The report shall provide complete information regarding the visit, including, but not limited to, dates, times, subject equipment, tasks performed, persons contacted, problems corrected, test results, training provided, and other pertinent information.

I. In addition to the above, the Contractor shall provide the services of person(s) authorized by the manufacturer to witness the unloading at the Site of the equipment provided under this Section, and to ascertain the condition of said equipment. Manufacturers' sales and marketing personnel may be accepted as authorized person(s) to perform these specific tasks. The Contractor shall submit to the Engineer a report, completed by the authorized person(s), and certified by the equipment manufacturer, documenting the findings of the authorized person(s).

END OF SECTION

SCHEDULE 41 12 20-1

SCREENINGS CONVEYOR SCHEDULE

Screenings Conveyor Tag Number	Number of units	Motor Tag Number	Control Panel Tag Number	Operating Conditions
TI1-08-005-003	1			See Section 2.02

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies minimum requirements for rigid equipment mounts. Completed equipment mounts shall consist of equipment pads, equipment anchors, and mounting plates (baseplates, soleplates, or fabricated steel frames) set in grout.

B. Requirements for non-rigid equipment mounts (vibration isolation systems) are specified in individual equipment specifications. Rigid equipment mounts conforming to the requirements of this Section shall be furnished for the equipment pad and other equipment mounting components supporting the vibration isolation system.

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 for 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

1.04 REFERENCES

A. Definitions:

1. Baseplate: A mounting plate configured with a top plate and a perimeter edge of the mounting plate that is below the top plate. Baseplates have a cavity between the top plate and a horizontal plane at the bottom edge of the perimeter of the mounting plate.

2. Soleplate: A machined or pre-formed mounting plate with a uniform horizontal surface across the entire underside of the mounting plate, excepting shear lugs/keys, grout pour holes, vent holes, and attachment hardware (nuts, bolts, tapped holes, etc.). Soleplates have a top plate but lack the perimeter bottom edge that extends below the underside of the top plate that is a defining feature of baseplates.

3. Fabricated Steel Frame: An equipment mounting plate constructed of rolled steel shapes and plates welded into a frame. Fabricated steel frames do not have top plates.

4. Equipment Pad: Concrete foundation (block or slab) supporting and elevating mounting plates above the supporting structural floor slab or local grade.

5. Mounting Pads: Milled/machined areas of baseplates, soleplates, and fabricated steel frames where the feet or mounting surfaces of mounted equipment and drivers are bolted to the baseplate, soleplate, or fabricated steel frame.

6. Leveling Blocks: Steel blocks temporarily placed under baseplates, soleplates, or fabricated steel frames at leveling positions (at equipment anchors) for the purpose of leveling baseplates, soleplates, or fabricated steel frames prior to grouting.

7. Shims: Thin stainless-steel plates of uniform thickness used for fine adjustment of level. Shims are used on top of leveling blocks for mounting plate leveling or used between equipment drivers and baseplates, soleplates, or fabricated steel frames for equipment alignment.

8. Wedges: Pairs of uniformly tapered metal blocks that are stacked with the tapered surfaces reversed (relative to the other wedge) so that the top and bottom surfaces of the wedges are parallel. Wedges are used between equipment pads and baseplates, soleplates, or fabricated steel frames for the purpose of leveling mounting plates.

9. Mounting Stud: Threaded rod or bolts anchored to baseplates, soleplates, or fabricated steel frames for the purpose of mounting equipment or ancillary devices onto baseplates, soleplates, or fabricated steel frames.

10. Reinforcement Dowels or Reinforcement Hooks: Steel reinforcement rods embedded in concrete, across a cold joint, for the purpose of transferring loads or force across the joint.

11. Leveling Position: A location on the top of a concrete equipment pad where leveling tools and equipment will be temporarily installed or used for the purpose of leveling baseplates, soleplates, and fabricated steel frames prior to grouting.

12. Grout Manufacturer: Refers to the manufacturer of the grout product used for installation of rigid equipment mounts.

13. Grout Manufacturer's Technical Representative(s): Refers to the technical representative(s) of the Grout Manufacturer. The Grout Manufacturer's Technical Representative shall not be an employee of the Contractor.

B. Reference Standards:

1. ACI 318, Appendix D - Building Code and Commentary, Anchorage to Concrete

2. AISC 14th Edition - Manual of Steel Construction

3. ANSI/HI 14.4 – Rotodynamic Pumps for Installation, Operation and Maintenance

4. API RECOMMENDED PRACTICE 686 - Recommended Practices for Machinery Installation and Installation Design

5. ASTM E329 - Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction

6. ASTM F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs

7. ASTM F1554 - Anchor Bolts, Steel, 36, 55 and 105 ksi Yield Strength

8. MIL-PRF-907E - Anti-Seize Thread Compound, High Temperature

9. SSPC - Society for Protective Coatings Specifications, Vol. 2

10. NYCBC - New York Building Code

11. IBC - International Building Code (including local amendments)

1.05 DESCRIPTION

A. Equipment mounts shall conform to the requirements specified in Schedule 43 05 13-1 – Equipment Mounting Schedule included after the end of the Section. Where equipment mounting requirements are not specifically identified in the Equipment Mounting Schedule, the default mounting configuration for equipment shall consist of Pad Anchored Equipment Pads per the Contract Drawings, mounting plates leveled within 0.005 inch/foot, anchored to the equipment pad with cast-in-place equipment anchors per the Contract Drawings, equipment anchor sleeve length is ten (10) times the bolt diameter, and the mounting plate is grouted in position using non-shrink grout.

B. If a conflict exists between this Section and requirements of individual equipment manufacturers, the more restrictive requirements shall prevail.

1.06 QUALITY ASSURANCE

A. Quality Control by Contractor:

1. To demonstrate conformance with the specified requirements for rigid equipment mounts, the Contractor shall provide the services of an independent testing laboratory that complies with the requirements of ASTM E329. The testing laboratory shall sample and test materials installed as part of rigid equipment mounts as specified in this Section. Costs of testing laboratory services shall be borne by the Contractor.

2. Where epoxy grout is specified in individual equipment specifications, the Contractor shall furnish the services of a grout manufacturer's technical representative who has been factory trained by the grout manufacturer. The grout manufacturer's technical representative shall perform training and quality control of epoxy grout installation for rigid equipment mounts as specified in this Section.

1.07 SUBMITTALS

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

1. Action Submittals:

a. A copy of this Section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate Section compliance or marked to indicate requested deviations from Section requirements.

b. A check mark (✓) shall denote full compliance with a paragraph as a whole. If deviations from the Sections are indicated, and, therefore, requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation.

c. Name, employer, a copy of the employee's Qualified Millwright card or other equivalent certificate of journeyman qualifications for millwrights who will install rigid equipment mounts.

d. Certificates or other documentation issued by the epoxy grout manufacturer that demonstrates that the grout manufacturer's technical representative has been factory trained on installation of epoxy grout for equipment mounts.

e. Shop drawings for equipment pads, equipment anchors, and baseplate, soleplate, or fabricated steel frame details. Shop drawings shall depict size and location of equipment pads and reinforcement; equipment drains; equipment anchor, size, location, and projection; expansion joint locations; elevation of top of grout and grout thickness; elevation of top of baseplate, soleplate, or mounting block; size and location of electrical conduits; and any other equipment mounting features embedded in equipment pads. Shop drawings for equipment pads, equipment anchors, and baseplate, soleplate, or fabricated steel frames shall be numbered and marked (specification number and equipment number) for inclusion (filing) with the associated equipment submittal requirements.

f. Equipment anchor calculations.

g. Results of grout strength tests.

h. Completed Rigid Equipment Mount Installation Inspection Checklist Forms.

i. List of Contractor's equipment installation staff that has completed epoxy grout manufacturer's grout installation training.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used.

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. Not Used.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Adjustable canister anchors shall be as manufactured by:

1. Unisorb Jakebolts, Michigan Center, MI;

2. Deco Heavy Duty Adjustable Anchors, Decatur, IL;

3. Rowan Adjustable Canister Anchor Bolt, Houston, TX;

4. Or approved equal.

B. Fixators shall be as manufactured by:

1. Unisorb, Michigan Center, MI;

2. Or approved equal.

C. Polymer Concrete Soleplates shall be as manufactured by:

1. Basetek PoxyBase, Middlefield, OH;

2. Goulds Chembase, Senaca Falls, NY;

3. Or approved equal.

D. Epoxy primer shall be as manufactured by:

1. Phillybond Phillyclad, Montgomeryville, PA;

2. Or approved equal.

E. Anti-seize or anti-galling compound shall be as manufactured by:

1. Jet Lube 550, Rockwall, TX;

2. LA-CO E-Z Break, Elk Grove Village, IL;

3. Or approved equal.

2.02 MATERIALS / EQUIPMENT

A. GENERAL

1. Equipment mounts shall conform to the requirements specified in Schedule 43 05 13-1 - Equipment Mounting Schedule.

2. Equipment and drivers shall be rigidly mounted on a common mounting plate and grouted into place on a concrete equipment pad unless alternate requirements are specified in the Contract Drawings or the Equipment Mounting Schedule. Unless otherwise specified in the individual equipment specification, mounting plates shall be anchored to equipment pads with a layer of grout between the equipment pad and the mounting plate.

B. EQUIPMENT ANCHORS:

1. Equipment Anchor Materials:

a. Equipment anchors shall be all thread rod with heavy hex weldable nuts, heavy hex bolts, Post-installed anchors (wedge, sleeve, undercut, expansion, and adhesive anchors), or adjustable canister anchors as specified in the Schedule 43 05 13-1 - Equipment Mounting Schedule.

b. Adjustable canister anchors shall be cast-in-place pre-manufactured adjustable anchor inserts. Adjustable canister anchors shall provide a minimum of six (6) inches of vertical bolt height adjustment and

lateral adjustment of the anchor bolt while maintaining the anchor bolt in a true vertical orientation.

c. Unless otherwise specified, equipment anchor materials shall conform to Table 43 05 13-1 below for the area exposure condition where the equipment is installed.

TABLE 43 05 13-1
EQUIPMENT ANCHOR MATERIALS

Area Exposure	Equipment Anchor Materials
Indoor, Dry	316 Stainless, Carbon Steel, ASTM F1554, Grade 36, weldable per S1 for threaded rod
Indoor, Wet	Galvanized Carbon Steel, ASTM F1554, Grade 36, weldable per S1 for threaded rod
Outdoor	304 Stainless, ASTM F593, Cond. CW
Submerged, Immersed	316 Stainless, ASTM F593, Cond. CW
Process Corrosive	316 Stainless, ASTM F593, Cond. CW
Chemical Corrosive	316 Stainless, ASTM F593, Cond. CW

2. Equipment Anchor Design:

a. The size (diameter) of anchors for clamping/fastening mounting plates to equipment pads shall be as specified by the equipment manufacturer.

b. The Contractor shall furnish equipment anchor calculation submittals for all equipment included in Schedule 43 05 13-1. Equipment anchor calculations shall be furnished as product data and submitted with equipment submittals. Equipment anchor calculations shall be sealed by a registered structural or civil engineer licensed in the State of New York.

3. Equipment Anchor Tension:

a. Unless alternate bolt torque/tension requirements are specified by the equipment manufacturer, equipment anchors shall be tightened to provide a final clamping force that produces a tensile stress of 15,000 psi in each equipment anchor. Adjustable canister anchors shall be tightened to the manufacturer's maximum safe working load. Equipment anchors consisting of post-installed anchors shall be tightened to manufacturer's recommendations.

b. Bolt torque values required to produce the specified bolt tension based on well lubricated plain finish national coarse thread bolts are presented below in Table 43 05 13-2. Revise bolt torque values per equipment manufacturer's recommendations for alternate thread patterns, thread lubrication, bolt material, or bolt finish.

TABLE 43 05 13-2
BOLT TORQUE VALUES

Bolt Diam. (in)	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-1/2
Final bolt torque for 15,000 psi bolt stress (ft*lbs)	8	15	30	50	80	125	180	250	400

c. Prior to leveling and grouting mounting plates, grouted equipment anchors shall be pull tested to the values specified in Table 43 05 13-3.

TABLE 43 05 13-3
PULL TEST LOADS

Anchor Diam. (in)	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-1/2
Pull test load (kips)	2.1	3.8	6.1	9.1	13	17	22	28	43

4. Anchor Sleeves:

a. Equipment anchors shall be fitted with sleeves as specified in the Equipment Mounting Schedule. Sleeve length for equipment anchors shall be fifteen (15) times the bolt diameter unless otherwise specified in the Equipment Mounting Schedule. Sleeves may be installed at the Contractor's option if not specified in the Equipment Mounting Schedule.

b. Adjust equipment anchor length/embedment depth shown in the Contract Drawings if sleeves are not required.

c. Anchor sleeves shall be flexible polyurethane foam, steel cylinder/tubes, or ribbed plastic sleeves.

d. Fill steel cylinders/tubes and ribbed plastic sleeves with a flexible room temperature vulcanizing (RTV) sealant prior to embedment/installation.

C. MOUNTING PLATES

1. General:

a. All baseplates, soleplates, and fabricated steel frames shall have edges of surfaces bearing on grout rounded to a radius of not less than 0.25 inch.

b. Perimeter corners of baseplates, soleplates, or fabricated steel frames shall be rounded to a radius of not less than two (2.0) inches to avoid producing stress risers on the grouted foundation.

c. Grout pouring holes (minimum 4 inches in diameter for epoxy grout, minimum 2.5 inches in diameter for cementitious non-shrink grout) shall be provided in all baseplates and soleplates and all baseplates and soleplates shall have air release holes.

d. Grout relief or vent holes (minimum 1 inch in diameter) shall be provided in all baseplates and soleplates.

e. Mounting holes for equipment anchors shall be drilled through baseplates, soleplates, and fabricated steel frames.

f. Mounting holes for equipment anchors shall be drilled. Mounting holes shall not be burned out and they shall not be open slots.

g. Terminations requiring connections to baseplates and soleplates shall be acorn nuts welded to the underside of the baseplate or soleplate or nuts welded to the underside of the baseplate or soleplate and plugged with cork, plastic plugs, or grease.

h. Where fasteners terminate only into the baseplate, soleplate, or fabricated steel frame, threaded lengths (tapped or embedded in mounting plates) shall be not less than the bolt diameter.

i. Where baseplates, soleplates, or fabricated steel frames are leveled using jackscrews, jackscrew threads shall be tapped in thickened pads or otherwise in sufficient metal to provide ease in adjusting level.

j. Mounting pads and/or mounting surfaces for baseplates, soleplates, and fabricated steel frames shall be milled flat after all welding and stress relieving and shall be coplanar within 0.0005 inch per foot in all directions. Baseplates shall be pre-grouted prior to milling.

k. Baseplates, soleplates, and fabricated steel frames shall provide common support for the equipment and driver (and flywheel, if one is specified).

l. Baseplates, soleplates, and fabricated steel frames for equipment with drivers 20 horsepower and greater shall be furnished with transverse alignment (horizontal) positioning jackscrews for alignment of equipment drivers on horizontal surfaces of baseplates.

m. Alignment/positioning jackscrews shall be in perpendicular directions in a horizontal plane at the mounting position for each corner or foot of the equipment driver. (Additional jackscrews shall be provided for transverse alignment of the flywheel, if flywheels are specified in the equipment specification.)

n. Where specified in individual equipment specifications; baseplates, soleplates, and fabricated steel frames shall be fitted with RK Fixators.

o. Fixators shall be installed at mounting surfaces for drivers.

p. Fixators shall be a three-piece wedge leveling adjustment device incorporating a spherical washer assembly to provide true level height adjustment at each mounting surface for the equipment driver.

2. Fabricated Steel Frames:

a. Fabricated steel frames shall be plate or fabricated structural steel mounting plates with thickened steel mounting pads for bolting equipment to the mounting plate.

b. Fabricated steel frames shall be rectangular in shape, excepting fabricated steel frames for centrifugal refrigeration machines and pumps which may be T- or L-shaped fabricated steel frames to accommodate the equipment driver and accessories.

c. Fabricated steel frames for split case pumps shall include supports for suction and discharge elbows, if required by the specified configuration.

d. Perimeter members shall be I-beams or C-channel with a minimum depth equal to 1/10 of the longest dimension of the fabricated steel frame. Beam depth need not exceed 14 inches provided that the deflection and misalignment is kept within acceptable limits as determined by the manufacturer.

e. Fabricated steel frames shall be furnished with mounting pads welded to the fabricated steel frame.

f. Surfaces of fabricated steel frames in contact with grout shall be sandblasted to white metal per SSPC SP-5.

g. Apply a high-strength epoxy primer within 8 hours of sandblasting the fabricated steel frame.

3. Baseplates:

a. Baseplates shall be welded steel, cast steel, or cast iron with thickened mounting pads for bolting equipment to the baseplate.

b. Internal stiffeners shall be provided on all cast and fabricated baseplates and shall be designed to allow free flow of grout from 1 section of the baseplate to another.

c. The minimum acceptable opening in cross bracing and stiffeners shall be 2 inches high by 6 inches wide.

d. All welds shall be continuous and free from skips, blowholes, laps, and pockets.

e. Baseplates shall be pre-grouted at the factory after all welding has been completed and prior to machining the mounting pads on the

baseplate. Baseplates that have not been pre-grouted at the factory shall be pre-grouted in the field by removing the equipment from the baseplate, inverting the baseplate, and pre-grouting as specified in this Section.

f. The underside of baseplates shall be sandblasted to white metal per SSPC SP-5 prior to pre-grouting.

g. Pre-grouting shall be completed within 8 hours of sandblasting.

h. Pre-grouting shall fill the underside of the baseplate to the bottom edges of the baseplate.

i. Cast iron baseplates shall be sealed to prevent surface bleeding prior to shipment to the Project Site.

4. Plate Steel Soleplates:

a. Plate steel soleplates shall be not less than 1.0 inch thick for equipment with drivers greater than 30 horsepower.

b. Plate steel soleplates shall be furnished with grout keys/lugs or stiffeners on the underside of the soleplate.

c. Excepting grout keys, grout pour holes, vent holes, and attachment hardware (nuts, bolts, tapped holes, etc.) the underside of plate steel soleplates shall be a flat uniform horizontal surface.

d. The underside of plate steel soleplates shall be scribed with the words “THIS SIDE DOWN” using welding rod material prior to milling the mounting pads for equipment or mounting surfaces.

e. Plate steel soleplates without grout pouring holes are acceptable provided that no dimension of the soleplate (width or length) exceeds 18 inches.

f. Surfaces of plate steel soleplates in contact with grout shall be sandblasted to white metal per SSPC-SP-5 prior to shipment to the Project Site.

g. Apply a high-strength epoxy primer within 8 hours of sandblasting the underside of plate steel soleplates.

h. Where equipment is fabricated or cast with feet or mounting surfaces that are not fastened to a common baseplate or soleplate, as in dry-pit bottom-suction pumps, the equipment may be supported on individual concrete piers or equipment pads in lieu of mounting on a common equipment pad and soleplate. In such instances, the equipment shall be supported at the feet or mounting surfaces on individual plate steel soleplates, which shall be leveled and grouted into place on the individual piers or equipment pads as specified in this Section. Where multiple soleplates are installed for an

equipment installation, soleplates shall be installed coplanar within 0.002 inch/foot.

5. Polymer Concrete Soleplates:

   a. Polymer Concrete Soleplates shall be pre-cast soleplates consisting of polymer concrete with stainless steel inserts for equipment mounting.

   b. Mounting surfaces on Polymer Concrete Soleplates shall be coplanar within 0.002 inch/foot. Polymer Concrete Soleplates shall be furnished with a uniform horizontal surface over the entire underside of the mounting plate.

   c. Excepting grout keys, grout pour holes and vent holes, the underside of soleplates shall provide a flat uniform horizontal surface.

6. Corrosion Resistant FRP Baseplates:

   a. Corrosion Resistant FRP Baseplates shall be pre-formed fiber reinforced plastic fabrications.

   b. Corrosion Resistant FRP Baseplates shall be products of the manufacturer of the equipment that is mounted on the baseplate.

D. GROUT FOR EQUIPMENT PADS

1. Epoxy Grout for Equipment Mounting:

   a. Where epoxy grout is specified in the Equipment Mounting Schedule, grout for setting bearing surfaces of baseplates, soleplates, and fabricated steel frames on equipment pads shall be epoxy grout for equipment mounting as specified in Section 03 60 00 - Grouting. Where the term “epoxy grout” is used in the context of details and Sections for equipment mounting it shall mean “epoxy grout for equipment mounting” as specified in Section 03 60 00 - Grouting.

2. Cementitious Nonshrink Grout:

   a. Where non-shrink grout is specified in the Equipment Mounting Schedule, cementitious non-shrink grout, specified in Section 03 60 00 - Grouting, may be used for setting bearing surfaces of baseplates, soleplates, or fabricated steel frames. Where the term “non-shrink grout” or “cementitious grout” is used in the context of details and Sections for equipment mounting it shall mean “cementitious non-shrink grout” as specified in Section 03 60 00 - Grouting. Training and quality control by the grout manufacturer’s technical representative is not required for rigid equipment mounts installed with cementitious non-shrink grout.

E. EPOXY PRIMER

1. Epoxy primer shall be a high-strength, lead free, chrome free, and rust inhibiting two-component epoxy primer specifically designed for use on metal substrates and in conjunction with epoxy grout. The epoxy primer's bond strength to sandblasted metal shall not be less than 1500 psi.

F. ANTI-SEIZE/ANTI-GALLING COMPOUND

1. Anti-seize or anti-galling compound shall be a molybdenum disulfide and graphite combination in aluminum complex base grease conforming to MIL-PRF-907E.

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. Roughen the underside of soleplates and fabricated steel frames and wipe with a residue-free solvent as recommended by the epoxy primer manufacturer before placement of the baseplate, soleplate, and fabricated steel frames on the equipment pad for leveling. Roughen surfaces of mounting plates that will be in contact with grout by power tool cleaning. Cleaning shall be performed by power wire brushing, power sanding, power grinding, power tool chipping or power tool descaling. Cleaning shall impart a minimum profile of 1.0 mil.

B. Prior to placement on the equipment pad for leveling, exposed grout surfaces of pre-grouted baseplates shall be roughened and wiped with a residue-free solvent as recommended by the manufacturer of the epoxy grout used for pre-grouting.

C. Prepare the underside of corrosion-resistant FRP baseplates and polymer concrete baseplates per the baseplate manufacturer's recommendations prior to placement of the baseplate on the equipment pad for leveling.

3.02 APPLICATION

A. General Requirements:

1. Grout for equipment mounting shall be as specified in the Equipment Mounting Schedule.

2. Grouting for installation of equipment on equipment pads shall take place prior to connecting any field piping or electrical and instrumentation systems.

3. Unless the Resident Engineer accepts an alternate installation procedure in writing, baseplates, soleplates, and fabricated steel frames shall be leveled and grouted with the equipment removed.

4. Pumps shall be installed in accordance with this Section and ANSI/HI 14.4.

5. Connecting piping with flexible connections and/or expansion joints shall be anchored such that the intended function of these joints is maintained in the piping system without imposing strain on the equipment connections.

B. Alternate Piping Connections:

1. Where an equipment manufacturer's installation requirements include a rigid connection between the machine and connecting piping systems, the Contractor shall delete any flexible coupling (including equipment connection fittings) shown on the Contract Drawings and install the equipment in the following manner, in lieu of installing the flexible coupling:

a. The equipment pad shall be installed as shown on the detail specified in the Equipment Mounting Schedule 43 05 13-1.

b. The baseplate, soleplate, or fabricated steel frames supporting the equipment shall be installed, leveled, and grouted in place as specified in this Section.

c. The piping shall be installed and aligned to the equipment connections and the field piping connections without welding one of the joints for one section of pipe between the equipment connection and the field piping and all valving. All flanged joints shall be bolted up and pressure-tested.

d. All piping shall be fully supported by supports designed to accept their full weight and thrust forces.

e. The final sections of piping shall be aligned with the equipment and field connections without the use of jacks, chain falls, or other devices to force it into alignment.

f. The final piping joints shall be welded only after the previous steps have been completed and accepted by the Resident Engineer.

C. Concrete Equipment Pad Preparation:

1. Roughen the top of the equipment pad after the concrete has reached its 28-day compressive strength.

2. Remove all laitance and defective or weak concrete.

3. Roughened surface profile shall be 0.25 inch amplitude, minimum.

4. Expose broken aggregate without dislodging unbroken aggregate from the cement matrix and without fracturing concrete and aggregate below the concrete surface.

5. Roughen using a light-duty (15 pounds or less), hand-held chipper with a chisel type tool.

6. Abrasive blast, bush-hammer, jack hammers with sharp chisels, heavy chipping tools, or needle gun preparation of concrete surfaces to be grouted are not acceptable.

7. Demonstrate removal of defective or weak concrete to the Resident Engineer prior to leveling.

8. The chipped surface of the concrete shall be such that the final elevation of the equipment pad provides the grout manufacturer's recommended thickness between the surface of the equipment pad and the lower baseplate flange, underside of the soleplate, or underside of the fabricated steel frame.

9. All dust, dirt, chips, oil, water, and any other contaminants shall be removed and the surface protected with plastic sheeting until grout is installed.

10. Concrete equipment pad surfaces that have been finished smooth and level for use as leveling positions shall be protected from damage during chipping activities. Alternatively, leveling positions may be restored on chipped surfaces. Leveling positions shall be restored by installing leveling blocks or leveling plates for jackscrews on a high compressive strength epoxy putty (Philadelphia Resins, Phillybond Blue 6A, or approved equal). Leveling blocks and leveling plates shall be installed level on the epoxy putty.

D. Leveling:

1. Except where union rules require installation by another trade, all equipment and machinery shall be mounted and leveled by a Qualified Millwright.

2. Use precision surveying equipment for leveling.

3. Machinists' spirit levels will not be permitted for leveling purposes for any baseplate, soleplate, or fabricated steel frame with a plan dimension greater than 4 feet.

4. Baseplates, soleplates, and fabricated steel frames shall be leveled to the tolerance specified in the Equipment Mounting Schedule or as otherwise required by the equipment manufacturer, if more stringent.

5. An anti-seize or anti-galling compound shall be applied to all equipment anchor threads prior to beginning baseplate, soleplate, or fabricated steel frame leveling.

6. All baseplates, soleplates, and fabricated steel frames shall be leveled against steel surfaces (jackscrew plates, leveling blocks, leveling nuts, support plates, or other steel surfaces). Use of other materials for leveling purposes is strictly and specifically prohibited.

7. Leveling equipment and tools shall be stainless steel leveling blocks and shims, steel wedges, or jackscrews bearing on leveling plates.

8. Leveling nuts may be used for leveling baseplates, soleplates, and fabricated steel frames weighing less than 200 pounds (including the weight of the equipment if leveled with the equipment on the mounting plate).
9. Leveling blocks shall be stainless steel, 4 inches square and 1.5 inches thick with an open-ended slot terminating in the center for the equipment anchor.
10. Leveling blocks shall be machined flat on all horizontal surfaces and placed under the baseplate or soleplate at each equipment anchor.
11. Shims shall be pre-cut stainless steel, slotted for removal after grouting. Leveling blocks and shims shall be coated with a light oil just prior to beginning the leveling and grouting work. Shims shall be placed so the tabs on the shims are easily accessible.
12. Clamp baseplates, soleplates, or fabricated steel frames in position (after leveling) by installing the equipment anchor nuts and washers.
13. Bolt tension to fix the position of mounting plates during grouting shall be 30 to 60% of the final clamping force applied to clamp the mounting plate to the equipment pad.
14. Prior to grouting, verify that the correct level and position of the baseplate, soleplate, or fabricated steel frame has been maintained after clamping it to the equipment pad.

E. Grouting:

1. Design forms for a minimum of 6 inches hydrostatic head above the final elevation of the grout.
2. Install grout expansion joints at 4-to-6-foot intervals, perpendicular to the centerline of baseplates. Design expansion joints in accordance with the grout manufacturer's written instructions.
3. Coat forms with three coats of paste wax on all areas of the forms that will be in contact with the grout.
4. Wax forms before assembly.
5. Prevent accidental application of wax to surfaces where the grout is to bond.
6. Remove any foreign material, such as oil, sand, water, wax, grease, etc., from concrete surfaces that will contact grout before forms are installed.
7. Forms shall be liquid tight. Seal any open spaces or cracks in forms, or at the joint between forms and the foundation using sealant, putty, or caulking compound.
8. Vertical and horizontal edges of the grout shall have 45-degree chamfers as specified in equipment pad details. The 45-degree perimeter chamfer strip shall be located at the final elevation of the grout.
9. Match chamfers in concrete portions of the equipment pad.

10. Install block outs at all leveling positions to allow removal of leveling equipment and leveling nuts to be backed off after the grout has cured.
11. Coat jackscrews with a light oil or other acceptable bond-breaking compound prior to grouting.
12. Final elevation of grout on fabricated steel frames shall be at the top of the lower flange of the perimeter I-beams or C-channel.
13. Top of grout elevation for baseplates and soleplates shall be at least 0.125 inch but not more than 0.5 inch above the bottom or underside of the perimeter edge of the baseplate or soleplate.
14. Seal equipment anchor sleeves to protect the sleeved length of the anchor from contact with grout.
15. Wrap exposed portions of equipment anchors with duct tape to protect them from grout splatter and to prevent bonding to grout.
16. Adjust ambient temperature to maintain mounting plate, foundation, and grout temperatures to grout manufacturer's recommended temperature.
17. Mix grout for equipment mounting in accordance with the grout manufacturer's written recommendations.
18. Epoxy grout shall be placed in a manner that avoids air entrapment, using a head box to pour grout into the grout holes.
19. Place grout at one end of the baseplate or soleplate and work grout toward the opposite end to force the air out from beneath the baseplate or soleplate.
20. Pour grout through a head box into grout pouring holes.
21. When the head box is moved to the next grout hole, a 6-inch standpipe shall be placed over the grout hole and filled with grout.
22. Use of vibrating tools and/or jarring (rapping or tapping) forms to facilitate grout flow is not permitted during placement of epoxy grout.
23. Never allow the grout in the head box to fall below the top of the baseplate or soleplate once the grout has made contact with the baseplate or soleplate.
24. Grout placement shall be continuous until all portions of the space beneath the baseplate, soleplate, or fabricated steel frame have been filled.
25. Prepare subsequent batches of grout prior to depleting the preceding batch.
26. Maintain grout height in standpipes after the space under the baseplate, soleplate, or fabricated steel frame has been filled.
27. When the grout has started to take an initial set (typically this is determined by a noticeable increase in temperature and no flow of grout at the vent holes) the standpipes shall be removed and excess grout cleaned from all surfaces.

28. Check for leaks throughout grout pours. Leaks shall be repaired immediately to prevent formation of voids.

29. Check baseplate, soleplate, or fabricated steel frame level and elevation before the grout sets.

30. Cure grout in accordance with the grout manufacturer's written instructions.

31. Where specified in the individual equipment specifications, a grout sample shall be taken for each equipment pad.

    a. Samples shall be placed in a cylinder of sufficient size to yield three 2-inch cubes as test samples.

    b. Samples shall be tagged with project name, date, time, the equipment number, and ambient temperature at the time of placement.

    c. Place samples next to the foundation of the equipment being grouted and cure for 48 hours.

    d. Test grout samples in accordance with the grout manufacturer's recommendations.

    e. Grout samples shall be tested by the independent testing laboratory.

    f. Test results shall be reported directly to the Resident Engineer.

F. Completion:

1. Upon acceptance by the Resident Engineer and the equipment manufacturer's representative and after the grout has reached sufficient strength, grout forms and block outs at leveling positions shall be removed. Leveling blocks and shims or wedges and support plates shall be removed, and leveling nuts and jack screws shall be backed off to allow the grout to fully support the baseplate, mounting block, or soleplate. Take care not to damage the grout during removal of extended shimming material or leveling equipment and tools.

2. The equipment anchor nuts shall be tightened, using calibrated indicating torque wrenches, to develop the full bolt tension.

3. Equipment anchor nuts shall be tightened in increments of not more than 25% of the final torque value in an alternating pattern to avoid stress concentration on the grout surface. After tightening equipment anchor nuts to final values, apply additional wax, grease, or mastic to all exposed portions of the equipment anchor beneath the baseplate, soleplate, or mounting block.

4. After applying additional wax or mastic to exposed portions of equipment anchors, block outs (pockets) for access to leveling nuts, leveling blocks and shims, or wedges shall be filled with the grout material installed under baseplates, soleplates, or fabricated steel frames and pointed after the equipment anchor nuts have been tightened to final values. Jackscrews shall

be removed and holes in the baseplate, soleplate, or fabricated steel frames filled with a flexible sealant (silicone rubber) or a short cap screw.

5. Check for baseplate, soleplate, or fabricated steel frame movement (soft foot) by individually loosening and re-tightening each equipment anchor. Vertical movement at each equipment anchor shall be measured and recorded during loosening and retightening and shall not exceed 20 micrometers (0.001 inch). Vertical movement shall be measured using a magnetic-based dial indicator on the baseplate, soleplate, or fabricated steel frame referenced to the epoxy grout surface of the equipment pad or other approved method. Soft foot conditions shall be sufficient cause for removal and reinstallation of grout and baseplates, soleplates, or fabricated steel frames.

6. Check for grout voids by tapping along the upper surfaces of the baseplate, soleplate, or mounting block. Grout voids shall be sufficient cause for removal and reinstallation of grout and baseplates, soleplates, or fabricated steel frames. Grout voids shall be marked. At the discretion of the Resident Engineer, grout voids may be repaired as specified in Chapter 5, Section 3.16 of API RP 686.

3.03 FIELD TESTING / QUALITY CONTROL

A. Epoxy Grout Training:

1. Prior to commencing rigid equipment mount installation Work on equipment pads, the Contractor shall furnish the services of a grout manufacturer's technical representative to conduct training for the workers who will be using epoxy grout for rigid equipment mount installations. The training shall be not less than 4 hours in length and shall cover all aspects of using the products, including form construction for each equipment installation, surface preparation, mixing, application, void prevention/elimination, and clean up. This requirement, however, shall not be construed as relieving the Contractor of overall responsibility for this portion of the Work. The epoxy grout manufacturer shall furnish a list of attendees who have been satisfactorily trained to perform epoxy grout installation for equipment mounting.

B. Epoxy Grout Quality Control:

1. For equipment mounted with epoxy grout, the epoxy grout manufacturer's technical representative shall provide quality control services for epoxy grout installation in rigid equipment mounts. The epoxy grout manufacturer's technical representative shall be on Site to inspect and verify that the installation personnel have successfully performed surface preparation, epoxy grout application, and Quality Control Inspection in accordance with this Section for a representative portion of the epoxy grout installation Work.

2. Specifically, the epoxy grout manufacturer's technical representative shall perform the following services for at least 1 rigid equipment mount installation for each equipment type and size installed with epoxy grout:

   a. Inspect ambient conditions during various phases of epoxy grouting installation for conformance with the epoxy grout manufacturer's requirements.

   b. Inspect the surface preparation of concrete substrates onto which epoxy grout materials are to be applied, for conformance to the specified application criteria, including but not limited to substrate profile, degree of cleanliness, and moisture.

   c. Inspect the surface preparation of the metallic substrates onto which the epoxy primer is to be applied.

   d. Inspect the epoxy-primed metallic substrate for coverage and adhesion.

   e. Inspect preparation and application of epoxy grout form work for conformance to the Sections.

   f. Inspect and record that the "pot life" of epoxy grout materials is not exceeded during installation.

   g. Inspect epoxy grout for cure.

   h. Inspect and record that localized repairs made to grout voids conform to the Contract Documents.

   i. Conduct a final review of completed epoxy grout installation for conformance to this Section.

   j. Attest to conformance of the Contractor's Work by signing appropriate entries in the attached 43 05 13-A - Rigid Equipment Mount Installation Checklist.

3.04 STARTUP / DEMONSTRATION

A. The Resident Engineer will conduct a final inspection with the Contractor for conformance to requirements of this Section.

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used.

END OF SECTION

SCHEDULE 43 05 13-1
EQUIPMENT MOUNTING SCHEDULE

EQUIPMENT NUMBER	EQUIPMENT NAME	SECTION	TITLE	EQUIPMENT PAD DETAILS	MOUNTING PLATE LEVELING	EQUIPMENT ANCHOR TYPE	EQUIPMENT ANCHOR SLEEVE LENGTH	GROUT TYPE
TI1-08-005-001	Mechanical Screen	46 21 12	Mechanically Claned Bar Screen	Not Reuired	Not Required	See Contract Drawings	See Contract Drawings	Epoxy
TI1-08-024-001	24” Hydrogritter Classifier	46 23 63	Grit Classifying and Washing Equipment	See Contract Drawings	0.002	See Contract Drawings	See Contractor Drawings	Non-shrink
TI1-08-024-002	18” Hydrogritter Classifier	46 23 63	Grit Classifying and Washing Equipment	See Contract Drawings	0.002	See Contract Drawings	See Contractor Drawings	non-Shrink

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NO TEXT ON THIS PAGE

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SECTION 43 05 13-A. RIGID EQUIPMENT MOUNT INSTALLATION CHECKLIST
CONTRACT TI-181

Equipment Tag No.: _____ Date: _____
Grout Product Name and Type: _____
Grouting System Manufacturer: _____
Grouting Application Contractor: _____
General Contractor: _____

Step 1: Verify Equipment Anchor Installation Conformance to Equipment Pad Details		
Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Millwright		Date
Step 2: Completion of Cleaning and Concrete Substrate Preparation Prior to Grouting		
Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date
Step 3: Equipment Leveling		
Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Millwright		Date
Step 4: Installation of Protection of Adjacent Surfaces or Structures NOT TO BE GROUTED		
Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date
Step 5: Preparation and Construction of Forms and Epoxy Grout Filling Standpipes		
Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date
Step 6: Completion of Ambient Condition Control in Structure or Building Area and Acceptance of Ambient Conditions as They Apply to Application and Curing Requirements for the Grouting System		
Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date
Step 7: Epoxy Grout Installation		
Name: Contractor Rep.		Date
Name: Construction Manager		Date

Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date
Step 8: Completion of Full and Proper Cure of Epoxy Grout		
Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date
Step 9: Completion of Localized Repair of Grout Voids		
Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date
Step 10: Final Acceptance of Grouting System Installation Including Final Clean-Up of the Work Site Complying with All Specification Requirements and the GSM's Quality Requirements		
Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies mechanical multi-rake bar screens complete with motor, supports, main control panel with variable frequency drive (VFD), VFD bypass and reversible capability, local control station, and accessories suitable for removing screenings from combined sewer water.

B. The Contractor shall provide all labor, materials, and equipment necessary to furnish, paint, shop test, deliver, install, adjust, field test, and place in satisfactory operation the mechanically cleaned bar screens as specified herein.

C. The Contractor shall maintain the manual bar screen from 7am to 3pm, Monday to Friday, throughout the duration of this Contract.

D. The Contractor shall coordinate the Work of this Section, and with Sections 41 12 20 - Screenings Conveyor.

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

F.

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G. The following schedule, attached after the end of section designation, is a part of this Section:

1. Schedule 46 21 12-1, Mechanically Cleaned Bar Screens

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 63 – Sustainability Certification Project Requirements

B. Section 01 61 50 - General Product Requirements

C. Section 01 65 00 – Product Delivery Requirements

D. Section 01 66 00 – Protection of Materials and Equipment

E. Section 01 73 17 – Installation of Equipment

F. Section 01 75 10 – Preliminary and Final Field Testing

G. Section 01 78 10 – Project Closeout

H. Section 01 78 24 – Spare Parts and Maintenance Materials

I. Section 01 79 05 – Equipment Start – up and Training.

J. Section 03 21 00 - Reinforcing Steel

K. Section 05 05 23.02 - Miscellaneous Metal Fastenings

L. Section 26 05 91 – Low-Voltage Electric Motors

M. Section 26 29 23 – Variable-Frequency Motor Controllers

N. Section 40 05 97 – Identification for Process Equipment

O. Section 40 61 13 – PMCS General Requirements

P. Section 40 61 95 – PMCS Monitoring and Control Criteria

Q. Section 40 61 96 – PMCS Control Strategies

R. Section 40 63 43 – PMCS Programmable Logic Controllers

S. Section 40 67 16 – PMCS Panels and Enclosures

T. Section 40 78 90 – PMCS Panel and Mounted Instruments

U. Section 41 12 20 – Screenings Conveyor

1.04 REFERENCES

A. This Section contains references to documents listed below. They are a part of this Section, as specified and modified. In case of a conflict between the requirements

of this Section and those of the listed documents, the requirements of this Section shall prevail.

B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued or replaced.

C. AISC 14th Edition Manual of Steel Construction, Eighth Edition

D. ASTM A36 Structural Steel

E. ASTM 283 Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars

F. ASTM A320 Alloy-Steel Bolting Materials for Low-Temperature Service

G. ASTM A666 Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar for Structural Applications

H. ASTM B580 Anodic Oxide Coatings on Aluminum

I. AWS-B3.0 Welding Procedures and Performance Qualifications

J. AWS-D1.1 Structural Welding Code

K. NEMA ICS 2 Industrial Control Devices, Controllers, and Assemblies

L. NFPA 70 National Electrical Code (NEC)

M. NFPA 90 Electrical Standard for Industrial Machinery

N. ISO 9001 Quality Management Systems

1.05 DESCRIPTION

A. The screen system shall consist of mechanical multi-rake bar screens complete with motor, supports, screen control panels, local control stations, discharge and bypass chutes, lifting attachments and accessories suitable for removing screenings from combined sewage as a complete and integrated package to ensure proper coordination, compatibility and operation of the system.

B. Equipment furnished under this section shall be suitable for treating primary sludge and mixed flow. The flow may be expected to contain waste solids, rags, flushable wipes, , sand, silt, petroleum products, industrial solvents, animal fats, and oils. The combined sewage will have a temperature of 32 to 80 degrees Fahrenheit and will have a pH which may range from 6 to 10. The equipment will be located indoors and will be exposed to variable concentrations of hydrogen sulfide and other gases

associated with combined sewage. The system must be designed to withstand freezing temperatures during power outages without damage.

C. Multi-Rake screen will be located in the main screening channel and will remove screened material from the combined sewage. Screened materials will be discharged onto a belt conveyor (Section 41 12 20 - Screenings Conveyor), which discharges to a dumpster through a dumpster chute. In the event the belt conveyor is not operating, the screenings will discharge via conveyor bypass chutes furnished by the screen manufacturer.

1.06 QUALITY ASSURANCE

A. In accordance with the procedures and requirements set forth in the General Conditions of the Contract and Division 1, General Requirements, the following provisions shall pertain to Work under this Section:

1. Manufacturer's Qualifications:

a. The Contractor shall provide evidence to the Engineer that the manufacturer has a minimum of 5 years' experience, in the design, manufacture, and supervision of installation of equipment of the type required under this Section at locations within the United States.

b. The Contractor shall provide evidence to the Engineer that equipment which was designed and manufactured by the manufacturer, and which is similar to the equipment required under this Section, has been in continuous and successful operation in at least 10 separate facilities for the past 5 years at locations within the United States. The design flow rates, channel depths, and channel widths of the installed equipment shall not be less than 30% of the values listed in this Section.

2. Quality Assurance Inspections

a. Shop inspections may be made by City representatives. The Contractor shall give ample notice to the Engineer prior to the beginning of any Work so that inspection may be performed.

b. As a minimum, the Division of Design Services, Quality Assurance Section intends to conduct the following quality assurance inspection operations at the manufacturer's facility(ies):

1) Welding quality control.

2) Review and obtain copies of Certified Material Test Reports and test reports for susceptibility to intergranular corrosion. Certified Material Test Report's shall be provided for all stainless-steel material. Certified test reports for Susceptibility to Intergranular Corrosion, in accordance with ASTM A262 practice E (or as approved), may be furnished for all heat lots for the stainless-steel material in lieu of

performing intergranular corrosion tests as specified at the manufacturer's facility.

3) Perform visual and dimensional inspection of completed Work.

4) Witness required shop performance tests.

B. Unit Responsibility

1. The Contractor shall provide a complete screening system through a single, qualified manufacturer ("Unit Responsibility Manufacturer").

a. The Unit Responsibility Manufacturer shall coordinate selection, coordinate design, and shall provide all mechanical equipment assembly components such that all equipment components furnished under Section 26 05 91 – Low-Voltage Electric Motors, Section 40 61 13 – PMCS General Requirements and Section 40 61 96 – PMCS Control Strategies.

b. The Unit Responsibility Manufacturer shall be the manufacturer of the mechanically cleaned bar screens. Agents, representatives, or other entities that are not a direct division of the mechanically cleaned bar screens unit manufacturing corporation shall not be accepted as a substitute for the mechanically cleaned bar screens unit manufacturer in meeting this requirement.

c. The requirement for unit responsibility shall in no way relieve the Contractor of its responsibility to the City for performance of all systems as provided in the Contract Documents.

2. A completed, signed, and notarized Certificate of Unit Responsibility shall be provided.

1.07 SUBMITTALS

A. All submittals shall be in accordance with Section 01 33 00 – Submittal Procedures or as specified herein.

B. The Contractor shall submit the following:

1. Working Drawings (see additional information below)

2. Operation and Maintenance Manuals

a. Operation and Maintenance Manuals shall be in accordance with Section 01 78 25 – Operations and Maintenance Manuals.

3. Shop Testing Plan (including description of testing arrangement), Field Testing and Startup Plan, Training Lesson Plan

4. Lists of Spare Parts, Special Tools, and Supplies

5. Lists of Manufacturer's Service Facilities and Service Capabilities

6. Reports of Certified Witnessed Shop Tests

7. Reports of Field Tests and Start up
8. Reports of Manufacturer's Representative Site Visits

C. Working Drawings shall include, but not be limited to, the following:

1. A copy of this Section, with addendum updates included, and all referenced and applicable Sections, with addendum updates included, with each paragraph check-marked to indicate Section compliance or marked to indicate requested deviations from Section requirements or those parts which are to be provided by the Contractor or others. Check marks shall denote full compliance with a paragraph as a whole. If deviations from the Sections are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the Sections. Failure to include a copy of the marked-up Sections, along with justification(s) for any requested deviations to the Section requirements shall be cause for rejection of the entire submittal and no further submittal material will be reviewed.
2. A copy of the Contract Document control diagrams and process and instrumentation diagrams, electrical drawings with addenda updates, that apply to the equipment in this section marked to show specific changes necessary for the supplied equipment. If no changes are required, the working drawing shall be marked "No Changes Required."
3. Manufacturer's equipment Sections and data sheets, with identification of all materials used and methods of fabrication.
4. Parts list with materials of construction.
5. Complete assembly, layout, installation, and shop drawings, with clearly marked dimensions, submergence requirements for screens, anchorage and baseplate details, blade diameter, and details. Include detailed structural, mechanical, and electrical drawings showing equipment fabrications and interface/ connections with other items or Work. Anchoring plan will include information on plan to avoid cutting existing reinforcing steel in accordance with Section 03 21 00 - Reinforcing Steel, Paragraph 3.02 F.
6. Equipment cross-section drawings.
7. External utility requirements for air, water, power, drain, etc., for each component.
8. Manufacturer's delivery, storage, and handling requirements including a rigging plan for each of the screen sections.

9. Manufacturer's installation instructions and recommendations, including installation requirements requiring coordination with Contractor and/or other equipment suppliers.
10. Weights of equipment component parts, assembled weight of equipment, and total shipping weight. As applicable, include dynamic loads and weight when full and all loads transmitted to supporting structure.
11. Detailed summaries of structural, anchorage, and process design calculations. Structural calculation summary shall be signed by a Professional Engineer registered in the State of New York.
12. Certification of manufacturing facility, ISO 9001.
13. Certification of welders, steamfitters, and other workmen.
14. Painting and Coating details.
15. Equipment nameplate data.
16. Manufacturer experience and listing of successful operation in other facilities of equipment similar to that proposed for this Project, as specified herein and the General Conditions of the Contract and Division 1, General Requirements.
17. Testing plans for both factory and field testing
18. Testing and adjusting instructions.
19. Electrical load calculations, rated power, rated input power.
20. Functional description of internal and external instrumentation and controls including control strategies, list of parameters monitored, controlled, or alarmed, and complete I/O list for bar screen controls.
21. Control Panel layout (exterior and interior), outline details, electrical wiring diagrams and schematics.
22. Product data sheets with range and setting of indicators, instruments, timers, and other related devices.
23. Bearing life calculations per AFBMA standards.
24. Motor data as specified in Section 26 05 91 – Low-Voltage Electric Motors.
25. Submit location of the nearest permanent service headquarters of the screen and motor manufacturer for the screen and motor submitted.
26. Equipment warranty information.
27. Procedures for the cleaning, descaling, passivation, and detection of iron contamination in stainless steel in accordance with ASTM A380 and shall be submitted for approval prior to the beginning of Work.

D. Sustainability Submittals

1. 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 their Manufacturer 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 Manufacturer shop drawings for review by the Engineer that clearly illustrate the Manufacturer is meeting the requirements as approved in the Contractor's New Materials Sustainable Implementation Plan.

1.08 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall deliver, store, and handle the equipment and materials provided under this Section and as specified in Section 01 65 00 – Product Delivery Requirements, and Section 01 66 00 – Protection of Materials and Equipment.

B. Additional requirements for delivery, storage, and handling of equipment and materials provided under this Section are as follows:

1. Screens shall be designed to be assembled and disassembled in multiple sections to facilitate installation in existing conditions. A minimum of 3 sections shall be provided for each screen and will be designed with bolted connections. The screen sections shall be approximately equal in length.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall provide spare parts and special tools necessary to service, disassemble, repair and adjust the equipment furnished under this Section, as specified in Section 01 78 24 – Spare Parts and Maintenance Materials and Section 01 78 10 – Project Closeout.

B. At minimum, the following spare parts shall be provided:

1. Complete set of bearings (1 per screen)
2. Motor, complete with break assembly (2 per screen)
3. Motor brake pads (if applicable), (2 per screen)
4. Sufficient chain length for complete change out (1 per screen)
5. Complete set of upper and lower sprockets for both sides (1 per screen)
6. Replacement bars (20% of bars for one screen unit).
7. Rake plate, including rake teeth (5 per screen).
8. Wiper arm assembly and wear pad (2 per screen).
9. Set of all limit switches (2 per screen).
10. Set of each type of fuse used (2 per screen).
11. Each type of relay used (2 per screen).

12. Each type of pilot light bulb used (5 per screen).

C. Spare parts shall be tagged and stored in accordance with Section 01 78 24 – Spare Parts and Maintenance Materials and Section 40 05 97 – Identification for Process Equipment.

D. Provide special tools required for routine maintenance.

E. The Contractor shall furnish such oil, grease, and any special lubricants as are necessary for the proper operation of the equipment provided under this Section, as specified in Section 01 61 50 - General Product Requirements, and Section 01 78 10 – Project Closeout.

1. The oil, grease, and special lubricants furnished shall be sufficient for the required operation of the equipment prior to its final acceptance, and for the operation of the equipment during the maintenance and guaranty period specified in Article 24 of the Standard Construction Contract.

2. The oil, grease, and special lubricants furnished under this Section shall, wherever possible, be standardized and consolidated with those furnished other Sections, as specified in Section 01 78 10 – Project Closeout.

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. The manufacturer shall provide warranty for all mechanically cleaned bar screens starting from the date of substantial completion and continuing through (5) five years after the date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Equipment/Materials provided under this Section shall be as manufactured (including all standard equipment, unless otherwise specified) by:

1. Huber Technology, Denver, North Carolina

2. Headworks International, Houston, Texas

3. Or approved equal

B. The Contractor shall supply products modified as necessary by the manufacturer to provide the specified features and to meet the specified operating conditions. The bar screens and controls shall be provided by a single supplier who will take unit responsibility for the system.

2.02 MATERIALS / EQUIPMENT

A. Mechanically Cleaned Bar Screens shall be in accordance with Section 01 61 50 – General Product Requirements, except as modified herein.

B. Passivation of Stainless Steel

1. The processes specified in this section shall be performed in the Manufacturer's facility or in a shop specializing in post fabrication treatment of stainless steel.
2. Equipment components that bolt together shall be passivated. Passivation may be provided prior to assembly or passivated with disassembled components following initial test assembly to provide access to all surfaces of the equipment.
3. Equipment specified under this Section shall be cleaned and passivated in accordance with methods defined in ASTM A380 and shall include full submergence as specified in this ASTM standard.
4. After passivation, the equipment shall be washed to remove any remaining surface debris.
5. Any damaged areas incurred by welding, assembly or otherwise shall be re-passivated using the full submergence, spray or paste passivation.
6. Protection shall be provided applying shrink wrap to all parts and assembled components of the equipment sufficient to prevent exposure of passivated surfaces to contaminants during handling, shipping and installation.

C. Materials specified below are considered the minimum acceptable for the purposes of durability, strength, and resistance to erosion and corrosion. The Contractor may propose alternative materials for the purpose of providing greater strength or to meet required stress limitations. However, alternative materials must provide at least the same qualities as those specified for the purpose.

Component	Material
Bar rack	AISI, type 316L stainless steel
Deadplate	AISI, type 316L stainless steel
Discharge chute	AISI, type 316L stainless steel
Hinged bypass chute	AISI, type 316L stainless steel
Cleaning rake, rake arms, and wiper	AISI, type 316L stainless steel
Side frames	AISI, type 316L stainless steel
Fasteners and miscellaneous hardware	AISI, type 316L stainless steel
Dielectric isolation pads and grommets	Neoprene or EPDM
Connecting arms (rake arms excluded)	AISI, type 316L stainless steel
Sprockets	AISI, type 316L stainless steel
Chain	AISI, type 316L stainless steel
Chain rollers	Polyamide
Scraper	AISI, type 316L stainless steel
Wiper/Scraper Blade	Neoprene or UHMW polyethylene
Upper Bearings	Anti-friction, rolling element type, grease lubricated
Submerged Bearings	Self-lubricating material

Component	Material
Shafting	AISI, type 316L stainless steel
Covers	AISI, type 316L stainless steel
Anchor Bolts	AISI, type 316L stainless steel
Safety screening	AISI, type 316L stainless steel
Anti-Seize Thread Lubricant	Provide manufacturer's standard product

D. The only obstructions in the channels shall be the bar rack, frame, and rake mechanism. Except for the bottom bar rack and channel wall bracket anchoring bolts, all structural supports and fasteners shall be above the channel walls so they do not interfere with flow.

E. The system shall be designed such that no routine maintenance of any element below the operating floor is required.

F. All components, including the gear reducer, shall be designed to withstand, without damage or permanent distortion, the full stalling torque of the drive motor.

G. The bar rack shall be structurally capable of withstanding all forces involved in the operation in a sludge and mixed flow system. The framework of the bar rack shall have a minimum thickness of 0.157 inches (four mm) and be sufficiently braced and stiffened to form a rigid structure. Bars shall be affixed to the bar rack framework which is bolted to the frame of the screen using fasteners. Bars shall be individually field-replaceable or replaceable in manageable sections. Bars shall be constructed having teardrop or a trapezoidal shape and minimum leading edge thickness of 5/16 inch. The orientation of the bars shall minimize the potential for screening materials wedging between the bars. Bars shall be bolted to a dead plate that extends to the point of screenings discharge. The bar rack shall be accurately constructed to give clear openings of 0.375-inch between bars on the upstream side.

H. The dead plate shall be constructed of 3/16-inch minimum thickness. The dead plate shall extend from the screen field to the point of screenings discharge. Dead plate shall be true and flat such that a close clearance between the raking tines and the plate can be maintained during the cleaning cycle. The back side of the dead plate shall be constructed to guarantee a maximum gap between rake bar and dead plate, leading to the discharge chute without interruption.

I. Each discharge chute is fully enclose with access hatch and shall be constructed of 11 gauge minimum 316 SS sheet bolted to the frame. The discharge chutes shall be lined with ultrahigh molecular weight polyethylene with a minimum thickness of 10 mm without raised fasteners pursuant to the manufacturer's recommendations. Each chute shall be oriented to deposit screenings onto the belt conveyor and allow conveyor bypass chute to rest against it when the bypass chute is in use as shown in Contract Drawings.

J. Side frames shall be 3/16-inch thick minimum thickness, suitably reinforced to support all loads. Frames shall be securely fastened to the top of the concrete channels with stainless steel adhesive anchors designed by the screening system

manufacturer. Provide and install minimum 1/2 inch thick neoprene flaps to seal the screen to the channel walls. Neoprene flaps shall be bolted to the frame using fasteners on a minimum of 6 inch centers. Each frame section shall be provided with a total of 4 lifting lugs welded to the upper end of the frame sections.

K. Rakes shall approach the channel invert from upstream side of screen and rake upward at the upstream face with tines between the bars. The rake mechanism shall consist of multiple rakes affixed to the roller chain whose spacing meets the specified cleaning interval. Rake teeth shall be designed to easily engaged with the bar openings. Each rake shall be designed such that screenings will not wrap around the rake tines and will not fall back into the sewage flow during the screening cycle. Rake tines shall have a tooth profile machined from a single continuous bar of thickness and depth to ensure adequate stiffness and strength to cope with the required duty cycle. The rake tines shall penetrate the screen field sufficiently to ensure that screenings are completely removed during each cleaning cycle. The rakes shall operate in guides on each side of screen frame to ensure engagement and to clean the bars from the upstream side of the screen. The rake shall have a minimum capacity of 0.183 cubic feet per foot. Engagement of the rake tines into the bar spacings shall be by mechanical means. Engagement of the rake tines into the bar spacings by the dead weight of the rake or chain mechanism will not be acceptable. During each cleaning cycle, the rake tines shall engage the bottom of the screen field at the channel invert.

L. Screenings transported to the top of the screen shall be discharged positively by means of a scraper to the discharge chute. The scraper shall be designed to pivot to allow cleaning of each rake on each cleaning cycle and cushioned during travel to the rest position. The scraper blade shall be replaceable in the field.

M. Each mechanically cleaned screen shall be provided with a total of 4 chain sprockets. The 2 upper chain sprockets shall be installed on a drive shaft and be supported on each end by a grease lubricated bearing. Drive shaft shall be capable of withstanding 200% percent of normal input torque. Upper sprocket bearings shall be flange mounted to the side frame and have a minimum AFBMA B-10 life of 50,000 hours. The bearings shall be furnished with externally accessible grease fittings. A seal shall be provided around the shaft where each shaft passes through the screen frame. The 2 lower chain sprockets shall be mounted on stub shafts and be designed to operate in a submerged condition. The bearings for the lower submerged sprockets shall be self-lubricating fiber composite or polyethylene and be maintenance free. A coated ceramic collar shall be bonded onto the stub shaft to provide increased protection against wear. The lower sprockets shall operate in a recess of the frame and not be directly exposed to the incoming flow. Screen manufacturer shall coordinate the sprocket diameter, pitch, tooth width, and hub diameter to meet the performance requirements.

N. Each mechanically cleaned screen shall be provided with 2 continuous catenary loops, one on each side of the screen. Roller type chains shall be made of high tensile strength and resistance to corrosion. Chain pins shall be constructed of stainless steel and hardened to Rockwell 26 HRC with a minimum weight of 6

lbs./ft. The average ultimate strength of the chain shall be minimum 31,000 pound-force (137,500 Newtons). Each chain shall be provided with an L-profile, Type 316L stainless steel chain guide securely fixed to the side members of the screen frame for the full length of travel. Thickness of chain guide shall be 4 mm minimum. Location of chain guide shall minimize obstruction to flow.

O. Each motor shall be sized based on the requirements of the driven loads with consideration given to all drive train components. Comply with Section 26 05 91 – Low-Voltage Electric Motors. The motor shall be premium efficiency and be sufficient size so that there will be no overload on the motor above rated nameplate horsepower under any condition of operation. The motor shall be capable of starting under full operational loading conditions (i.e., all rakes have a full design load of screenings in place at start-up). Electrical service to each motor will be 460 volts, 3-phase, 60 Hz. Motors shall operate at 1,800 rpm maximum. Motors shall have all copper windings. Each motor shall be Chemical Industry, Severe-Duty (CISD) TEFC with severe duty features rated for Class I, Division 1, Group D. Additional motor requirements are specified in Section 26 05 91 - Low-Voltage Electric Motor. At minimum, motor accessories shall include space heater and thermal overload protection. Torque and heat dissipation shall be sufficient for continuous operation. The motor shall be close-coupled to a gear reducer. The gear reducer shall be Bauer, SEW Euro-drive or approved equal.

P. Front face and side of the screen shall have a cover from operating floor to top of screen. Covers will be hinged or clamp-down designed to be readily removable to provide for easy maintenance and adequate to protect operating personnel standing nearby. Any removable cover piece shall not weigh more than 40 pounds. Each removal cover shall have lifting handles designed for convenient removal. Screen manufacturer shall coordinate the cover locations with the walkway platform for screen access shown on the Contract Drawing. The coordination shall be provided so that any cover provide shall not interfere with the walkway support members. If required, segment(s) of cover may be eliminated along the walkway horizontal support frame. The cover system shall be structurally capable of withstanding the full impact and wedging action of large debris that may be carried up the screen face and clogging that may occur in the drive sprocket return area without damage.

Q. Gear box and the motor mating faces shall configuration readily available in the USA. Procuring European dimensioned equipment for the motor and gear box is not acceptable.

R. Equipment anchoring system shall be sized and designed by the equipment manufacturer and complete information on anchor bolts size lengths embedment depth, epoxy material and any associated hardware shall be provided in the submittal. Supply scope of the anchoring system items shall be coordinated by the Contractor with the screen manufacturer. Anchoring system shall be installed in accordance with the equipment manufacturer’s instructions. Adhesive anchors meeting the requirements of Section 05 05 23.02 - Miscellaneous Metal Fastening will be used for all anchoring to existing concrete. Anchoring must avoid existing

reinforcing steel in accordance with Section 03 21 00 - Reinforcing Steel paragraph 3.02 F.

2.03 FABRICATION / ASSEMBLING / FINISHES

A. The screen frame shall be supplied in flanged subassemblies such that the unit can be assembled and disassembled using the associated permanent bridge crane in the building. The flanged subassemblies shall be bolted together onsite during installation. Side frames shall be mounted above the channel walls to provide an unobstructed path for the rack cleaning mechanism.

B. Screens shall be provided in 3 or more sections of approximately equal length so that, if required, screen can be disassembled within the screening building for post installation removal. Bars shall be 1 continuous section.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Certified shop tests for instrumentation and controls shall be performed as specified in Section 40 61 95 – PMCS Monitoring and Control Criteria and Section 40 61 96 – PMCS Control Strategies.

B. The following witnessed factory testing shall be provided for each screen and performed by the manufacturer at the manufacturers testing facility:

1. Each bar screen shall be factory assembled and tested complete including motor, main control panel, and local control panel.

2. A no-load test run to confirm that no oil leaks, excessive lubricant temperature, excessive noise and excessive vibration occur, and confirm the control operations.

3. Testing shall include a simulation of a fixed bar screen obstruction requiring the initiation of an auto-reverse sequence in accordance with the control strategy to clear the obstruction.

4. Run equipment and test for minimum of 2 hours.

5. A visual inspection of the unit to confirm Project requirements.

6. Measurement of the no load motor current shall be performed.

7. Measurement of the output speed to verify gear ratio shall be performed.

8. Loading and Impact Tests:

a. Sand bags weighing 200 lbs shall be loaded on a stopped rake. The screen shall be started at low speed and the sand bags shall be transported from the lower portion (i.e. bottom sprocket elevation) of the screen to discharge elevation. This shall be completed for each screen 3 times in succession without alarm.

b. A fifty (50) lb rigid object (e.g. a log) shall be dropped onto the screen field from a three (3) ft height (with the screen in the horizontal position) and distortion of the screenfield shall be

measured. A successful test shall result in zero (0) measurable distortion of the bars.

C. The manufacturer shall provide a letter report certifying that the unit has passed the specified test and inspection requirements. The entire assembly shall be prepared for shipment in accordance with the manufacturer's recommendations.

2.05 OPERATING AND PERFORMANCE REQUIREMENTS

A. The screens shall be suitable for operation under the following conditions:

Condition	Value
Channel Width	4.50 ft. [a]
Channel Invert, elevation	28.50 ft. [b,c]
Operating Floor, elevation	31.00 ft. [b]
Discharge Height above Operating Floor	3.89 ft.
Minimum Downstream Operating Water Depth at 5 mgd	9.12 in
Maximum Downstream Operating Water Depth at 15 MGD	18.36 in.
Bar Spacing	0.375 in.
Bar Width	0.315 in.
Minimum screen field length	4.08 ft
Maximum Design Flow per Bar Screen	15 mgd
Allowable rake speed range, fpm	26-39
Maximum rake spacing, ft	7
Motor horsepower (minimum)	1.5
Screenings removal capacity, cf/hr	70
Maximum differential head across bar rack, 30% blinding and 15 mgd, inch	8
Screen Incline from Vertical	60 degrees [d]
[a]Contractor shall field verify exact channel dimensions prior to shop drawing submittal and adjust fabrication accordingly. [b]Elevations are provided in North American Vertical Datum of 1988 [c]Contractor shall field verify exact channel invert elevation. [d]Contractor shall coordinate exact incline with existing field conditions. [e]Includes a 20% safety factor.	

2.06 CONTROLS

A. Each Bar Screen shall include a Vendor Control Panel complete with VFD and a separate local control station (located at the screen) to control each bar screen as specified herein. The screening control system shall be furnished by the bar screen Manufacturer completely pre-wired and tested, requiring only mounting and connection to external wiring in the field.

B. Vendor Control Panel - Each Vendor Control Panel shall be provided in NEMA 4X ventilated and filtered enclosures. Filters shall be located on the front of the enclosure. Variable Frequency Drives, relays, timers, and other control devices

required for control and operation of the equipment shall be mounted in the panel. Provide a suitably sized control power transformer with primary and secondary overcurrent protection. The control system shall be configured where upon loss of power and return of power the system shall return to the ready state. Provide VFD bypass FVNR reversing motor starter with solid state overload. 480 VAC power equipment shall be separated, using a painted metal barrier, from the 120 VAC equipment. Each panel shall have nameplate engraved with specific panel names and numbers. Panel shall be built by a UL 508A shop and include a UL-508A label. Panel devices and panel construction, shall be in accordance with Division 26, Section 40 67 16 – PMCS Panels and Enclosures, Section 40 78 90 – PMCS Panel and Mounted Instruments, and Devices and shall meet current NEC and all local requirements. Firmware and software necessary to access and program the control logic shall be provided digitally along with a hard copy of the control logic.

C. The Vendor Control Panel shall include a fully rated reversing contactor to allow for reverse operation in Hand or Bypass.

D. Pre-screen level, post-screen level and level differential to be displayed on each Vendor Control Panel and SCADA.

E. As required by Section 40 61 95 – PMCS Monitoring and Control Criteria, Section 40 61 96 – PMCS Control Strategies, the following is a minimum:

1. The control system shall be a programmable logic controller with Ethernet TCP/IP communications to SCADA.
2. Coordinate with the Systems Integrator to integrate the monitoring and control features with the Plant Control System as specified.
3. Operator interface shall be a minimum six-inch color touch screen.
4. Pilot devices shall be NEMA rated to match the panel, 30 mm type.
5. Control relay contacts shall be rated at 10 A and include a energized coil indicator.
6. High voltage and control voltage shall be physically separated and secured within the control panel.

F. Vendor Control Panel front mounted devices shall be as shown on the Process and Instrumentation Drawings. As a minimum, include the following status contacts for the Vendor Control Panel (For details on the local control stations see paragraph 2.06I):

1. HOA selector switch
2. VFD/Bypass selector switch
3. Manual Speed Pot
4. Run Low speed light; High speed light, Rev Run Light,
5. Control Power On, White
6. Jam light, Amber

7. Overload Fault light, Amber
8. Alarm Reset push button
9. Overload reset push button
10. Flashing Alarm light
11. Emergency Stop
12. Display opening for differential level indicator

G. The VFD shall meet the requirements of Section 26 29 23 – Variable-Frequency Motor Controllers. VFD shall include discrete and analog input and outputs as specified herein and indicated on the Contract Drawings.

H. The bar screens shall be controlled by an PLC (Programmable Logic Controller) meeting the requirements of Section 40 63 43 - PMCS Programable Logic Controller. The PLC shall be used to control the VFD to operate the screen at two (2) speeds and through the automatic reversing/cleaning attempt sequence. The bar screen package system PLCs shall be capable of communication with the City's SCADA system via Ethernet. Each package PLC shall be compatible for connection to the SCADA system using CAT 6 cable with RJ-45 connector.

1. Network communication to SCADA shall be over Modbus TCP/IP protocol.
2. The PLC shall interface via Ethernet to the plant-wide control system and include the following:
    a. Coordinate with the systems integrator to provide a contiguous list of data points noted herein and shown on the Contract Drawings. Provide a contiguous list of data for monitoring and control from SCADA.

I. Local Control Station - Each screen shall have a Local Control Station rated for Class I, Division 1, Group C and D. The local control station shall include:

1. Remote/Local selector switch with spring return to Remote
2. Forward-Auto-Reverse 3 position selector switch with spring return to center Auto position.
3. Emergency Stop mushroom pushbutton as shown on the process and instrumentation Drawings (PID).

J. CONTROL STRATEGY DESCRIPTION: As shown on the P&IDs each screen can be controlled from:

1. Manufacturer provided Vendor Control Panel for each screen
2. Manufacturer provided local control station for each screen
3. The Operator can manually control each bar screen from the respective bar screen control panel or from respective local control station.

4. Manual Control from Local Control Station (LCS)

5. On LCS, Local/Remote switch is in Local (held in the position by hand), operator can run the screen in forward or reverse using Forward-Auto-Reverse switch. Reverse and Forward positions must be held in position by hand. The bar screen will operate either forward or reverse manually as long as both switches are held in respective position. Once the switches are released, Local/Remote switch will spring return to Remote and Forward-Auto-Reverse will spring return to center Auto position.

6. Emergency Stop push button shall stop screen operation and an alarm shall sound in the instrumentation and control room and screen area.

K. Manual Control from Vendor Control Panel

1. When the Hand/Off/Auto switch is placed into the HAND mode on the Vendor Control Panel, the bar screen shall start. The speed of the bar screen can be controlled using the Speed Control at the Vendor Control Panel potentiometer.

2. The operator can stop the screen by placing the HOA switch in the OFF position.

L. Automatic Control from Vendor Control Panel

1. When the Hand/Off/Auto switch is placed into AUTO position, and the Remote/Local switch for the bar screen is placed in REMOTE position at the local control station, the screen shall operate in AUTO mode. Screens must receive a permissive signal from the facility Main Control Panel indicating that the associated influent gate is open to run in Automatic.

2. In AUTO mode, the screen will operate based on the Differential Level across each bar screen. In automatic mode, each screen shall be controlled using 2 ultrasonic level sensors provided by the bar screen Manufacturer. Screens shall be started and stopped automatically and run at full speed. The Manufacturer will optimize the start and stop set points during start up. The screens will run until water level in the influent channel drops below an adjustable set point initially set at 6 inches and there is no differential between the influent and effluent side of the screen. In addition, the screens will operate if the back-up high level float switch indicates that there is high water in the influent channel.

M. Overload/Jam Condition

1. With the PLC operational: if an overcurrent is detected the screen shall automatically stop and run in reverse for a predetermined time. The screen shall then stop and return to forward. If the cause of the overload is cleared, the screen shall automatically resume normal operation. If an overload is again detected, the reversing cycle is repeated up to 4 times prior to initiating an alarm.

2. Operating with the VFD or bypass mode: Should the PLC be out of service: with the HOA in the hand position the screen shall operate in the forward and reverse direction in the VFD mode or Bypass Mode. The direction shall be controlled using the Forward/Reverse hand switch.

N. Indicating lights shall be provided at the Vendor Control Panel to indicate running and alarm status of the bar screen as shown on the PIDs. Legend plates and a door mounted Alarm Reset push button shall also be provided.

O. Electrical components located on the mechanical bar screen shall be suitable for a Class I, Division 1, Group D environment. Junction boxes, limit switches, and other electrical devices shall be provided with NEMA 7 enclosures. All conduits and cable required to power the motor shall be provided from the motor via a corrosion-resistant and explosion proof cable tracking system to a power conductor junction box by the screen Manufacturer. All conduits and cable required for ancillary switches and sensors, and other auxiliary devices located on the bar screen, shall be provided to a common control junction box containing a terminal strip. Junction boxes shall be located on the side of each screen at an elevation no more than four (4) ft above working floor. All conduits shall be galvanized rigid steel with PVC coating. The Contractor shall be responsible for all electrical conduits, wiring, and electrical appurtenances located on the screen, including a terminal junction box common interface for power and control circuits mounted on the screen.

2.07 SEQUENCE OF OPERATION/TWO SPEED OPERATION

Vendor Panel (Hand/Off/ Auto)	Local Control Stations (*Local/Remote*) & (Fwd/Off/Rev)	Result	Action when Differential Level Condition occurs	Comments
Auto	Remote & Any Position	Screen is called to run.	Screen performs cleaning attempt up to 4 times. If differential level does not return to target, screen stops and initiates alarm contact.	
Auto	Remote & Any Position	Screen starts when the rising water differential reaches set level	Screen performs cleaning attempt up to 4 times. If differential level does not return to target, screen stops and initiates alarm contact.	LSP - Low Speed Mode. Approx.

Vendor Panel (Hand/Off/ Auto)	Local Control Stations (*Local/Remote*) & (Fwd/Off/Rev)	Result	Action when Differential Level Condition occurs	Comments
Auto	Remote & Any Position	Exercise run	Screen performs cleaning attempt up to 4 times. If differential level does not return to target, screen stops and initiates alarm signal.	X min in LSP, every Y min. (X & Y are Operator adjustable) Permissive from MCP not required
Auto	Local & Forward	Screen operates forward.	Screen stops immediately. No cleaning attempt.	
Auto	Local & Reverse	Screen operates in reverse.	Screen stops immediately. No cleaning attempt.	
Auto	E-Stop Engaged	Screen stops immediately and alarms.	N/A	
Auto	Local & Off	Screen will not operate.	N/A	
Off	Any Position & Any Position	Screen will not operate.	N/A	

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. In general, workmanship and finish of all metalwork shall be of the highest grade and equal to the best practice of modern shops. Exposed surfaces shall have smooth finish and sharp, well defined lines. Materials of construction where not specified herein shall be suitable for the service encountered, and as reviewed by the Engineer.

1. All Work shall be in accordance with Section 01 43 05 – Contractor's Work Quality.

B. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the equipment is ready for continuous operation. The equipment shall be delivered onsite in 2 or more components. Each component will be as fully assembled as transportation will allow. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer. Finished surfaces of all exposed openings shall be protected by wooden blanks, strongly built and securely bolted thereto.

C. Finished iron or steel surfaces shall be painted per manufacturer's recommendation in a color chosen by the City. Each box or package shall be properly marked to show its net weight in addition to its contents. Care shall be taken to avoid supporting or lifting the screens in a manner that will place excessive stress on parts or shafts that are not designed to support the weight of the unit. The screens assembly shall be lifted by eyebolts provided in the frame. All appurtenances shall be handled and stored in accordance with the manufacturer's recommendations and as specified herein.

3.02 INSTALLATION

A. Installation of equipment and materials provided under this Section shall be in accordance with the manufacturer's recommendations, the approved working drawings, and the requirements specified in Section 01 73 17 – Installation of Equipment.

B. Installation shall be carried out by mechanics skilled in Work of this kind, under the general supervision of a factory-trained representative of the manufacturer. The equipment shall be checked, aligned, tested, and placed in operation by a factory-trained manufacturer's representative.

C. Equipment identification shall be in accordance Section 40 05 97 – Identification of Process Equipment.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field testing shall be performed in accordance with Section 01 75 10 – Preliminary and Final Field Tests.

B. After installation and prior to being placed in operation, each unit shall be inspected and checked by a qualified representative of the equipment manufacturer, as required. The following items will be verified:

1. Verification that all external system protective functions are functional and have been tested.

2. Verification that all internal protective functions are operational.

3. Verification that connections between the bar screen discharge chute and discharge dumpster allow discharge without spilling material onto the operating floor.

4. Review and verify that the specified control strategies, to ensure proper protection and operation of all components, systems, and interlocks.

5. Manufacturer's recommendations for prestart preparation and preoperational checkout procedures.

C. Make all adjustments to each unit as directed by the equipment manufacturer prior to placing the unit in operation. Each screen shall be checked by the manufacturer for lubrication, rotation, and the representative shall notify the Contractor and Engineer of anything in the installation which affects the manufacturer's guarantee. The manufacturer's representative shall provide certification that each screen is rotating in the right direction and is ready for testing.

D. Functional test shall be coordinated with the City. Provide certification of test results. Tests and certification shall be as specified in Section 01 75 10 - Preliminary and Final Testing and Section 01 79 05 - Equipment Start-up and Training.

1. A factory trained representative shall test the installed equipment at full load and full speed for a minimum of 4 hours. The test runs shall be undertaken with water in the channels filled up to the peak water elevations shown on the Contract Drawings. The test runs shall determine acceptable running noise, speed, and rotational direction.

2. Motor temperature shall be recorded at intervals of no greater than 15 minutes and shall not exceed the manufacturer's recommended maximum. Sound level shall be recorded and shall not exceed 75 dBA at a distance of 3 feet from the equipment.

3. Provide a written certification from the equipment manufacturer that the equipment has been properly installed according to the plans, sections and manufacturer's specifications, and that the equipment is operating normally.

E. In the event of improper installation, correction of the Work and subsequent test runs will be provided until the defects are corrected at no additional cost to the City. Manufacturer will provide certification that the improper installation has been corrected.

3.04 STARTUP / DEMONSTRATION

A. As a part of the commissioning services, the Contractor shall provide on-the-job training as specified herein and conforming to the requirements of Section 01 79 05 - Equipment Start-up and Training and Section 01 75 10 – Preliminary and Final Field Tests. Training shall be scheduled in combination with the first start up trip. Training shall include the following:

1. Screen theory

2. Equipment description

3. Operational and Controls information for the specific equipment provided under this section

4. Troubleshooting

5. Operation and Maintenance Manual orientation and layout
6. Routine maintenance
7. Equipment calibration

B. Disassembly and assembly

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not used.

3.06 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall provide the service of the manufacturer's representative to assist in the installation of equipment; check the installation before the equipment is placed into operation; assist in the start-up of the equipment; and train the plant operations and the maintenance staff in the care, operation, and maintenance of the equipment. The services provided shall be in accordance with the requirements of Section 01 61 50 - General Product Requirements, 01 73 17 – Installation of Equipment, 01 75 10 – Preliminary and Final Field Testing, and 01 79 05 – Equipment Start – up and Training.

B. The Contractor shall provide the services of the manufacturer's representative at such times and for such durations of time as are needed to perform the tasks required of the representative, as specified in the Sections listed in Article 3.06.A above. At a minimum, the services of the manufacturer's representative shall be provided as indicated herein below. The number of visits and person-days per visit indicated below shall be understood as referring to the minimum required services for the lot of equipment provided under this Section.

1. Installation: 2 visits of 2 person-days per visit.
2. Field Testing: 2 visits of 2 person-days per visit.
3. Start-up: 2 visits of two 2 person-days per visit.
4. Training: 1 visits of two 2 person-days per visit.

C. The Engineer reserves the right to require that any unused person-days from any visit be applied to any other specified visit.

D. Person-days shall be understood only as days spent onsite (not in transit).

E. The manufacturer's representative shall be a direct employee of the equipment manufacturer, with at least 3 years' experience in the installation, testing, training and start-up of equipment of the type provided under this Section. The manufacturer's sales and marketing personnel will not be accepted as manufacturer's representatives.

F. The manufacturer's representative shall sign in and out at the office of the Engineer each day they are at the Site.

G. Reports: The Contractor shall submit a report from the manufacturer for each visit to the Site of the manufacturer's representative. The report shall provide complete

information regarding the visit, including, but not limited to, dates, times, subject equipment, tasks performed, persons contacted, problems corrected, test results, training provided, and other pertinent information.

H. In addition to the above, the Contractor shall provide the services of person(s) authorized by the manufacturer to witness the unloading at the Site of the equipment provided under this Section, and to ascertain the condition of said equipment. Manufacturers' sales and marketing personnel may be accepted as authorized person(s) to perform these specific tasks. The Contractor shall submit to the Engineer a report, completed by the authorized person(s) and certified by the equipment manufacturer, documenting the findings of the authorized person(s).

END OF SECTION

SCHEDULE 46 21 12-1
MECHANICALLY CLEANED BAR SCREEN SCHEDULE

Tag Number	Name	Location	Type	Rating Point and Design Criteria					Local Control Panel Tag Number	Remote Control Panel Tag Number	Motor Details			
				Headloss (ft)	Working EL (ft)	Channel Invert (ft)	Channel Width (ft)	Bar Spacing (in)			Motor Tag Number	Horse power	RPM	Enclosure Type
TI1-08-005-001,	Grit Screen	Grit Building	Multi-Rake	0.65 @15MGD	31.00	28.50	4.50	0.375				1.5	1800	Explosion Proof

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SECTION 46 23 63 – GRIT CLASSIFYING AND WASHING EQUIPMENT
CONTRACT TI-181

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies cyclones for grit concentration and grit classifiers for washing and dewatering of grit slurries, complete with motors, instruments, accessories suitable for removing grit from screened primary sludge. The equipment shall be rated for a Class I, Division 1 (Group D) environment.

B. The Contractor shall provide all labor, materials, and equipment necessary to furnish, paint, shop test, deliver, install, adjust, field test, and place in satisfactory operation the grit classifying equipment as specified herein.

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

D.

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E. The following schedule, attached after the end of section designation, is a part of this Section:

1. Schedule 46 23 63-1, Grit Separation and Washing Equipment

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 63 – Sustainability Certification Project Requirements

C. Section 01 43 05 – Contractor's Work Quality

D. Section 01 43 15 – Witness Shop Testing

E. Section 01 61 50 - General Product Requirements

F. Section 01 65 00 – Product Delivery Requirements

G. Section 01 66 00 – Protection of Materials and Equipment

H. Section 01 73 17 – Installation of Equipment

I. Section 01 75 10 – Preliminary and Final Field Tests

J. Section 01 78 10 – Project Closeout

K. Section 01 78 24 – Spare Parts and Maintenance Materials

L. Section 01 78 25 – Operations and Maintenance Manuals

M. Section 01 79 05 – Equipment Start – up and Training

N. Section 09 91 00 – Painting

O. Section 26 05 91 – Low-Voltage Electric Motors

P. Section 40 05 97 – Identification for Process Equipment

Q. Section 40 61 95 – PMCS Monitoring and Control Criteria

R. Section 40 61 96 – PMCS Control Strategies

1.04 REFERENCES

A. This Section contains references to the following documents. They are a part of this Section, as specified and modified. In case of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing,

references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued or replaced.

C. ABMA 11 Load Ratings and Fatigue Life for Roller Bearings

D. AGMA 6010-E Spur, Helical, Herringbone and Bevel Enclosed Drives

E. AGMA 6023-A Design Manual for Enclosed Epicyclic Gear Drives.

1.05 DESCRIPTION

A. The 24-inch grit cyclone/classifier system consists of dual cyclones mounted on a single classifier, motor, instruments, and accessories suitable for removing grit from the primary sludge.

B. The 18-inch grit cyclone/classifier system consists of a single cyclone mounted on a single classifier, motor, instruments, and accessories suitable for removing grit from the primary sludge.

C. Equipment furnished under this section shall be suitable for receiving primary sludge. The primary sludge may be expected to contain, sand, silt, petroleum products, industrial solvents, detergents, plastics and organic solids, , animal fats, and oils. Primary sludge will have a temperature of 32 to 80 degrees Fahrenheit and will have a pH which may range from 6 to 10. The equipment will be located indoors and will be exposed to variable concentrations of hydrogen sulfide and other gases associated with primary sludge. The equipment will potentially be subject to freezing conditions during power failures and shall be designed to not be damaged from freezing whether full or empty of water.

D. Grit classifiers will separate and dewater grit from the primary sludge. Separated and dewatered grit will be discharged into individual dumpsters, which are manually removed.

1.06 QUALITY ASSURANCE

A. The following provisions shall pertain to Work under this Section:

1. Manufacturer’s Qualifications:

a. The Contractor shall provide evidence to the Engineer that the manufacturer has a minimum of 10 years’ experience, in the design, manufacture, and supervision of installation of equipment of the type and size required under this Section.

B. The Contractor shall provide evidence to the Engineer that equipment which was designed and manufactured by the manufacturer, and which is similar to the equipment required under this Section, has been in continuous and successful operation in at least 10 separate facilities for the past 10 years.

1.07 SUBMITTALS

A. All submittals shall be in accordance with Section 01 33 00 – Submittal Procedures or as specified herein.

B. The Contractor shall submit the following:

1. Working Drawings (see additional information below)
2. Operation and Maintenance Manuals
    a. Operation and Maintenance Manual shall be in accordance with Section 01 78 25 – Operations and Maintenance Manuals.
3. Shop Testing Plan, Field Testing Plan, Field Training Plan
4. Lists of Spare Parts, Special Tools, and Supplies
5. Reports of Certified Shop Tests
6. Reports of Field Tests and Start up
7. Reports of Manufacturer's Representative Site Visits

C. Working drawings shall include, but not be limited to, the following:

1. A copy of this Section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate Section compliance or marked to indicate requested deviations from Section requirements or those parts which are to be provided by the Contractor or others. Check marks shall denote full compliance with a paragraph as a whole. If deviations from the Sections are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the Sections. Failure to include a copy of the marked-up Section, along with justification(s) for any requested deviations to the Section requirements shall be cause for rejection of the entire submittal and no further submittal material will be reviewed.
2. A copy of the Contract Document control diagrams and process and instrumentation diagrams, electrical drawings with addenda updates, that apply to the equipment in this section marked to show specific changes necessary for the supplied equipment. If no changes are required, the working drawing shall be marked "No Changes Required."
3. Equipment specifications and data sheets, with identification of all materials used and methods of fabrication.
4. Parts list with materials of construction.
5. Complete assembly, layout, installation, and shop drawings, with clearly marked dimensions, anchorage and baseplate details, blade diameter and details, shaft diameter and speed. Include detailed structural, mechanical, and electrical drawings showing equipment fabrications and interface/connections with other items or Work.

6. Detailed installation drawings shall show size and location of all piping, and structural connections including any proposed modifications to the penetration locations and piping configurations to suit the installation based upon the selected manufacturer.
7. Equipment cross-section drawings.
8. External utility requirements for air, water, power, drain, etc., for each component.
9. Manufacturer's delivery, storage, and handling requirements.
10. Manufacturer's installation instructions and recommendations, including installation requirements requiring coordination with Contractor and/or other equipment suppliers.
11. Weights of equipment component parts, assembled weight of equipment, and total shipping weight. As applicable, include dynamic loads and weight when full and all loads transmitted to supporting structure.
12. Structural and/or process design calculation. Structural calculations shall be signed by a Professional Engineer registered in the State of New York. As applicable, include dynamic loads and weight when full and all loads transmitted to supporting structure.
13. Certification of manufacturing facility.
14. Certification of welders, steamfitters, and other workmen.
15. Painting and Coating details (as applicable).
16. Equipment nameplate data.
17. Manufacturer experience and listing of successful operation in other facilities of equipment similar to that proposed for this Project, as specified herein and the General Conditions of the Contract and Division 1, General Requirements.
18. Testing and adjusting instructions.
19. Bearing life calculations per AFBMA standards.
20. Motor data as specified in Section 26 05 91 – Low-Voltage Electric Motors.
21. Submit location of the nearest permanent service headquarters of the classifier and motor manufacturer for the classier and motor submitted.
22. Equipment warranty information.

D. Sustainability Submittals

1. 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 their 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. The Contractor shall deliver, store, and handle the equipment and materials provided under this Section as specified in Section 01 65 00 – Product Delivery Requirements and Section 01 66 00 – Protection of Materials and Equipment.

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. The Contractor shall provide all manufacturer recommended spare parts and special tools necessary to service, disassemble, repair and adjust the equipment furnished under this Section, as specified in Section 01 78 24 – Spare Parts and Maintenance Materials and Section 01 78 10 – Project Closeout.

B. The following spare parts shall be provided at a minimum:

1. Cyclones
    a. 3 sets of all liners
    b. 3 sets vortex finder gasket
    c. 3 sets retainer rings or retainer plates (as applicable)
2. Classifiers
    a. 1 lower bearing assembly per classifier
    b. 1 lower bearing tool (if required)
    c. 1 lock bushing (if required by manufacturer) per classifier
    d. 1 set of wearing shoes with bolts and nuts per classifier

C. The Contractor shall provide such special tools and appliances as may be needed to adjust, operate, maintain, or repair the equipment furnished under this Section, as specified in Section 01 61 50 - General Product Requirements, and in Section 01 78 10 – Project Closeout.

D. The Contractor shall furnish such oil, grease, and any special lubricants as are necessary for the proper operation of the equipment provided under this Section, as specified in Section 01 61 50 - General Product Requirements, in Section 01 78 24 – Spare Parts and Maintenance Materials and Section 01 78 10 – Project Closeout.

1. The oil, grease, and special lubricants furnished shall be sufficient for the required operation of the equipment prior to its final acceptance, and for the operation of the equipment during the maintenance and guaranty period specified in Article 24 of the Standard Construction Contract.

2. The oil, grease, and special lubricants furnished under this Section shall, wherever possible, be standardized and consolidated with those furnished other Sections, as specified in Section 01 78 10 – Project Closeout.

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. All equipment provided under this Section shall be covered by a two (2) year manufacturer's warranty starting on the date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Equipment/Materials provided under this Section shall be as manufactured (including all standard equipment, unless otherwise specified) by:

1. WEMCO (as manufactured by Trillium Pumps USA, Inc., Fresno, CA)
2. Jim Myers & Sons (JMS), Charlotte, NC
3. Or approved equal

B. The Contractor shall supply products modified as necessary by the manufacturer to provide the specified features and to meet the specified operating conditions. The cyclone, classifier and controls shall be provided by a single supplier who will take unit responsibility for the system.

2.02 MATERIALS / EQUIPMENT

A. Grit Classifying and Washing Equipment shall be in accordance with Section 01 61 50 – General Product Requirements, except as modified herein.

B. Materials specified are considered the minimum acceptable for the purposes of durability, strength, and resistance to erosion and corrosion. The Contractor may propose alternative materials for the purpose of providing greater strength or to meet required stress limitations. However, alternative materials must provide at least the same qualities as those specified for the purpose.

C. Cyclone materials shall be as follows:

Component	Material
Cone housing	Steel
Cone lining	Natural gum rubber
Inlet head housing	Cast Iron
Vortex finder	Ni-hard or hardened high chrome iron, ASTM A532, with minimum Brinell hardness of 500
Apex housing	Aluminum
Cylinder housing	Steel, ASTM A131, 1015
Cylinder lining	Natural gum rubber
Retainer ring	Steel, ASTM A131, 1015 to 1020
Cyclone Support	Type 316L SS

D. Classifier materials shall be as follows:

Component	Material
Tank assembly	¼-inch min thickness – Type 316L SS
Cover	16 gage- Type 316L SS
Lower bearing assembly	Cast iron or Steel (Coal Tar Epoxy Coated)
Motor support, (if applicable)	Type 316L SS
Spiral screw assembly	Type 316L SS
Lifting device	Type 316L SS
Tank support	Type 316L SS
Sluice water assembly	Type 316 SS
Wearing shoes	Ni-hard or similar metal with a minimum Brinell hardness of 500
Discharge Chute	Type 316 SS
Anchor bolts	Type 316 SS

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Each cyclone shall have a long sweep involuted feed inlet designed to minimize turbulence within the cyclone and minimize wear along the feed inlet. Concentric feed inlets will not be accepted.

B. Inlet and overflow shall be provided with fittings suitable for use with flanged couplings. The inlet shall be provided with a 0 to 30-psig pressure gage, calibrated in 0.20-psig increments, complete with a sealed diaphragm. Gauge shall be mounted to be readily viewable from the operating floor.

C. The vortex finder shall be a minimum Brinell hardness of 500 and shall be easily replaceable.

D. A hinged quick disconnect shall be provided between the apex assembly and lower cone section to allow removal of material which may clog the apex, without disconnecting any piping on the cyclone itself.

E. All interior surfaces in contact with high velocity water and/or grit shall be fully lined with natural rubber. The liners shall be easily replaceable.

F. The classifier settling tank shall be of not less than 1/4-inch Type 316L stainless steel plate. The tank shall be flared to develop the surface area required to meet the design criteria in this Section. It shall be suitably reinforced and mounted on stainless steel legs. The full water depth in the settling compartment shall be at least 1.5 times the diameter of the screw. The weir overflow shall be readily adjustable with a removable weir bars and discharge into a launder box fitted with a drainage connection

G. Each classifier tank shall be supplied complete with two fabricated feed box(es) to facilitate the introduction of underflow from the cyclone into the classifier.

1. The feed box shall be reinforced minimum 12 gauge 316 stainless steel plate, and shall be fitted with a wear protector, coated with ¼-inch thick

neoprene to protect against abrasion, and to function as a splashguard. The wear protector and splashguard shall be internal to the feedbox such that no splashing will be allowed outside the feedbox.

2. The feed boxes shall have hinged covers, to provide for inspection of the cyclone apexes without disturbing the cyclone piping or alignment. The hinged covers shall be provided with two snap buckles, one on each side, for quick release.

3. The feed boxes shall be designed and located by the manufacturer to minimize short-circuiting to the overflow weir of the classifier, and to handle maximum cyclone underflow discharge.

H. The classifier tank shall be provided with a welded bar, running from the top of the tank to below the water level to provide a sluice channel, to prevent the buildup of grit opposite the raked material, to aid in drainage. The manufacturer shall supply and install a valve cock with a ½-inch NPT nipple for the spiral sluice water. A 115-volt, single phase solenoid valve, which is compatible with the motor enclosure, shall also be supplied and installed by the manufacturer for the sluice water line and connected by the electrical contractor to open when the motor is activated.

I. The grit shall be removed from the bottom of the settling compartment and discharged by means of a 50% pitch screw-type conveyor. The screw shall be made from preformed heavy 316L stainless steel flight sections with a minimum thickness of 3/8 inches, welded to the shaft, and fitted with wearing shoes. The wearing shoes shall be replaceable and shall be mounted on the flights by means of countersunk stainless steel bolts and nuts. The wearing shoes shall be 3/4 inches minimum thickness. There shall be sufficient clearance between the screw and the tank so that a buildup of grit or sand will provide a bed for the screw, eliminating tank wear.

J. The pipe shaft of the screw shall be Schedule 80, 316 stainless steel pipe and designed with a maximum stress of 3000 psi, and a fatigue life, at 98% reliability, of 20 years minimum. Design calculations shall be submitted and sealed by a Professional Engineer licensed in the state of New York.

K. The lower end of the screw shall be supported by a bearing. The upper end of the screw shall be rigidly connected to and supported by the drive unit. An alternative design including externally mounted lower seal/bearing is acceptable. Designs which utilize an externally mounted lower bearing must be provided with a lubrication reservoir.

L. The lower bearing shall be lubricated within a cast iron housing. The bearing shall be designed to accept thrust loads due to operation of the classifier. The housing shall be provided with stainless steel cap screws and fill and drain plugs. The bearing shall be provided with a permanent seal to prevent leakage of lubricant and infiltration of grit and other foreign particles into the housing. The seal shall be of the self-compensating type consisting of 2 mating hardened steel alloy rings, each held in place by a rubber toric. The wearing surfaces of the rings shall be precision

lapped to form an initial sealing band of approximately 1/32-inch in width. The seal assembly shall be designed so that as seal rings wear through operation, the pressure from the rubber torics shall push the rings further against each other to form a broadened contact band. The only maintenance required for the bearing shall be annual inspection and change of the lubricating oil.

M. The upper end of the screw shall be connected to a cycloidal motion speed reducer by a flanged, rigid coupling. The cycloidal speed reducer shall be designed so that all torque is transmitted by rollers and shall be capable of withstanding shock loads of 500% of the rated loading. The cycloidal motion drive shall take radial and all thrust loads from the shaft and at maximum load provide a minimum L-10 bearing life of 50,000 hours. The drive unit shall be designed in accordance with AGMA 6023-A and 6010-E for the specified motor size using a service factor of 1.25 based upon the motor's nameplate rating. Supports and bearings shall comply with applicable AGMA standards.

N. The classifier drive unit shall be a maximum eighteen- 1,800rpm TEFC Class 1 Div 1 Group D constant speed motor driving the cycloidal motion speed reducer, by means of a belt drive or directly coupled. The motor and its accessories shall comply with the requirements of Section 26 05 91 – Low-Voltage Electric Motors.

O. Provide all necessary electrical components and wiring for a complete, functional system. Electrical components and wiring shall be provided and installed in accordance with the National Electric Code (NEC) and additional requirements by the State of New York.

P. Contractor shall provide 316 stainless steel anchor bolts (and related hardware, including, but not limited to, nuts and washers) in accordance with the size, number, type, and embedment depth required by the manufacturer.

Q. Ancillary Components:

1. Grit discharge chute – Provide grit chute in the orientation and dimensions shown in the Contract Drawings. Design chute in a manner so that adjustment can be made in the field for desired alignment as required for final installation. The responsibility of designing and supplying the grit discharge chutes shall be coordinated between the Contractor and the grit cyclone/classifier manufacturer.

2. Solenoid Valve (For Service Water Supply to Grit Classifier) – Provide minimum of (½-inch diameter stainless steel solenoid valve body and stainless steel or non-metallic sealed actuator/coil body that is rated suitable for the environment detailed in Schedule 46 23 63-1 at the end of this Section.

R. Support frame – All support frames for classifier and cyclone shall be factory designed so that the entire assembly of classifier/cyclone shall achieve intended angle and shall be kept to the minimum required overall height for ease of access to classifier/cyclone components.

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Witness shop tests shall be performed for each grit cyclone and classifier unit in accordance with Section 01 43 15 – Witness Shop Testing or as specified herein.

1. Witness shop tests for motors shall be performed as specified in Section 26 05 91 – Low-Voltage Electric Motors.

2. Certified shop tests for instrumentation and controls shall be performed as specified in Section 40 61 95 – PMCS Monitoring and Control Criteria and Section 40 61 96 – PMCS Control Strategies.

B. A visual inspection of the unit to confirm Project requirements.

C. A no load test run on each unit to confirm that no oil or water leaks, excessive lubricant temperature, excessive noise, and excessive vibration occur. Any causes for leaks, excessive sound, vibration, or lubricant temperature shall be corrected before shipment.

1. Measurement of the no load amp draw of the motor shall be performed.

2. Measurement of the output rpm of the screw to verify speed reduction shall be performed.

D. Factory testing shall be performed on 1complete unit using a simulated test loop consisting of a mixture of water and sand pumped to the cyclones to simulate operating conditions.

1. A known volume and weight of water shall be added to the test loop such that the resultant pumped product has a content of approximately 1% solids by weight entering the cyclones.

E. Flow shall be directed to flow through the cyclones and test samples shall be taken at the cyclone inlet and at the classifier weir after allowing the system to run for 5 minutes to stabilize the sand concentrations.

F. Samples shall be sent to a third party laboratory to be analyzed. Analysis shall include on weight, volume, and screening sieves to demonstrate compliance with the requirements of Part 2.05.B.

G. The Contractor shall provide a brief letter report certifying that the unit has passed the specified test and inspection requirements. The entire assembly shall be prepared for shipment in accordance with the manufacturer's recommendations. Certified testing materials shall be provided as specified in Section 01 43 15 – Witness Shop Testing.

2.05 OPERATING REQUIREMENTS

A. The cyclones and classifiers shall be suitable for continuous or intermittent operation, under the following conditions.

B. The cyclones shall capture a minimum of 95% of all grit particles in the primary sludge having a diameter equal to or greater than that retained on a 150-mesh U.S.

standard sieve and specific gravity of 2.65 or greater. They shall be suitable for the following operating conditions and conform to the following design requirements:

Condition	Value
Rated inlet flow rate, per cyclone, gpm	960
Rated underflow rate, per cyclone, gpm	50
Minimum inlet flow rate, per cyclone, gpm	700
Maximum inlet flow rate, per cyclone, gpm	1000
Inlet pressure, psig	5-20
Inlet port size, inches	8-inch
Overflow port size, inches	10-inch
Tank overflow size, inches	4-inch

C. Each classifier shall dewater grit by conveying the material up an incline sloped at 3-1/2-inches per foot, maximum, to a discharge nozzle located not less than 12-inches above the maximum liquid level in the unit. Dewatering action shall be accomplished by drainage through the mass of material conveyed by a helical conveyor to the discharge nozzle. The classifiers supplied under this Section shall conform to the following:

Condition	Value
Minimum screw diameter, inches	18 and 24
Application rate, maximum per cyclone gpm (Cyclone Underflow)	6**0**
Minimum Pool Area, sf	24” Unit = 36 Sq.ft. 18” Unit = 19.9 Sq.ft.
Minimum Weir Length, ft	24” Unit = 4.4 ft. 18” Unit = 3.2 ft.
Service water pressure range available, psi	
Motor Horsepower (min)	24” Unit = 2 HP 18” Unit = 1 HP
Phase/Hertz/Volts	3/60/460
Motor Speed	1750 RPM

2.06 CONTROLS

A. Torque limit and zero (0) speed switches shall be provided by the equipment vendor as part of the equipment operation and protection features.

B. Each Grit Classifier shall be automatically started and stopped in conjunction with the corresponding Pump. Grit classifier shall start when pump back pump starts and shall stop after a predetermined length of time after the pump back pump stops. The

associated solenoid valve (when in Auto mode) on the service water line for each Grit Classifier shall open when the classifier starts and shall close after a time delay when the classifier stops. A manually operated globe valve shall be provided by the manufacturer upstream of the solenoid valve and shall be used to manually adjust the amount of the flush water flow. Valve shall meet the requirements of Section 40 05 56 - Process Valves, Smaller than Four-Inch Diameter.

C. As required by Section 40 61 95 – PMCS Monitoring and Control Criteria and Section 40 61 96 – PMCS Control Strategies, the following is a minimum:

1. The control system shall include a hardwired a NEMA 7 Local Control Station for each classifier containing

a. Hand –Off-Auto Selector Switch

b. Mushroom type Emergency Stop Pushbutton

c. RUN light, Green

2. Coordinate with the Systems Integrator to integrate the monitoring and control features with the Plant Control System as specified.

3. Scope of supply for the controls shall be coordinated between the Contractor and grit cyclone/classifier manufacturer.

D. Pilot devices shall be 30 mm type.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. In general, workmanship and finish of metalwork shall be of the highest grade and equal to the best practice of modern shops. Exposed surfaces shall have smooth finish and sharp, well-defined lines. Materials of construction where not specified herein shall be suitable for the service encountered, and as reviewed by the Engineer.

1. All Work shall be in accordance with Section 01 43 05 – Contractor's Work Quality.

B. The equipment shall be delivered onsite as fully assembled as transportation will allow. Each box or package shall be properly marked to show its net weight in addition to its contents. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer. Finished surfaces of all exposed openings shall be protected by wooden blanks, strongly built, and securely bolted thereto.

C. Finished iron or steel surfaces shall be painted per manufacturer's recommendation. Finished paint material shall comply with Section 09 91 00 – Painting.

3.02 INSTALLATION

A. Installation of equipment and materials provided under this Section shall be in accordance with the manufacturer's recommendations, the approved working

drawings, and the requirements specified in Section 01 73 17 – Installation of Equipment.

B. Installation shall be carried out by mechanics skilled in Work of this kind, under the general supervision of a factory-trained representative of the manufacturer. The equipment shall be checked, aligned, tested, and placed in operation by a factory-trained manufacturer's representative.

C. Equipment Identification shall be in accordance with Section 40 05 97 – Identification of Process Equipment.

3.03 FIELD TESTING / QUALITY CONTROL

A. Field testing shall be performed in accordance with Section 01 75 10 – Preliminary and Final Field Tests.

B. After installation and prior to being placed in operation, each unit shall be inspected and checked by a qualified representative of the equipment manufacturer, as required.

C. Make all adjustments to each unit as directed by the equipment manufacturer prior to placing the unit in operation. Each classifier shall be checked by the manufacturer for lubrication, alignment, rotation, and the representative shall notify the Contractor and Engineer of anything in the installation which affects the manufacturer’s guarantee. The manufacturer’s representative shall provide certification that equipment is rotating in the right direction and is ready for testing.

D. A factory trained representative shall test the installed equipment. The test runs shall determine acceptable running noise, speed, and rotational direction. Sound level shall be recorded and shall not exceed 75 dBA at a distance of 3 feet from the equipment. Provide a written certification from the equipment manufacturer that the equipment has been properly installed according to the plans, Sections, and manufacturer’s specifications, and that the equipment is operating normally. In the event of improper installation, correction of the Work and subsequent test runs will be provided until the defects are corrected. Manufacturer will provide certification that the improper installation has been corrected.

1. Ensure the manufacturer changes out the vortex finder and apex during startup to adjust operating pressure and allow proper operation within the required limits, if needed.

3.04 STARTUP / DEMONSTRATION

A. As a part of the commissioning services, the Contractor shall provide on-the-job training as specified herein and conforming to the requirements of Section 01 79 05 - Equipment Start-up and Training, and Section 01 75 10 – Preliminary and Final Field Tests. Training shall be scheduled in combination with the first start up trip. Training shall include the following:

1. General operational information for the specific equipment provided under this section

2. Troubleshooting
3. Operation and Maintenance Manual orientation and layout
4. Routine maintenance

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not used.

3.06 MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall provide the service of the manufacturer's representative to: assist in the installation of equipment; check the installation before the equipment is placed into operation; assist in the start-up of the equipment; and train the plant operations and the maintenance staff in the care, operation, and maintenance of the equipment. The services provided shall be in accordance with the requirements of Section 01 79 05 – Equipment Start – up and Training.

B. The Contractor shall provide the services of the manufacturer's representative at such times and for such durations of time as are needed to perform the tasks required of the representative, as specified herein. At a minimum, the services of the manufacturer's representative shall be provided as indicated herein below. The number of visits and person-days per visit indicated below shall be understood as referring to the total required services for the lot of equipment provided under this Section.

Purpose:	No. of Visits:	Person-days per visit:
Installation	2	2
Field Testing	2	2
Start-up	2	2
Training	2	2

C. The Engineer reserves the right to require that any unused person-days from any visit be applied to any other specified visit.

D. Person-days shall be understood only as days spent onsite (not in transit).

E. Unless otherwise authorized by the Engineer, the manufacturer's representative shall be a direct employee of the equipment manufacturer, with at least 5 years' experience in the installation, testing, training and start-up of equipment of the type provided under this Section. The manufacturer's sales and marketing personnel will not be accepted as manufacturer's representatives.

F. The manufacturer's representative shall sign in and out at the office of the Engineer each day they are at the Site.

G. Reports: The Contractor shall submit a report from the manufacturer for each visit to the Site of the manufacturer's representative. The report shall provide complete

information regarding the visit, including, but not limited to, dates, times, subject equipment, tasks performed, persons contacted, problems corrected, test results, training provided, and other pertinent information.

H. In addition to the above, the Contractor shall provide the services of person(s) authorized by the manufacturer to witness the unloading at the Site of the equipment provided under this Section, and to ascertain the condition of said equipment. Manufacturers' sales and marketing personnel may be accepted as authorized person(s) to perform these specific tasks. The Contractor shall submit to the Engineer a report, completed by the authorized person(s), and certified by the equipment manufacturer, documenting the findings of the authorized person(s).

END OF SECTION

SCHEDULE 46 23 63-1
GRIT CLASSIFYING AND WASHING EQUIPMENT SCHEDULE

Grit Classifying and Washing Equipment Tag Number	Name	Location	Quantity	Type	Rating Point			Drive Type	Motor Details			
					Capacity (gpm)	Pressure Inlet (psi)	Removal (mesh)		Tag Number	Horse-power	RPM	Enclosure Type
TI1-08-024-01	24”-Hydrogritter Classifier	Grit Building	1	Grit Classifier w/Hydrocyclones	950	5-15	NA	NA	NA	3	1800	Explosion Proof suitaable for Class I Division 2Explosion Hazard Environ-ment
TI1-08-024-002	18”-Hydrogritter Classifier	Grit Building	1	Grit Classifier w/Hydrocyclone	950	5-15	NA	NA	NA	2	1800	Explosion Proof suitaable for Class I Division 2 Explosion Hazard Environ-ment

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THE CITY OF NEW YORK

DEPARTMENT OF
ENVIRONMENTAL PROTECTION

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

TI-181
Multi-Rake Screen and Degritting System Installation

Volume 2 of 2
Contract Terms and Specifications

August 2026